

CHƯƠNG TRÌNH ĐÀO TẠO KHÓA 2025 - NGÀNH KỸ THUẬT HÓA HỌC
TRÌNH ĐỘ ĐẠI HỌC

*Kèm theo Quyết định số /QĐ-ĐHQT ngày 04 tháng 9 năm 2025
của Hiệu trưởng Trường Đại học Quốc tế)*

1. Thông tin chung

- Tên ngành đào tạo:
- + Tiếng Việt: Kỹ thuật Hóa học
- + Tiếng Anh: Chemical Engineering
- Mã ngành đào tạo: 7520301
- Trình độ đào tạo: Đại học
- Loại hình đào tạo: Chính quy
- Thời gian đào tạo: 4.5 - 5 năm
- Tên văn bằng sau khi tốt nghiệp:
- + Tiếng Việt: Kỹ sư Kỹ thuật Hóa học
- + Tiếng Anh: Engineer in Chemical Engineering
- Nơi đào tạo: Trường Đại học Quốc tế - ĐHQG-HCM

2. Thông tin tuyển sinh và kế hoạch đào tạo

a. Đối tượng tuyển sinh

Đối tượng tuyển sinh căn cứ theo quy chế tuyển sinh đại học của Bộ Giáo dục và Đào tạo và Thông tin tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Thông tin tuyển sinh của trường Đại học Quốc tế.

b. Hình thức tuyển sinh

Trường Đại học Quốc tế thực hiện tuyển sinh theo Quy chế tuyển sinh Đại học ban hành hàng năm bởi Bộ Giáo dục và Đào tạo, căn cứ theo Thông tin tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Thông tin tuyển sinh của trường Đại học Quốc tế.

c. Nhóm ngành tuyển sinh: Nhóm Khoa học sự sống và Hóa học (IU04)

d. Tổ hợp môn xét tuyển

STT	Tổ hợp
1	Toán – Lý – Hóa
2	Toán – Hóa – Sinh
3	Toán – Hóa – Anh
4	Toán – Sinh – Anh
5	Văn – Hóa – Sinh

STT	Tổ hợp
6	Văn – Hóa – Anh
7	Văn – Sinh – Anh

e. Dự kiến chỉ tiêu tuyển sinh, quy mô đào tạo

Năm	2025	2026	2027	2028	Từ 2029 trở đi
Tuyển sinh mới	60	60	60	60	60
Quy mô đào tạo	60	120	180	240	300

3. Mục tiêu đào tạo

a. Mục tiêu chung

Đào tạo kỹ sư hóa học với triết lý ‘Job ready’, cụ thể như sau:

1. Có kiến thức cơ bản vững chắc về khoa học và kỹ thuật trong lĩnh vực hóa học và những lĩnh vực có liên quan (như sinh học, dược học, môi trường, v.v..).
2. Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề đa dạng trong các lĩnh vực nghề nghiệp.
3. Có đạo đức nghề nghiệp, hiểu rõ các vấn đề về môi trường, xã hội, an ninh và kinh tế.
4. Có đầy đủ các kỹ năng mềm, kỹ năng quản lý, khả năng làm việc nhóm, khả năng lãnh đạo, khả năng giao tiếp và làm việc chuyên môn thành thạo bằng tiếng Anh.
5. Có nhận thức về tầm quan trọng của việc trau dồi bản thân và không ngừng học tập suốt đời.

Sự phù hợp của mục tiêu đào tạo với tầm nhìn, sứ mạng và mục tiêu giáo dục của Luật giáo dục đại học được thể hiện qua Bảng 1.

Bảng 1. Sự phù hợp của mục tiêu đào tạo với Tầm nhìn, sứ mạng và Mục tiêu giáo dục của Luật giáo dục đại học.

Mục tiêu đào tạo của CTĐT	Tầm nhìn	Sứ mạng	Luật giáo dục*
Có kiến thức cơ bản vững chắc về khoa học và kỹ thuật trong lĩnh vực hóa học và những lĩnh vực có liên quan (vd như sinh học, dược học, môi trường, v.v..). Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề đa dạng trong các lĩnh vực nghề nghiệp.	Hướng tới xây dựng bộ môn Kỹ thuật Hóa học thuộc tóp đầu tại Việt Nam và khu vực Đông Nam Á; là nơi vun đắp và phát triển nguồn	Là bộ môn đào tạo chất lượng giáo dục quốc tế, mang bản sắc văn hóa Việt Nam. Đào tạo chất lượng cao ngành Kỹ thuật Hóa học. Đạt chuẩn kiểm định chất lượng giáo dục theo tiêu chuẩn quốc tế. Giảng dạy và nghiên cứu thực hiện bằng tiếng Anh là điểm khác biệt nâng tầm quốc tế của bộ môn Kỹ thuật	1. Đào tạo nhân lực trình độ cao, nâng cao dân trí, bồi dưỡng nhân tài; nghiên cứu khoa học và công nghệ tạo ra tri thức, sản phẩm mới, phục vụ nhu cầu phát triển kinh tế - xã hội, bảo đảm quốc phòng, an ninh, hội nhập quốc tế. 2. Đào tạo người học phát triển toàn diện về đức,

Mục tiêu đào tạo của CTĐT	Tầm nhìn	Sứ mạng	Luật giáo dục*
Có đạo đức nghề nghiệp, hiểu rõ các vấn đề về môi trường, xã hội, an ninh và kinh tế. Có đầy đủ các kỹ năng mềm, kỹ năng quản lý, khả năng làm việc nhóm, khả năng lãnh đạo, khả năng giao tiếp và làm việc chuyên môn thành thạo bằng tiếng Anh. Có nhận thức về tầm quan trọng của việc trau dồi bản thân và không ngừng học tập suốt đời.	nhân lực chất lượng cao cho thị trường lao động trong nước và quốc tế trong lĩnh vực Kỹ thuật Hóa học.	Hóa học. Người học được đào tạo và rèn luyện để trở thành công dân toàn cầu và có trách nhiệm với xã hội, dẫn dắt xã hội trong tương lai. Nghiên cứu cơ bản với hàm lượng tri thức lớn song hành với nghiên cứu ứng dụng, đáp ứng yêu cầu đổi mới sáng tạo và phát triển bền vững của doanh nghiệp, địa phương và xã hội; quan tâm, thúc đẩy các hoạt động kết nối và phục vụ	trí, thể, mỹ; có tri thức, kỹ năng, trách nhiệm nghề nghiệp; có khả năng nắm bắt tiến bộ khoa học và công nghệ tương xứng với trình độ đào tạo, khả năng tự học, sáng tạo, thích nghi với môi trường làm việc; có tinh thần lập nghiệp, có ý thức phục vụ Nhân dân.

*Luật số: 43/2019/QH14, Luật Giáo Dục, Điều 39. Mục tiêu của giáo dục đại học

b. Mục tiêu cụ thể (Program Objectives - POs)

Mục tiêu cụ thể của CTĐT được xác định từ mục tiêu chung, bao gồm 04 mục tiêu, trong đó có 01 mục tiêu về kiến thức, 02 mục tiêu về kỹ năng và 01 mục tiêu về tự chủ và trách nhiệm, được trình bày như sau:

PO1 - Kiến thức:

PO1.1 Có nền tảng các kiến thức cơ bản vững chắc về khoa học và kỹ thuật khoa học trong lĩnh vực công nghệ hóa học (và các ngành khoa học liên quan như sinh học, dược học) hiện đại.

PO1.2 Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề trong đa dạng lĩnh vực nghề nghiệp.

PO2 - Kỹ năng:

PO2.1 Hiểu rõ hơn các vấn đề về môi trường, xã hội, an ninh và kinh tế ảnh hưởng đến quyết định và đạo đức nghề nghiệp.

PO2.2 Có các kỹ năng mềm cần thiết. Có khả năng làm việc nhóm, khả năng lãnh đạo và kỹ năng quản lý. Có khả năng giao tiếp và làm việc chuyên môn bằng tiếng Anh (ở mức thành thạo).

PO3 - Tự chủ và trách nhiệm:

PO3.1 Nhận thức và hiểu rõ tầm quan trọng của việc không ngừng học tập, trau dồi bản thân và khả năng học tập lâu dài

4. Chuẩn đầu ra của chương trình đào tạo (Program Learning Outcomes –PLOs)

Chuẩn đầu ra của chương trình đào tạo được xác định từ các mục tiêu cụ thể. Chuẩn đầu ra bảo đảm đầy đủ theo quy định về chuẩn đầu ra theo các bậc/trình độ tương ứng tại phụ lục “Bảng mô tả Khung trình độ Quốc gia Việt Nam” kèm theo Quyết định số 1982/QĐ-TTg ngày 18 tháng 10 năm 2016 của Thủ tướng Chính phủ.

Chuẩn đầu ra (CĐR)	Nội dung Chuẩn đầu ra Sinh viên tốt nghiệp từ chương trình KTHH sẽ có các năng lực	Trình độ năng lực*
Kiến thức		
PLO1	Xác định, xây dựng và giải quyết các vấn đề kỹ thuật hóa học phức tạp bằng cách áp dụng các nguyên tắc của kỹ thuật, khoa học và toán học.	4
PLO2	Áp dụng thiết kế kỹ thuật hóa học để tạo ra giải pháp đáp ứng các nhu cầu cụ thể, có cân nhắc đến các yếu tố về sức khỏe cộng đồng, an toàn và phúc lợi, cũng như các yếu tố toàn cầu, văn hóa, xã hội, môi trường và kinh tế.	4
Kỹ năng		
PLO3	Giao tiếp (bao gồm tiếng Anh) hiệu quả với nhiều đối tượng khác nhau.	4
PLO4	Hoạt động hiệu quả trong một nhóm mà các thành viên cùng đưa ra vai trò lãnh đạo, tạo ra một môi trường hợp tác và hòa nhập, thiết lập mục tiêu, lập kế hoạch nhiệm vụ và đáp ứng các mục tiêu.	4
PLO5	Phát triển và tiến hành các thí nghiệm thích hợp, phân tích và giải thích số liệu, đồng thời sử dụng đánh giá kỹ thuật để đưa ra kết luận.	4
PLO6	Tiếp thu và áp dụng kiến thức mới khi cần thiết, sử dụng chiến lược học tập phù hợp.	4
Mức tự chủ và trách nhiệm		
PLO7	Nhận thức được trách nhiệm đạo đức và nghề nghiệp trong các tình huống kỹ thuật và đánh giá sáng suốt thông qua việc xem xét tác động của các giải pháp kỹ thuật trong bối cảnh về xã hội, môi trường, kinh tế, và toàn cầu.	4

*Trình độ năng lực theo thang Bloom

Chuẩn đầu ra chương trình đào tạo đáp ứng chuẩn đầu ra chương trình vi mạch bán dẫn được quy định tại Quyết định số 1314/QĐ-BGDĐT ngày 13 tháng 5 năm 2025 của Bộ trưởng Bộ Giáo dục và Đào tạo.

Chuẩn đầu ra CTĐT vi mạch bán dẫn			Chuẩn đầu ra CTĐT ngành Kỹ thuật Hóa học*						
			<i>Kiến thức</i>		<i>Kỹ năng</i>				<i>Mức tự chủ và trách nhiệm</i>
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
<i>Người học tốt nghiệp CTĐT về vi mạch bán dẫn phải đáp ứng MĐNL tối thiểu*</i>	<i>Kiến thức</i>	1. Khả năng xác định, hình thành và giải quyết các vấn đề kỹ thuật phức tạp trong lĩnh vực vi mạch bán dẫn bằng cách áp dụng các nguyên lý toán học, khoa học và kỹ thuật	4						
		2. Khả năng áp dụng thiết kế kỹ thuật để phát triển các giải pháp đáp ứng nhu cầu cụ thể trong kỹ thuật vi mạch bán dẫn, có cân nhắc đến sức khỏe, an toàn, phúc lợi cộng đồng,		4					

Chuẩn đầu ra CTĐT vi mạch bán dẫn		Chuẩn đầu ra CTĐT ngành Kỹ thuật Hóa học*						
		Kiến thức		Kỹ năng				Mức tự chủ và trách nhiệm
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
	cùng các yếu tố toàn cầu, văn hóa, xã hội, môi trường và kinh tế, phù hợp với chuẩn mực đạo đức nghề nghiệp							
Kỹ năng	3. Khả năng giao tiếp hiệu quả với nhiều đối tượng và các bên liên quan, bao gồm chuyên gia kỹ thuật, lãnh đạo và các thành phần không chuyên môn, bảo đảm sự rõ ràng và chính xác trong việc trình bày và truyền đạt thông tin			4				
	4. Khả năng làm việc hiệu quả trong một nhóm chuyên môn, nơi các thành viên cùng nhau thể hiện vai trò lãnh đạo, nhằm tạo lập môi trường hợp tác và hòa nhập, thiết lập mục tiêu, lập kế hoạch nhiệm vụ và hoàn thành mục tiêu chung				4			
	5. Khả năng xây dựng và thực hiện các thí nghiệm phù hợp trong lĩnh vực vi mạch bán dẫn, phân tích và giải thích dữ liệu một cách khoa học, đồng thời sử dụng phán đoán kỹ thuật để rút ra kết luận phù hợp với thực tiễn					4		
Mức tự chủ và trách nhiệm	6. Khả năng nhận biết trách nhiệm đạo đức và nghề nghiệp trong các tình huống kỹ thuật, và đưa ra các phán đoán sáng suốt có tính đến tác động của giải pháp kỹ thuật trong bối cảnh toàn cầu, kinh tế, môi trường và xã hội để bảo đảm tính bền vững							4
	7. Khả năng tiếp thu và áp dụng kiến thức mới để đáp ứng sự phát triển nhanh chóng của công nghệ vi mạch bán dẫn, thông qua việc vận dụng các chiến lược học tập phù hợp để bảo đảm khả năng học tập suốt đời							4
Trình độ ngoại ngữ	8. Có năng lực tương ứng với từng trình độ đào tạo theo Khung năng lực ngoại ngữ 6 bậc dùng cho Việt Nam (bậc 4/6)			4				

* Trình độ năng lực theo thang Bloom

Chuẩn đầu ra chương trình đào tạo đáp ứng Thông tư 02/2025/TT-BGDĐT ngày 24/01/2025 của Bộ Giáo dục và Đào tạo Quy định về Khung năng lực số cho người học. Mức độ đáp ứng khung năng lực số của chương trình đào tạo được trình bày cụ thể tại Phụ lục 3.

5. Ma trận giữa mục tiêu đào tạo và chuẩn đầu ra

CĐR sẽ gắn kết với mục tiêu cụ thể đã được xác định ở Mục 3, theo Bảng 2.

Bảng 2. Mối quan hệ giữa CĐR của CTĐT và mục tiêu đào tạo

	PLOs ⁽¹⁾	POs				
		PO1		PO2		PO3
		PO1.1	PO1.2	PO2.1	PO2.2	PO3.1
Kiến thức	PLO1	x	x			
	PLO2		x	x		
Kỹ năng	PLO3			x	x	
	PLO4				x	
	PLO5				x	
	PLO6			x	x	
Thái độ	PLO7					x

6. Quy trình đào tạo, điều kiện tốt nghiệp

Căn cứ Quyết định số 1342/QĐ-ĐHQG ngày 30 tháng 9 năm 2022 của Giám đốc Đại học Quốc gia Thành phố Hồ Chí Minh về việc ban hành Quy chế đào tạo trình độ đại học.

Căn cứ Quyết định số 719/QĐ-ĐHQGT ngày 06 tháng 12 năm 2021 của Hiệu trưởng trường Đại học Quốc tế về việc ban hành Quy chế đào tạo trình độ đại học theo hệ thống tín chỉ tại trường Đại học Quốc tế.

7. Thang điểm (theo thang điểm chính thức của trường)

Trường quy định thang điểm đánh giá kết quả học tập của người học (Quy chế đào tạo trình độ đại học theo hệ thống tín chỉ tại trường Đại học Quốc tế)

Bảng 3: Thang điểm

Xếp loại	Thang điểm 100	Điểm chữ	Thang điểm 4
Xuất sắc	Từ 90 đến 100	A+	4,0
Giỏi	Từ 80 đến cận 90	A	3,5
Khá	Từ 70 đến cận 80	B+	3,0
Trung bình khá	Từ 60 đến cận 70	B	2,5
Trung bình	Từ 50 đến cận 60	C	2,0
Yếu	Từ 40 đến cận 50	D+	1,5

Xếp loại	Thang điểm 100	Điểm chữ	Thang điểm 4
Kém	Từ 30 đến cận 40	D	1,0
	Dưới 30	F	0,0

8. Khối lượng kiến thức toàn khoá

Tổng số tín chỉ: **151 tín chỉ**, trong đó phân bổ kiến thức như Bảng 4 (không bao gồm Giáo dục thể chất và Giáo dục quốc phòng):

Bảng 4. Cấu trúc chương trình đào tạo

TT	Các khối kiến thức	Khối lượng			
		Số tín chỉ			Tỷ lệ % (Tổng khối kiến thức/Tổng số tín chỉ)
		Tổng	Lý thuyết	Thực hành	
I	Khối kiến thức giáo dục đại cương	56	52	4	37.09
	- Bắt buộc: 53 tín chỉ	53	49	4	
	- Tự chọn: 3 tín chỉ	3	3	0	
II	Khối kiến thức cơ sở ngành	36	29	7	23.84
	- Bắt buộc: 36 tín chỉ	36	29	7	
	- Tự chọn: 0 tín chỉ	0	0	0	
III	Kiến thức chuyên ngành	36	30	6	23.84
	- Bắt buộc: 27 tín chỉ	27	21	6	
	- Tự chọn: 9 tín chỉ	9	0	0	
IV	Kiến thức bổ trợ	2	2	0	1.32
	- Bắt buộc: 2 tín chỉ	2	2	0	
	- Tự chọn: 0 tín chỉ	0	0	0	
V	Thực tập, khóa luận/luận văn tốt nghiệp	21	0	21	13.91
	Tổng cộng (I+II+III+IV+V)	151	113	38	100

9. Nội dung chương trình đào tạo

Bảng 5. Khung CTĐT chung của nhóm ngành Khoa học sự sống và Hóa học

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I	Kiến thức giáo dục đại cương				34	33	1	
I.1	Lý luận chính trị				11	11	0	
1	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin	Bắt buộc	3	3	0	
2	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2	0	
3	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2	0	
4	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam	Bắt buộc	2	2	0	
5	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng HCM	Bắt buộc	2	2	0	
I.2	Khoa học xã hội – Nhân văn – Nghệ thuật				3	3	0	
6	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3	0	
I.3	Ngoại ngữ				8	8	0	
7	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2	0	
8	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2	0	

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
9	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2	0	
10	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2	0	
I.4	Toán – Tin học – Khoa học tự nhiên – Công nghệ - Môi trường				12	11	1	
11	MA001IU	Calculus 1	Toán 1	Bắt buộc	4	4	0	
12	PH013IU	Physics 1 - Mechanics	Vật lý 1	Bắt buộc	2	2	0	
13	CH011IU	Chemistry for Engineers	Hóa đại cương	Bắt buộc	3	3	0	
14	MA040IU	Applied Statistics	Thống kê ứng dụng	Bắt buộc	2	2	0	
15	MA041IU	Applied Statistics Lab	Thực hành thống kê ứng dụng	Bắt buộc	1	0	1	PTN Máy tính
	Giáo dục thể chất							
16	PT001IU	Physical Training 1	Giáo dục thể chất 1	Bắt buộc	3	3	0	
17	PT002IU	Physical Training 2	Giáo dục thể chất 2	Bắt buộc	3	3	0	

Bảng 6. Các môn học thuộc CTĐT

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
I	Kiến thức giáo dục đại cương				56	52	4		
I.1	Lý luận chính trị				11	11	0		
1.	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin	Bắt buộc	3	3	0		
2.	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2	0		
3.	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2	0		
4.	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam	Bắt buộc	2	2	0		
5.	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng HCM	Bắt buộc	2	2	0		
I.2	Khoa học xã hội – Nhân văn – Nghệ thuật				9	9	0		
6.	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3	0		
7.	PE008IU	Critical Thinking	Tư duy phân tích	Bắt buộc	3	3	0		
8.	PE020IU	Engineering Ethics and Professional Skills	Đạo đức và kỹ năng nghề nghiệp	Bắt buộc	3	3	0		
I.3	Ngoại ngữ				8	8	0		
9.	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2	0		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
10.	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2	0		
11.	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2	0		
12.	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2	0		
I.4	Toán – Tin học – Khoa học tự nhiên – Công nghệ - Môi trường				25	21	4		
13.	MA001IU	Calculus 1	Toán 1	Bắt buộc	4	4	0		
14.	MA003IU	Calculus 2	Toán 2	Bắt buộc	4	4	0		
15.	PH013IU	Physics 1 - Mechanics	Vật lý 1	Bắt buộc	2	2	0		
16.	CH011IU	Chemistry for Engineers	Hóa đại cương	Bắt buộc	3	3	0		
17.	CH012IU	Chemistry Laboratory	Thực hành Hóa đại cương	Bắt buộc	1	0	1	PTN Hóa UD	
18.	ENEE1013IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	PTN Máy tính	
19.	ENEE1014IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1		
20.	MA040IU	Applied Statistics	Thống kê ứng dụng	Bắt buộc	2	2	0		
21.	MA041IU	Applied Statistics Lab	Thực hành thống kê ứng dụng	Bắt buộc	1	0	1	PTN Máy tính	
22.	CHE0011IU	Applied Mechanics	Cơ ứng dụng	Bắt buộc	2	2	0		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
23.	CE205IU	Fluid Mechanics	Cơ học lưu chất	Bắt buộc	2	2	0		
24.	CE206IU	Fluid Mechanics Lab	Thực hành cơ lưu chất	Bắt buộc	1	0	1	PTN Xây dựng	
I.5	Kinh tế - Quản lý (chọn 1 trong 5 môn)				3	3	0		
25.	IT120IU	Entrepreneurship	Khởi nghiệp	Tự chọn	3	3	0		
26.	ENEE4011IU	Engineering Project Management	Quản lý dự án kỹ thuật	Tự chọn	3	3	0		
27.	BA115IU	Introduction to Business Administration	Quản trị học	Tự chọn	3	3	0		
28.	BA154IU	Entrepreneurship and Small Business Management	Sáng lập doanh nghiệp	Tự chọn	3	3	0		
29.	CHE0051IU	Entrepreneurship and Sustainability in Engineering	Khởi nghiệp và Bền vững trong Kỹ thuật	Tự chọn	3	3	0		
I.6	Giáo dục thể chất								
	PT001IU	Physical Training 1	Giáo dục thể chất 1	Bắt buộc	3	3	0		
	PT002IU	Physical Training 2	Giáo dục thể chất 2	Bắt buộc	3	3	0		
II	Kiến thức cơ sở ngành				36	29	7		
30.	CHE1011IU	Introduction to Chemical Engineering	Nhập môn kỹ thuật Hóa học	Bắt buộc	2	2	0		
31.	CHE2103IU	Inorganic Chemistry	Hóa vô cơ	Bắt buộc	3	3	0		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
32.	CHE2104IU	Inorganic Chemistry Lab	Thực hành Hóa vô cơ	Bắt buộc	1	0	1	PTN Hóa UD	
33.	CHE1081IU	Organic Chemistry 1	Hóa hữu cơ 1	Bắt buộc	3	3	0		
34.	CHE1091IU	Organic Chemistry 2	Hóa hữu cơ 2	Bắt buộc	3	3	0		
35.	CHE1092IU	Organic Chemistry Laboratory	Thực hành Hóa hữu cơ	Bắt buộc	2	0	2	PTN Hóa UD	
36.	CHE1051IU	Analytical Chemistry 1	Hóa phân tích 1	Bắt buộc	3	3	0		
37.	CHE1061IU	Analytical Chemistry 2	Hóa phân tích 2	Bắt buộc	3	3	0		
38.	CHE1062IU	Analytical Chemistry Laboratory	Thực hành Hóa phân tích	Bắt buộc	2	0	2	PTN Giảng dạy HH	
39.	CHE1031IU	Physical Chemistry 1	Hóa lý 1	Bắt buộc	3	3	0		
40.	CHE1043IU	Physical Chemistry 2	Hóa lý 2	Bắt buộc	2	2	0		
41.	CHE1044IU	Physical Chemistry 2 Lab	Thực hành Hóa lý 2	Bắt buộc	1	0	1	PTN Giảng dạy HH	
42.	CHE1104IU	Biochemistry	Hóa sinh	Bắt buộc	3	3	0		
43.	CHE1105IU	Biochemistry Lab	Thực hành Hóa sinh	Bắt buộc	1	0	1	PTN Hóa UD	
44.	CHE1021IU	Process Instrumentation and Control	Đo lường và điều khiển quá trình	Bắt buộc	2	2	0		
45.	CHE1111IU	Industrial Chemistry	Hóa học công nghiệp	Bắt buộc	2	2	0		
III	Kiến thức chuyên ngành				36	30	6		
III.1	Kiến thức chuyên ngành (bắt buộc)				27	21	6		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
46.	CHE2011IU	Reaction Kinetics and Catalysis	Động học phản ứng và xúc tác	Bắt buộc	3	3	0		
47.	CHE2024IU	Computational Chemistry	Hóa tính toán	Bắt buộc	2	2	0		
48.	CHE2025IU	Computational Chemistry lab	Thực hành hóa tính toán	Bắt buộc	1	0	1	PTN Máy tính	
49.	CHE2034IU	Simulation and Optimization	Mô phỏng và tối ưu hóa	Bắt buộc	2	2	0		
50.	CHE2035IU	Simulation and Optimization Lab	Thực hành Mô phỏng và tối ưu hóa	Bắt buộc	1	0	1	PTN Máy tính	
51.	CHE2041IU	Mass Transfer Operations	Quá trình và thiết bị truyền khối	Bắt buộc	3	3	0		
52.	CHE2051IU	Heat Transfer Operations	Quá trình và thiết bị truyền nhiệt	Bắt buộc	3	3	0		
53.	CHE2061IU	Chemical Reaction Engineering	Kỹ thuật phản ứng	Bắt buộc	3	3	0		
54.	CHE2071IU	Mechanical Unit Operations	Các quá trình và thiết bị cơ học	Bắt buộc	3	3	0		
55.	CHE2081IU	Occupational Introduction to Health Safety and Environment	An toàn sức khỏe nghề nghiệp và môi trường	Bắt buộc	2	2	0		
56.	CHE2012IU	Chemical Engineering Lab	Thực hành kỹ thuật hóa học	Bắt buộc	1	0	1	PTN KTHH	

Stt	Mã MH	Tên môn học (MH)		Loại MH	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt	(bắt buộc/ tự chọn)	Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
57.	CHE2092IU	Chemical Process Design and Simulation	Thiết kế và mô phỏng quá trình hóa học	Bắt buộc	3	0	3	PTN Máy tính	
III.2	Kiến thức chuyên ngành (tự chọn)				9	9	0		
	Sinh viên chọn tối thiểu 9 tín chỉ bất kỳ trong các môn học tự chọn trong danh sách								
58.	CHE3111IU	Green Chemical Engineering	Kỹ thuật hóa học xanh	Tự chọn	3	3	0		
59.	CHE3211IU	Nanomaterials	Vật liệu nano	Tự chọn	3	3	0		
60.	CHE3221IU	Biomaterials	Vật liệu sinh học	Tự chọn	3	3	0		
61.	CHE3311IU	Organic Chemistry Synthesis	Tổng hợp hữu cơ	Tự chọn	3	3	0		
62.	CHE3414IU	Advanced Engineering Drawing	Vẽ kỹ thuật nâng cao	Tự chọn	2	2	0		Nếu chọn môn CHE3414 IU, sinh viên bắt buộc phải đăng ký kèm theo môn CHE3415 IU
63.	CHE3415IU	Advanced Engineering Drawing Lab	Thực hành Vẽ kỹ thuật nâng cao	Tự chọn	1	0	1	PTN Máy tính	
64.	CHE3121IU	Environmental Chemistry 1	Hóa môi trường 1	Tự chọn	3	3	0		
65.	CHE3131IU	Environmental Chemistry 2	Hóa môi trường 2	Tự chọn	3	3	0		
66.	CHE3231IU	Heterogeneous Catalysis	Xúc tác dị thể	Tự chọn	3	3	0		
67.	CHE3327IU	Methods for Natural Products and Drugs	Các phương pháp nghiên cứu cho hợp chất thiên	Tự chọn	3	3	0		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
			<i>nhiên và thuốc</i>						
68.	CHE3421IU	<i>Piping and Instruments System Design</i>	<i>Thiết kế đường ống và thiết bị</i>	<i>Tự chọn</i>	3	3	0		
69.	CHE3141IU	<i>Sustainable Energy</i>	<i>Năng lượng bền vững</i>	<i>Tự chọn</i>	3	3	0		
70.	CHE3151IU	<i>Natural Gas Processing</i>	<i>Chế biến khí thiên nhiên</i>	<i>Tự chọn</i>	3	3	0		
71.	CHE3241IU	<i>Bioinorganic Chemistry</i>	<i>Hóa sinh vô cơ</i>	<i>Tự chọn</i>	3	3	0		
72.	CHE3331IU	<i>Medicinal Chemistry</i>	<i>Hóa dược</i>	<i>Tự chọn</i>	3	3	0		
73.	CHE3431IU	<i>Treatment Plant Operation</i>	<i>Vận hành nhà máy xử lý</i>	<i>Tự chọn</i>	3	3	0		
74.	CHE3251IU	<i>Corrosion Chemistry</i>	<i>Hóa học ăn mòn</i>	<i>Tự chọn</i>	3	3	0		
75.	CHE0042IU	<i>Project 1</i>	<i>Đồ án môn học 1</i>	<i>Tự chọn</i>	1	0	1		
76.	CHE0072IU	<i>Project 2</i>	<i>Đồ án môn học 2</i>	<i>Tự chọn</i>	2	0	2		
77.	CHE3511IU	<i>Environmental Pollution Control Engineering</i>	<i>Kỹ thuật Kiểm soát Ô nhiễm Môi trường</i>	<i>Tự chọn</i>	3	3	0		
78.	CHE3521IU	<i>Climate Change Mitigation and Adaptation</i>	<i>Giảm nhẹ và thích ứng với Biến đổi khí hậu</i>	<i>Tự chọn</i>	3	3	0		
IV	Kiến thức bổ trợ				2	2	0		
79.	CHE0041IU	Research Methodology	Phương pháp nghiên cứu khoa học	Bắt buộc	2	2	0		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN	Ghi chú
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
V	Thực tập, khóa luận/ luận văn tốt nghiệp				21	0	21		
80.	CHE4012IU	Research 1	Nghiên cứu 1	Bắt buộc	1	0	1		
81.	CHE4062IU	Internship 1	Thực tập 1	Bắt buộc	2	0	2		
82.	CHE4072IU	Internship 2	Thực tập 2	Bắt buộc	3	0	3		
83.	CHE4082IU	Internship 3	Thực tập 3	Bắt buộc	3	0	3		
84.	CHE4512IU	Pre-thesis	Đề cương luận văn	Bắt buộc	2	0	2		
85.	CHE4522IU	Thesis	Luận văn	Bắt buộc	10	0	10		
	Tổng số (tín chỉ)				151	113	38		

10. Dự kiến kế hoạch giảng dạy tham khảo (*phân bố các môn học theo từng học kỳ*)

Bảng 7. Kế hoạch giảng dạy theo từng học kỳ (tham khảo)

Kế hoạch giảng dạy AE

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I (tổng tín chỉ: 20)	PT001IU	Physical Training 1	Giáo dục thể chất 1	Bắt buộc	3	3	0	
	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin	Bắt buộc	3	3	0	
	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác- Lênin	Bắt buộc	2	2	0	SH: PE015IU Philosophy of Marxism and Leninism
	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2	0	SH: PE016IU Political economics of Marxism and Leninism
	MA001IU	Calculus 1	Toán 1	Bắt buộc	4	4	0	
	PH013IU	Physics 1	Vật lý 1	Bắt buộc	2	2	0	
	CH011IU	Chemistry for Engineers	Hoá đại cương	Bắt buộc	3	3	0	
	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2	0	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2	0	
Tổng cộng					20	20	0	
II (tổng tín chỉ: 20)	PT002IU	Physical Training 2	Giáo dục thể chất 2	Bắt buộc	3	3	0	
	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam	Bắt buộc	2	2	0	HT: PE015IU Philosophy of Marxism and Leninism HT: PE016IU Political economics of Marxism and Leninism HT: PE017IU Scientific socialism

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng Hồ Chí Minh	Bắt buộc	2	2	0	HT: PE015IU Philosophy of Marxism and Leninism HT: PE016IU Political economics of Marxism and Leninism HT: PE017IU Scientific socialism
	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3	0	
	MA040IU	Applied Statistics	Thống kê ứng dụng	Bắt buộc	2	2	0	
	MA041IU	Applied Statistics Lab	Thực hành thống kê ứng dụng	Bắt buộc	1	0	1	SH: MA040IU - Applied Statistics
	CH012IU	Chemistry Lab	Thực hành hoá đại cương	Bắt buộc	1	0	1	HT: CH011IU Chemistry for Engineers
	CHE1011IU	Introduction to Chemical Engineering	Nhập môn Kỹ thuật Hoá học	Bắt buộc	2	2	0	
	PE008IU	Critical Thinking	Tư duy phân tích	Bắt buộc	3	3	0	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2	0	
	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2	2	
	Tổng cộng				20	18	2	
III (tổng tín chỉ: 17)	CHE2103IU	Inorganic Chemistry	Hóa vô cơ	Bắt buộc	3	3	0	HT: CH011IU Chemistry for Engineers
	CHE2104IU	Inorganic Chemistry Lab	Thực hành Hóa vô cơ	Bắt buộc	1	0	1	SH: CHE2103IU Inorganic Chemistry
	CHE1051IU	Analytical Chemistry 1	Hoá phân tích 1	Bắt buộc	3	3	0	HT: CH011IU Chemistry for Engineers
	CHE1081IU	Organic Chemistry 1	Hoá hữu cơ 1	Bắt buộc	3	3	0	HT: CH011IU Chemistry for Engineers
	MA003IU	Calculus 2	Toán 2	Bắt buộc	4	4	0	HT: MA001IU Calculus 1
	CE205IU	Fluid Mechanics	Cơ lưu chất	Bắt buộc	2	2	0	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CE206IU	Fluid Mechanics Lab	Thực hành cơ lưu chất	Bắt buộc	1	0	1	SH: CE205IU Fluid Mechanics
	Tổng cộng				17	15	2	
IV (tổng tín chỉ: 16)	CHE1091IU	Organic Chemistry 2	Hoá hữu cơ 2	Bắt buộc	3	3	0	HT: CHE1081IU Organic Chemistry 1
	CHE1092IU	Organic Chemistry Laboratory	Thực hành hoá hữu cơ	Bắt buộc	2	0	2	SH: CHE1091IU Organic Chemistry 2
	CHE1061IU	Analytical Chemistry 2	Hoá phân tích 2	Bắt buộc	3	3	0	HT: CHE1051IU Analytical Chemistry 1
	CHE1062IU	Analytical Chemistry Laboratory	Thực hành hoá phân tích	Bắt buộc	2	0	2	SH: CHE1061IU Analytical Chemistry 2

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE1031IU	Physical Chemistry 1	Hoá lý 1	Bắt buộc	3	3	0	HT: CH011IU Chemistry for Engineers HT: PH013IU Physics 1 HT: MA003IU Calculus 2
	PE020IU	Engineering Ethics and Professional Skills	Đạo đức và kỹ năng nghề nghiệp	Bắt buộc	3	3	0	
	Tổng cộng				16	12	4	
	MP001IU	Military education	Giáo dục quốc phòng					
V (tổng tín chỉ: 16)	CHE0011IU	Applied Mechanics	Cơ ứng dụng	Bắt buộc	2	2	0	HT: PH013IU Physics 1 HT: MA001IU Calculus 1
	CHE1043IU	Physical Chemistry 2	Hoá lý 2	Bắt buộc	2	2	0	HT: CHE1031IU Physical Chemistry 1
	CHE1044IU	Physical Chemistry Laboratory 2	Thực hành hoá lý 2	Bắt buộc	1	0	1	SH: CHE1043IU Physical Chemistry 2

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE201IU	Reaction Kinetics and Catalysis	Động học phản ứng và xúc tác	Bắt buộc	3	3	0	HT: CHE2103IU Inorganic chemistry
	CHE205IU	Heat Transfer Operations	Quá trình và thiết bị truyền nhiệt	Bắt buộc	3	3	0	HT: CHE1031IU Physical Chemistry 1
	ENEE1013IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	
	ENEE1014IU	Engineering Drawing Lab	Thực hành vẽ kỹ thuật	Bắt buộc	1	0	1	SH: ENEE1013IU Engineering Drawing Lab
	CHE102IU	Process Instrumentation and Control	Đo lường và điều khiển quá trình	Bắt buộc	2	2	0	HT: CH011IU Chemistry for Engineers
	Tổng cộng				16	14	2	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
VI (tổng tín chỉ: 16)	CHE1104IU	Biochemistry	Hoá sinh	Bắt buộc	3	3	0	HT: CHE1061IU Analytical Chemistry 2 HT: CHE1062IU Analytical Chemistry Laboratory HT: CHE1091IU Organic Chemistry 2
	CHE1105IU	Biochemistry Laboratory	Thực hành hoá sinh	Bắt buộc	1	0	1	SH: CHE1104IU Biochemistry
	CHE2071IU	Mechanical Unit Operations	Các quá trình và thiết bị cơ học	Bắt buộc	3	3	0	SH: CHE2041IU Mass Transfer Operations
	CHE2034IU	Simulation and Optimization	Mô phỏng và tối ưu hóa	Bắt buộc	2	2	0	
	CHE2035IU	Simulation and Optimization Laboratory	Thực hành Mô phỏng và tối ưu hóa	Bắt buộc	1	0	1	SH: CHE2034IU Simulation and Optimization

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE2041IU	Mass Transfer Operations	Quá trình và thiết bị truyền khối	Bắt buộc	3	3	0	HT: CHE2051IU Heat Transfer Operations
	CHE4012IU	Research 1	Nghiên cứu 1	Bắt buộc	1	0	1	
	CHE4062IU	Internship 1	Thực tập 1	Bắt buộc	2	0	2	
	Tổng cộng				16	11	5	
Hè (tổng tín chỉ: 3)	CHE4072IU	Internship 2	Thực tập 2	Bắt buộc	3	0	3	HT: CHE4062IU Internship 1
	Tổng cộng				3	0	3	
VII (tổng tín chỉ: 15)	CHE2024IU	Computational Chemistry	Hoá tính toán	Bắt buộc	2	2	0	HT: CH011IU - Chemistry for Engineers, HT: CHE1091IU - Organic Chemistry 2, HT: CHE1043IU Physical Chemistry 2
	CHE2025IU	Computational Chemistry Lab	Thực hành hoá tính toán	Bắt buộc	1	0	1	SH: CHE2024IU - Computational Chemistry

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE2061IU	Chemical Reaction Engineering	Kỹ thuật phản ứng	Bắt buộc	3	3	0	HT: CHE2011IU - Reaction Kinetics and Catalysis, HT: CHE1043IU - Physical Chemistry 2
	Nhóm môn học chuyên ngành tự chọn <i>Sinh viên chọn tối thiểu 9 tín chỉ bất kì trong các môn học tự chọn trong danh sách</i>				9	9	0	
	<i>CHE3111IU</i>	<i>Green Chemical Engineering</i>	<i>Kỹ thuật hóa học xanh</i>	<i>Tự chọn</i>	3	3	0	<i>HT: CHE2011IU - Reaction Kinetics and Catalysis</i>
	<i>CHE3211IU</i>	<i>Nanomaterials</i>	<i>Vật liệu nano</i>	<i>Tự chọn</i>	3	3	0	<i>HT: CHE1061IU Analytical chemistry 2 HT: CHE2103IU Inorganic Chemistry HT: CHE1043IU Physical Chemistry 2</i>
	<i>CHE3221IU</i>	<i>Biomaterials</i>	<i>Vật liệu sinh học</i>	<i>Tự chọn</i>	3	3	0	
	<i>CHE3311IU</i>	<i>Organic Chemistry Synthesis</i>	<i>Tổng hợp hữu cơ</i>	<i>Tự chọn</i>	3	3	0	<i>HT: CHE1091IU Organic Chemistry 2</i>

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE3414IU	Advanced Engineering Drawing	Vẽ kỹ thuật nâng cao	Tự chọn	2	2	0	
	CHE3415IU	Advanced Engineering Drawing Lab	Thực hành Vẽ kỹ thuật nâng cao	Tự chọn	1	0	1	SH: CHE3414IU Advanced Engineering Drawing
	CHE3121IU	Environmental Chemistry 1	Hóa môi trường 1	Tự chọn	3	3	0	HT: CHE1061IU Analytical chemistry 2
	CHE3131IU	Environmental Chemistry 2	Hóa môi trường 2	Tự chọn	3	3	0	
	CHE3231IU	Heterogeneous Catalysis	Xúc tác dị thể	Tự chọn	3	3	0	HT: CHE2011IU Reaction Kinetics and Catalysis
	CHE3327IU	Methods for Natural Products and Drugs	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Tự chọn	3	3	0	HT: CHE1091IU Organic Chemistry 2 HT: CHE1061IU Analytical Chemistry 2
	CHE3421IU	Piping and Instruments System Design	Thiết kế đường ống và thiết bị	Tự chọn	3	3	0	
	CHE3141IU	Sustainable Energy	Năng lượng bền vững	Tự chọn	3	3	0	

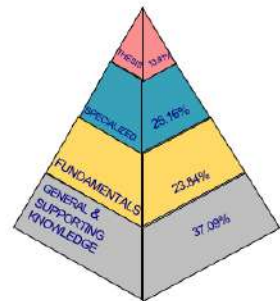
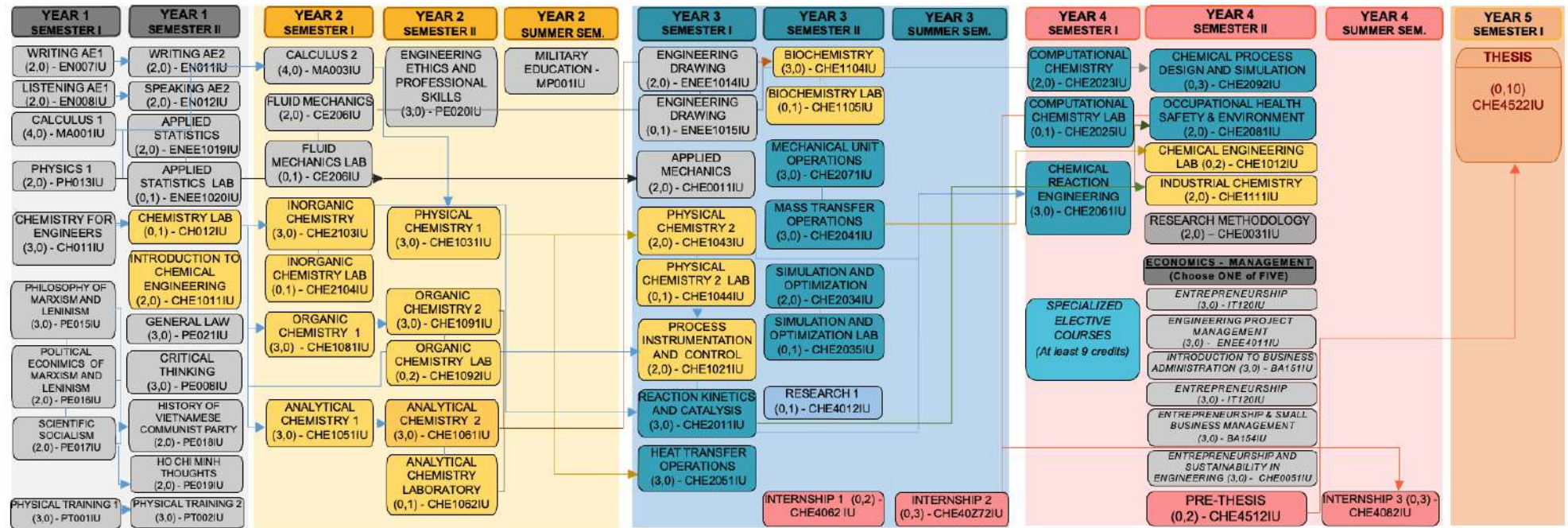
Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE3151IU	Natural Gas Processing	Chế biến khí thiên nhiên	Tự chọn	3	3	0	
	CHE3241IU	Bioinorganic Chemistry	Hóa sinh vô cơ	Tự chọn	3	3	0	HT: CHE1104IU Biochemistry HT: CHE2103IU Inorganic chemistry
	CHE3331IU	Medicinal Chemistry	Hóa dược	Tự chọn	3	3	0	HT: CHE1104IU Biochemistry
	CHE3431IU	Treatment Plant Operation	Vận hành nhà máy xử lý	Tự chọn	3	3	0	
	CHE3251IU	Corrosion Chemistry	Hóa học ăn mòn	Tự chọn	3	3	0	HT: CHE1043IU Physical Chemistry 2 HT: CHE2103IU Inorganic Chemistry HT: CHE1081IU Organic Chemistry
	CHE0042IU	Project 1	Đồ án môn học 1	Tự chọn	1	0	1	
	CHE0072IU	Project 2	Đồ án môn học 2	Tự chọn	2	0	2	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE351IU	Environmental Pollution Control Engineering	Kỹ thuật Kiểm soát Ô nhiễm Môi trường	Tự chọn	3	3	0	HT: CHE204IU Mass Transfer Operations HT: CHE207IU Mechanical Unit Operations
	CHE352IU	Climate Change Mitigation and Adaptation	Giảm nhẹ và thích ứng với Biến đổi khí hậu	Tự chọn	3	3	0	
	Tổng cộng				15	14	1	
VIII (tổng tín chỉ: 15)	CHE2092IU	Chemical Process Design and Simulation	Thiết kế và mô phỏng quá trình hóa học	Bắt buộc	3	0	3	HT: CHE206IU Chemical Reaction Engineering HT: CHE207IU, Mechanical Unit Operations HT: CE206IU Fluid mechanics
	CHE2012IU	Chemical Engineering Lab	Thực hành kỹ thuật hoá học	Bắt buộc	1	0	1	HT: CHE204IU Mass Transfer Operations
	CHE1111IU	Industrial Chemistry	Hoá học công nghiệp	Bắt buộc	2	2	0	HT: CHE201IU Reaction Kinetics and Catalysis

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	CHE2081IU	Occupational Health Safety and Environment (HSE)	An toàn sức khỏe nghề nghiệp và môi trường	Bắt buộc	2	2	0	HT: CHE2011IU Reaction Kinetics and Catalysis
	CHE0041IU	Research Methodology	Phương pháp nghiên cứu khoa học	Bắt buộc	2	2	0	
	CHE4512IU	Pre-thesis	Đề cương luận văn	Bắt buộc	2	0	2	
	Nhóm môn học Kinh tế - Quản lý tự chọn <i>Sinh viên chọn tối thiểu 3 tín chỉ bất kì trong các môn học tự chọn trong danh sách:</i>				3	3	0	
	<i>IT120IU</i>	<i>Entre- preneurship</i>	<i>Khởi nghiệp</i>	<i>Tự chọn</i>	3	3	0	
	<i>ENEE4011IU</i>	<i>Engineering Project Management</i>	<i>Quản lý dự án kỹ thuật</i>	<i>Tự chọn</i>	3	3	0	
	<i>BA115IU</i>	<i>Introduction to Business Administration</i>	<i>Quản trị học</i>	<i>Tự chọn</i>	3	3	0	
	<i>BA154IU</i>	<i>Entrepreneurship and Small Business Management</i>	<i>Sáng lập doanh nghiep</i>	<i>Tự chọn</i>	3	3	0	
	<i>CHE0051IU</i>	<i>Entrepreneurship and Sustainability in Engineering</i>	<i>Khởi nghiệp và Bền vững trong Kỹ thuật</i>	<i>Tự chọn</i>	3	3	0	
	Tổng cộng				15	9	6	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/học trước (HT)/song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
Hè (tổng tín chỉ: 3)	CHE4082IU	Internship 3	Thực tập 3	Bắt buộc	3	0	3	HT: CHE4072IU - Internship 2, HT: CHE2081IU - Occupational Health Safety and Environment (HSE)
	Tổng cộng				3	0	3	
IX (tổng tín chỉ: 10)	CHE4522IU	Thesis	Luận văn	Bắt buộc	10	0	10	HT: CHE4512IU - Pre-thesis; SV đạt 90% tổng số tín chỉ tích lũy của CTĐT
	Tổng cộng				10	0	10	
	Tổng				151	113	38	

ROADMAP OF CHEMICAL ENGINEERING – BATCH 2025



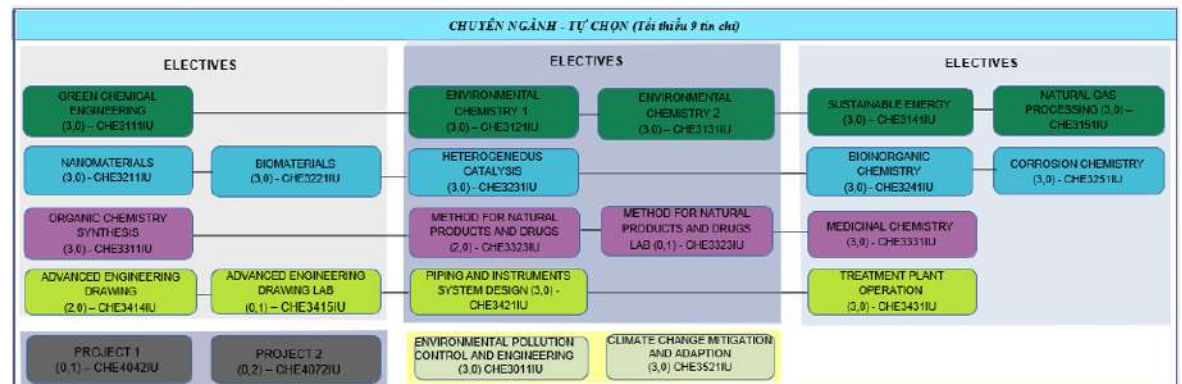
GENERAL KNOWLEDGE	SPECIALIZED KNOWLEDGE (Compulsory)
SUPPORTIVE KNOWLEDGE	SPECIALIZED KNOWLEDGE (Elective)
FUNDAMENTAL KNOWLEDGE	INTERNSHIP/ DISSERTATION/THESIS

Course code explanation: CHEXYZIU

+ **X** (Course Group): 0 – General knowledge/ Supporting knowledge | 1 – Fundamentals | 2 – Specialized (Compulsory) | 3 – Specialized (Elective) | 4 – Internship/Dissertation/Thesis |

+ **YY** (Course order)

+ **Z** (Course type): 1 – Theory | 2 – Practice | 3 – Theory and Practice |



11. Ma trận các môn học và chuẩn đầu ra

Mức độ đóng góp của các môn học vào chuẩn đầu ra của CTĐT ngành Kỹ thuật Hóa học (PLO) được trình bày như Bảng 8. Trình độ năng lực được xác định theo thang Bloom (Kiến thức: 1-6; Kỹ năng: 1-7; Thái độ: 1-5)

Bảng 8. Đóng góp của các môn học vào CĐR của CTĐT

Học kỳ	Mã môn học	Tên môn học	Chuẩn đầu ra của CTĐT						
			Kiến thức		Kỹ năng				Thái độ
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
I	PE015IU	Philosophy of Marxism and Leninism		2					
	PE016IU	Political economics of Marxism and Leninism		2					
	PE017IU	Scientific socialism		2					
	MA001IU	Calculus 1	3	3	3		3		
	PH013IU	Physics 1	2	2	3			3	
	CH011IU	Chemistry for Engineers	3	3	3			3	
	EN007IU	Writing AE1			4				
	EN008IU	Listening AE1			4				
II	PE018IU	History of Vietnamese Communist Party		2					
	PE019IU	Ho Chi Minh's Thoughts		2					
	PE021IU	General Law		3				3	
	MA040IU	Applied Statistics	3	3	3				3
	MA041IU	Applied Statistics Lab	3	3	3	3	3		
	CH012IU	Chemistry Lab	3		3	3	3		
	CHE1011IU	Introduction to Chemical Engineering	3	3	3	3			
	PE008IU	Critical Thinking	3	3	3		3		
	EN011IU	Writing AE2			4				
	EN012IU	Speaking AE2			4				
III	CHE2103IU	Inorganic Chemistry	3	3	3				
	CHE2104IU	Inorganic Chemistry Lab	3		3	3	3		

Học kỳ	Mã môn học	Tên môn học	Chuẩn đầu ra của CTĐT						
			Kiến thức		Kỹ năng				Thái độ
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
	CHE1051IU	Analytical Chemistry 1	3		3				
	CHE1081IU	Organic Chemistry 1	3		3				
	MA003IU	Calculus 2	3	3	3		3		
	CE205IU	Fluid Mechanics	3	3	3		3		
	CE206IU	Fluid Mechanics Lab	3		3	3			
IV	CHE1091IU	Organic Chemistry 2	3		3				
	CHE1092IU	Organic Chemistry Laboratory	3		3	3	3		
	CHE1061IU	Analytical Chemistry 2	3		3				
	CHE1062IU	Analytical Chemistry Laboratory	3		3	3	3		4
	CHE1031IU	Physical Chemistry 1	3	3	3				
	PE020IU	Engineering Ethics and Professional Skills			3	3		3	3
V	CHE0011IU	Applied Mechanics	3		3		3		
	CHE1043IU	Physical Chemistry 2	3		3				
	CHE1044IU	Physical Chemistry Laboratory 2	3	3	3	3	3		
	CHE2011IU	Reaction Kinetics and Catalysis	4	4	4			4	
	CHE2051IU	Heat Transfer Operations	4		4				
	ENEE1013IU	Engineering Drawing		2	3		3		
	ENEE1014IU	Engineering Drawing Lab		2	3		3		
	CHE1021IU	Process Instrumentation and Control	3	3	3			3	

Học kỳ	Mã môn học	Tên môn học	Chuẩn đầu ra của CTĐT						
			Kiến thức		Kỹ năng				Thái độ
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
VI	CHE1104IU	Biochemistry	3		3				
	CHE1105IU	Biochemistry Laboratory	3		3	3	3		4
	CHE2071IU	Mechanical Unit Operations	4		4				
	CHE2034IU	Simulation and Optimization	4		4		4	4	
	CHE2035IU	Simulation and Optimization Laboratory	4		4		4	4	3
	CHE2041IU	Mass Transfer Operations	4		4				
	CHE4012IU	Research 1	3	3	3	3	3	3	3
	CHE4062IU	Internship 1	2		2		2	2	2
Hè	CHE4072IU	Internship 2	3	3	3	3	3	3	3
VII	CHE2024IU	Computational Chemistry	4		4		4		
	CHE2025IU	Computational Chemistry Lab	3		4	4	4		
	CHE2061IU	Chemical Reaction Engineering	4		4		4		
	Nhóm môn học chuyên ngành tự chọn Sinh viên chọn tối thiểu 9 tín chỉ bất kì trong các môn học tự chọn trong danh sách:								
	CHE3111IU	Green Chemical Engineering	4	4	4	4		4	
	CHE3211IU	Nanomaterials	4	4	4	4		4	
	CHE3221IU	Biomaterials	4	4		4		4	4
	CHE3311IU	Organic Chemistry Synthesis	4	4	4	4		4	4
	CHE3414IU	Advanced Engineering Drawing	4	4	4	4		4	

Học kỳ	Mã môn học	Tên môn học	Chuẩn đầu ra của CTĐT						
			Kiến thức		Kỹ năng				Thái độ
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
	CHE3415IU	Advanced Engineering Drawing Lab	4	4	4	4		4	
	CHE3121IU	Environmental Chemistry 1	4	4	4	4		4	
	CHE3131IU	Environmental Chemistry 2	4	4	4	4		4	
	CHE3231IU	Heterogeneous Catalysis	4	4	4	4		4	
	CHE3327IU	Methods for Natural Products and Drugs	4	4	4				
	CHE3421IU	Piping and Instruments System Design	4	4	4	4		4	
	CHE3141IU	Sustainable Energy	4	4	4	4		4	
	CHE3151IU	Natural Gas Processing	4	4	4	4		4	
	CHE3241IU	Bioinorganic Chemistry	4		4				
	CHE3331IU	Medicinal Chemistry	4		4				
	CHE3431IU	Treatment Plant Operation	4	4	4	4		4	
	CHE3251IU	Corrosion Chemistry	4	4	4	4		4	
	CHE0042IU	Project 1	4	4	4	4		4	
	CHE0072IU	Project 2	4	4	4	4		4	
	CHE3511IU	Environmental Pollution Control Engineering	4	4	4	4		4	
	CHE3521IU	Climate Change Mitigation and Adaptation	4	4	4	4		4	

Học kỳ	Mã môn học	Tên môn học	Chuẩn đầu ra của CTĐT						
			Kiến thức		Kỹ năng				Thái độ
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
VIII	CHE2092IU	Chemical Process Design and Simulation	4	4	4	4		4	
	CHE2012IU	Chemical Engineering Lab	4	4	4	4	4	4	
	CHE1111IU	Industrial Chemistry	3	3	3			3	
	CHE2081IU	Occupational Health Safety and Environment (HSE)	4	4	4			4	4
	CHE0041IU	Research Methodology	3		3	3		3	3
	CHE4512IU	Pre-thesis	4	4	4		4	4	4
	Nhóm môn học Kinh tế - Quản lý tự chọn Sinh viên chọn tối thiểu 3 tín chỉ bất kì trong các môn học tự chọn trong danh sách:								
	IT120IU	Entrepreneurship	3	3	3	3	3	3	
	ENEE4011IU	Engineering Project Management	3	3	3	3	3	3	
	BA115IU	Introduction to Business Administration	3	3	3	3	3	3	
	BA154IU	Entrepreneurship and Small Business Management	3	3	3	3	3	3	
	CHE0051IU	Entrepreneurship and Sustainability in Engineering	3	3	3	3	3	3	
Hè	CHE4082IU	Internship 3	4	4	4	4	4	4	4
IX	CHE4522IU	Thesis	5	5	5		5	5	5

12. Mô tả vắn tắt nội dung và khối lượng các môn học

12.1. Philosophy of Marxism and Leninism (Triết học Mác-Lênin):

- Mã môn học: **PE015IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

The course equips students with the basic contents of the worldview and the Marxist-Leninist philosophical methodology.

Help students to apply knowledge about worldview, Marxist-Leninist philosophical methodology creatively in cognitive and practical activities, in order to solve problems of social life of country and time.

12.2. Political economics of Marxism and Leninism (Kinh tế chính trị Mác-Lênin):

- Mã môn học: **PE016IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

The program consists of 6 chapters, in which Chapter 1 discusses the Objects, research methods and functions of Marxist-Leninist political economy; the remain chapters present the core content of Marxist-Leninist Political Economy according to the module's objectives. Specifically, the content includes commodities, markets and the role of stakeholders; producing surplus value; competition and monopoly; socialist-oriented market economy and economic interest relations in Vietnam; and industrialization, modernization, and international economic integration in Vietnam.

12.3. Scientific socialism (Chủ nghĩa xã hội khoa học):

- Mã môn học: **PE017IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

The subject equips students with the basic contents of scientific socialism (one of the three constituent parts of Marxism-Leninism).

Help students to apply knowledge about scientific socialism creatively in cognitive and practical activities, in order to solve problems of social life of country and time.

12.4. History of Vietnamese Communist Party (Lịch sử Đảng Cộng Sản Việt Nam):

- Mã môn học: **PE018IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

Providing systematic and basic knowledge about the birth of the Communist Party of Vietnam (1920-1930), the Party's leadership over the Vietnamese revolution during the struggle for power (1930-1945), the two resistance wars against French and US colonialism (1945-1975), and national construction and defense during the period of the country's transition to socialism and carrying out the renovation work (1975-2018). Through historical events and experiences to build a sense of respect for objective truths, raise pride and confidence in the Party's leadership.

Equip with scientific thinking methods on history, skills in choosing research materials and studying subjects; and the ability to apply historical awareness to practical work and critical thinking toward false claims about the history of the Party.

12.5. History of Vietnamese Communist Party (Lịch sử Đảng Cộng Sản Việt Nam):

- Mã môn học: **PE019IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

The course equips students with basic knowledge about subjects, research methods and meaning of Ho Chi Minh's ideologies; origin of Ho Chi Minh's ideologies; national independence and socialism; Communist Party of Viet Nam and the Vietnamese State; great national unity and international solidarity; culture, morality and human.

12.6. General Law (Pháp luật đại cương):

- Mã môn học: **PE021IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

Provide essential knowledge of Vietnamese legal system through integrated technology and real cases for social and cultural sustainability.

Raise awareness of responsibility toward others and how to stand for ending all types of legal violations, especially corruption in various social contexts.

Practice necessary skills to act as an ambassador to ensure social fairness and global equitable rights.

Use integrated online legal resources and communication tools.

12.7. Critical Thinking (Tư duy phân tích):

- Mã môn học: **PE008IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course provides students with the knowledge and practice necessary to sharpen their observation and judgment skills, enabling them to evaluate arguments effectively and construct compelling arguments of their own. Additionally, the course helps students evaluate information from diverse sources to obtain reliable data and avoid fallacies.

12.8. Engineering Ethics and Professional Skills (Đạo đức và kỹ năng nghề nghiệp):

- Mã môn học: **PE020IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course is designed to introduce engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering, and apply classical moral theory and decision making for engineering issues encountered in academic and professional careers. This course also provides students with the professional skills: sharing ideas and concepts, team working, and presentation skills.

12.9. Writing AE1 (Tiếng Anh chuyên ngành 1 (kỹ năng viết)):

- Mã môn học: **EN007IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course provides students with comprehensive instructions and practice in essay writing, including transforming ideas into different functions of writing such as process, cause-effect, comparison-contrast, and argumentative essays.

12.10. Listening AE1 (Tiếng Anh chuyên ngành 1 (kỹ năng nghe)):

- Mã môn học: **EN008IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

The course is designed to prepare students for effective listening and note-taking skills, so that they can pursue the courses in their majors without considerable difficulty. The course is therefore lecture-based in that the teaching and learning procedure is built up on lectures on a variety of topics such as business, science, and humanities.

12.11. Writing AE2 (Tiếng Anh chuyên ngành 2 (kỹ năng viết)):

- Mã môn học: **EN011IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course introduces basic concepts in research paper writing, especially the role of generalizations, definitions, classifications, and the structure of a research paper to students who attend English- medium college or university. It also provides them with methods of developing and presenting an argument, a comparison or a contrast.

12.12. Speaking AE2 (Tiếng Anh chuyên ngành 2 (kỹ năng nói)):

- Mã môn học: **EN012IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

Giving presentations today becomes a vital skill for students to succeed not only in university but also at work in the future. Speaking AE2, therefore, provides students with the knowledge and skills needed to deliver effective presentations (informative and persuasive presentations).

12.13. Calculus 1 (Toán 1):

- Mã môn học: **MA001IU**
- Số tín chỉ: 4 tín chỉ (4 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course equips students with basic concepts of calculus: limits, continuity, differentiation, and integration. Applications of these concepts are extensively discussed; provide students with the main ideas and techniques of calculus. These include limits, continuity, differentiation, and integration.; Introduce practical applications of these ideas and techniques, through practical examples taken from many areas of engineering, business, and life sciences.; Develop skills in mathematical modelling and problem solving, ability to think logically, and adapt these skills creatively to new situations.

12.14. Calculus 2 (Toán 2):

- Mã môn học: **MA003IU**
- Số tín chỉ: 4 tín chỉ (4 lý thuyết + 0 thực hành)
- Môn học trước: MA001IU Calculus 1
- Mô tả nội dung môn học:

This course is a continuation of Calculus 1. Its aim is to equip student with basic concepts of sequence, series, vector functions, functions of several variables, multiple integrals and their applications.

12.15. Physics 1 (Vật lý 1):

- Mã môn học: **PH013IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course will provide students with:

- The basic knowledge of general Mechanics Physics
- Skills to solve problems in engineering environment by applying both theoretical and experimental techniques
- Understanding and skills needed to use physical laws governing real process and to solve them in the engineering environment
- Confidence and fluency in discussing physics in English

12.16. Chemistry for Engineers (Hóa đại cương):

- Mã môn học: **CH011IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This one-semester course is designed for engineering students those who are pursuing a chemistry or non-chemistry engineering degree such as information technology, biotechnology, civil, biomedical, electronic and telecommunication engineering, environmental engineering, and chemical engineering. The course will introduce the basic principles of chemistry and connect those principles to issues in engineering professions.

The course objectives for chemistry for engineers aim to equip students with a strong conceptual understanding of chemical principles, analytical and problem-solving skills, and the ability to apply their knowledge to various chemical systems and phenomena.

12.17. Chemistry Laboratory (Thực hành Hóa đại cương):

- Mã môn học: **CH012IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học trước: CH01IU Chemistry for Engineers
- Mô tả nội dung môn học:

The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in the lecture. Prior to each lab, students must read the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.

12.18. Engineering Drawing (Vẽ kỹ thuật):

- Mã môn học: **ENEE1013IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course aims to provide Environmental Engineering students with the ability to understand technical ideas on the technical scheme and the skill to construct the engineering drawing compliance with TCVN and ISO by hand and by using AutoCAD software. The course also provides the knowledge for using geometrical construction with drawing instruments and AutoCAD software, drawing representation and the standard of presentation of engineering drawing.

12.19. Engineering Drawing Lab (Thực hành vẽ kỹ thuật):

- Mã môn học: **ENEE1014IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: ENEE1013IU Engineering Drawing

- Mô tả nội dung môn học:

This course aims to provide students with knowledge of AutoCAD software and the use of AutoCAD software to construct basic engineering drawings in accordance to TCVN and ISO quickly and accurately.

12.20. Applied Statistics (Thống kê ứng dụng):

- Mã môn học: **MA040IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course is designed for students pursuing a degree in chemical/environmental engineering and provides knowledge on statistical data, plotting data, descriptive statistics, probability and distribution, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.

12.21. Applied Statistics Lab (Thực hành thống kê ứng dụng):

- Mã môn học: **MA041IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: MA040IU Applied Statistics
- Mô tả nội dung môn học:

This course is designed for students pursuing a degree in chemical/environmental engineering and provides knowledge and skills in using Python/R software for plotting data, descriptive statistics, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.

12.22. Applied Mechanics (Cơ ứng dụng):

- Mã môn học: **CHE001IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước: PH013IU Physics 1; MA001IU Calculus 1
- Mô tả nội dung môn học:

This subject presents the fundamental knowledge of equilibrium conditions of force system and the knowledge and skills of methods of calculation of strength of materials problems: Tension and Compression, Torsion, Plane Bending, Combined Bending and Torsion; and the knowledge of transmissions of belt, chain, gear, shaft and driveshaft (bearings) in engineering.

12.23. Fluid Mechanics (Cơ học lưu chất):

- Mã môn học: **CE205IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

Fluid mechanics is one of a principle subjects for civil engineers. Generally, fluid mechanics is the study of the mechanisms in which fluids, under all possible conditions (such as: gases and liquids) respond to forces, exert forces, and move from one place to another in physical view. This course will provide fundamental knowledge on physical properties of fluids and its characteristics as well. Moreover, students learn the laws and the governing equations representing different kinds of fluids at both static and motion state interacting to structures; and know how to solve these equations or compute physical parameters in practical meaning. In addition, the practices to measure fluid properties are introduced in this course.

12.24. Fluid Mechanics lab (Thực hành cơ học lưu chất):

- Mã môn học: **CE206IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CE205IU Fluid Mechanics
- Mô tả nội dung môn học:

This course is primarily used as an undergraduate teaching lab. The experimental exercises will be provided to students for demonstrating the theoretical class lectures. These experiments are designed to examine some properties of fluids and to conduct experiments involving principle phenomena of incompressible.

12.25. Entrepreneurship (Khởi nghiệp):

- Mã môn học: **IT120IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course reviews the significant economic and social contributions entrepreneurs provide to society, the intense lifestyle commitment, and the skills necessary for entrepreneurial success. It explores how to identify and develop solutions to the most common leadership and personal challenges faced by entrepreneurs when starting new ventures or launching new products. It also promotes a deeper understanding of what is required to be a successful entrepreneur, highlights the skills and tools necessary to start a new business and explores alternatives to common pitfalls. This course applies

entrepreneurial marketing approaches used by successful entrepreneurs. These include utilizing industry sector trends, identifying emerging customer niches, developing new products/services, using guerilla marketing strategies, and Internet and social marketing strategies. It emphasizes the importance of managing cash flows, ratio analysis, pro forma development, and the basics of deal structure and harvesting a business venture. Students will identify and interpret sources of information from company financial reports, financial publications, industry benchmarks, the media, and web sites. An introduction to the process of researching, writing, and presenting a business plan. Students identify and screen ideas using a business feasibility study that describes the product features, market opportunity, customer profile, sales forecast, competitive advantage, and profit potential. Following a successful feasibility study, students may use business plan software as each develops their own complete business plan.

12.26. Engineering Project Management (Quản lý dự án kỹ thuật):

- Mã môn học: **ENEE4011IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course is developed to provide the principal concept on project management which was characterized by the project management body of knowledge guide (PMBOK Guide). This guide emphasizes the five project process groups of initiating, planning, executing, controlling and closing, and the nine knowledge areas of project integration, scope, time, cost, quality, human resources, communication, risk, and procurement management.

12.27. Introduction to Business Administration (Quản trị học):

- Mã môn học: **BA115IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

Employing the interactive learning and problem-based teaching approach, this course emphasizes the interaction between lecturers and students. The lecture materials will be uploaded in Blackboard to help the students to preview the materials and to concentrate on listening and critical thinking during the lecture.

This will help students to interact with the lecturer during the classroom. The sessions for presentations and discussions comprise company case studies as well as answering some theoretical and conceptual questions, which help the students to see how the concepts are applied in the real business context.

Students will present the case to the class and discuss with the peers. Guest speakers are invited to talk about selected topics or real-life experiences.

12.28. Entrepreneurship and Small Business Management (Sáng lập doanh nghiệp):

- Mã môn học: **BA154IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course aims to provide a hands-on introduction to the scalable venture creation process for students with a strong interest in entrepreneurship. The course is designed for a variety of student interests. It directly addresses the concerns of students wanting to become entrepreneurs in the near or more distant future. It is also useful to anyone who expects to be interacting with entrepreneurs in their business careers. Finally, this course is useful for anybody with a curious mind and a willingness to combine serious analysis with creative thinking.

12.29. Entrepreneurship and Sustainability in Engineering (Khởi nghiệp và Bền vững trong Kỹ thuật):

- Mã môn học: **CHE0051IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course is designed for students to understand the basics knowledge and principles of entrepreneurship in engineering; sustainability and 17 sustainable development goals (SDGs); as well as relevant issues and frameworks in achieving sustainable entrepreneurship in engineering-related business plans.

Students will be provided with the knowledge about:

- (1) Basic economic theory and key principles of entrepreneurship in engineering;
 - (2) Basic theory of sustainability and 17 sustainable development goals (SDGs);
- Relevant issues and frameworks in achieving sustainable entrepreneurship in engineering-related business plans.

12.30. Introduction to Chemical Engineering (Nhập môn kỹ thuật Hóa học):

- Mã môn học: **CHE1011IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước/môn học song hành/ môn học tiên quyết):
- Mô tả nội dung môn học:

This course will introduce students to the engineering profession and the field of chemical engineering, guide them through the principles of engineering design and problem-solving, and help them develop teamwork, time management, and communication skills.

12.31. Inorganic Chemistry (Hóa vô cơ):

- Mã môn học: **CHE2103IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CH011IU Chemistry for Engineers
- Mô tả nội dung môn học:

This course is designed to provide students with a broad knowledge and understanding of atomic properties, molecular structure, and properties of inorganic complexes and compounds.

Upon successful completion of this course, the students should be able to demonstrate knowledge of:

- Electronic structure of the atom,
- Main group chemistry.
- Connection between electronic structure and molecular properties.
- Symmetry elements in molecules and assign molecules to the appropriate point group.
- Several theories of bonding, the advantages and disadvantages of each theory, and which theory is most useful for each type of inorganic molecule.
- Solvent systems and acid-base behavior
- Ionic bonding and solid-state behavior.

Features of organometallic chemistry

12.32. Inorganic Chemistry Lab (Thực hành Hóa vô cơ):

- Mã môn học: **CHE2104IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn song hành: CHE2103IU Inorganic Chemistry
- Mô tả nội dung môn học:

This course is designed for chemical engineering students. The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in Inorganic Chemistry lectures. Prior to each lab, students must read

the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.

12.33. Organic Chemistry 1 (Hóa hữu cơ 1):

- Mã môn học: **CHE1081IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CH011IU Chemistry for Engineers
- Mô tả nội dung môn học:

This course is specifically designed for students of Chemical Engineering. It is the first part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on aspects of stereochemistry and the basics of addition, substitution and elimination reactions, functional groups, saturated and aromatic heterocyclic compounds.

Students will be provided with skills of recognizing different types of functional groups and reactions. Students will be provided with the ability to analyze and draw reaction mechanisms.

12.34. Organic Chemistry 2 (Hóa hữu cơ 2):

- Mã môn học: **CHE1091IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1081IU Organic Chemistry 1
- Mô tả nội dung môn học:

This course is specifically designed for students of Chemical Engineering. It is the second part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on functional groups, mechanisms of their common reactions with a biological emphasis.

Students will be provided with skills of recognizing different types of functional groups and reactions. Students will be provided with the ability to analyze and draw reaction mechanisms.

12.35. Organic Chemistry Laboratory (Thực hành Hóa hữu cơ):

- Mã môn học: **CHE1092IU**
- Số tín chỉ: 2 tín chỉ (0 lý thuyết + 2 thực hành)
- Môn học song hành: CHE1091IU Organic Chemistry 2
- Mô tả nội dung môn học:

The organic chemistry laboratory course introduces the student to fundamental techniques and procedures in extraction, purification, synthesis and characterization of organic compounds and simple reactions used in the organic chemistry laboratory. In addition, the student will be trained in the proper way to write a scientific laboratory report.

The organic chemistry laboratory course introduces the student to fundamental techniques and procedures in extraction, purification, synthesis and characterization of organic compounds and simple reactions used in the organic chemistry laboratory. In addition, the student will be trained in the proper way to write a scientific laboratory report.

12.36. Analytical Chemistry 1 (Hóa phân tích 1):

- Mã môn học: **CHE1051IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CH011IU Chemistry for Engineers
- Mô tả nội dung môn học:

The students will be provided with the ranges and uses of classical analytical methods in qualitative and quantitative analysis and also with statistical methods in assessment of analytical measurement data quality and interpretation of their significance, validation of analytical methods and results. Students will develop skills in analysis tasks, critical thinking and problem-solving skills. Student will understand the professional and safety responsibilities residing in working on chemical analysis.

12.37. Analytical Chemistry 2 (Hóa phân tích 2):

- Mã môn học: **CHE1061IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1051IU Analytical Chemistry 1
- Mô tả nội dung môn học:

The students will be provided with the ranges and uses of modern analytical methods in qualitative and quantitative analysis. Techniques used in separation of sample will also be introduced. Students will develop skills in analysis tasks, critical thinking, and problem-solving skills. Student will understand the professional and safety responsibilities residing in working on chemical analysis.

12.38. Analytical Chemistry Laboratory (Thực hành Hóa phân tích):

- Mã môn học: **CHE1062IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học song hành: CHE1061IU Analytical Chemistry 2
- Mô tả nội dung môn học:

The course will provide students with laboratory skills used in classical and instrumental chemical analysis techniques. Students will also learn how to analyze data, perform statistical analysis, and interpret results.

The students will be familiar with classical and instrumental techniques in chemical analysis. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.

12.39. Physical Chemistry 1 (Hóa lý 1):

- Mã môn học: **CHE1031IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước: HT: CH011IU Chemistry for Engineers; PH013IU Physics 1; MA003IU Calculus 2

- Mô tả nội dung môn học:

The course is designed for chemical engineering students and others. The course provides the students with the necessary background in chemical engineering thermodynamics which includes thermodynamics, chemical equilibrium, and phase equilibrium. The knowledge in this course will be further elaborated on in the other fundamental courses as well as specialized courses in the chemical engineering program.

The course includes two sections:

- Thermodynamics: (i) Concepts and properties of pure substances (ii) the first law of thermodynamics, (iii) the second law of thermodynamics (iv) Thermodynamic cycles and (v) Application of thermodynamic laws in chemical reaction systems.

- Chemical and phase equilibrium: (vi) Chemical equilibrium, (vii) Theory of phase equilibrium and phase equilibrium of single component systems (viii) Liquid – vapor and liquid – liquid equilibrium (ix) Liquid – solid equilibrium.

12.40. Physical Chemistry 2 (Hóa lý 2):

- Mã môn học: **CHE1043IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước: CHE1031IU Physical Chemistry 1

- Mô tả nội dung môn học:

The course is designed for chemical engineering students providing the students with the necessary background in chemical kinetics, electrochemistry, surface phenomena and catalysis. Also, after 10 weeks for lectures in class, the 5-week part of experiment related to all contents of physical chemistry will be organized at the remaining time.

Students will be provided with skills of knowing to solve kinetic problems using applied mathematics, build an equation of rate reaction, electrochemical system, evaluate

the capacity of adsorption from isothermal adsorption equation, can interpret all the surface phenomena using fundamental knowledge of colloid chemistry.

12.41. Physical Chemistry 2 Lab (Thực hành Hóa lý 2):

- Mã môn học: **CHE1044IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CHE1043IU Physical Chemistry 2
- Mô tả nội dung môn học:

This course will introduce students to experimental methods in physical chemistry, chemical analysis and the principles and applications of chemical instrumentation. The course will acquaint the student the behavior of real chemical systems, the theory of the chemical phenomenon under observation and the design and methodology of measurement systems to detect the chemical phenomenon.

The course is designed for chemical engineering students. The laboratory course of physical chemistry 2 introduces the student to fundamental techniques and procedures in performing, observing, collecting, and processing data obtained from experiments including chemical kinetics, surface phenomena, colligative properties, and ideal and non-ideal solutions. In addition, the student will be trained in the proper way to write a scientific laboratory report.

12.42. Biochemistry (Hóa sinh):

- Mã môn học: **CHE1104IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1061IU Analytical Chemistry 2; CHE1062IU Analytical Chemistry Laboratory; CHE91IU Organic Chemistry 2
- Mô tả nội dung môn học:

The course will cover fundamental concepts in biochemistry and an introduction to metabolisms occurring in living organisms in order to understand the molecular basic of life. The course topics will include enzyme kinetics and mechanisms and metabolisms of important biological molecules such as carbohydrates, fatty acids, amino acids with an emphasis on their degradation pathways.

The students will be provided fundamental concepts in biochemistry and metabolic pathways occurring in living organisms in order to understand the molecular basics of life. Students will develop skills to communicate effectively scientific knowledge.

12.43. Biochemistry Lab (Thực hành hoá sinh):

- Mã môn học: **CHE1105IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CHE1104IU Hóa sinh
- Mô tả nội dung môn học:

The course provides students with laboratory skills in the quantitative analysis of important macromolecules including proteins, carbohydrates, and metal ions as well.

The students will be familiar with quantitative analysis of macromolecules such as proteins, carbohydrates, essential metal ions and investigation of the activity of a certain type of enzymes. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.

12.44. Process Instrumentation and Control (Đo lường và điều khiển quá trình):

- Mã môn học: **CHE1021IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước: CH011IU Chemistry for Engineers
- Mô tả nội dung môn học:

Process control has a number of significant advantages. The use of process control in a system enables the maximum profitability to be achieved. Other advantages are that automatic control results in increased plant flexibility, reduced maintenance, and in stable and safe operation of the plant.

In this course, fundamental concepts of control theory as well as practical aspects of process control loops are explained. Theoretical modelling of chemical processes, a necessary step for designing process controller, is introduced with practice exercises. Process instruments that constitute industrial control loops are described. Measurement principles for sensors measuring temperature, pressure, liquid level, flowrate and composition are briefly described with guidance on how to select the proper types of sensors. Practical knowledge for designing and tuning of PID controllers, the most important and most popular type of process controllers, is also provided with illustrated examples.

12.45. Industrial Chemistry (Hóa học công nghiệp):

- Mã môn học: **CHE1111IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước: CHE2011IU Reaction Kinetics and Catalysis
- Mô tả nội dung môn học:

This course will provide students with essential skills and knowledge involved in industrial chemistry. The covered topics include homogeneous and heterogeneous catalysis processes, inorganic chemical production processes, surfactants, paints and coatings, Processes in the Oil Refinery, olefins and polymer production processes, introduction to battery.

12.46. Reaction Kinetics and Catalysis (Động học phản ứng và xúc tác):

- Mã môn học: **CHE2011IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE2103IU Inorganic chemistry
- Mô tả nội dung môn học:

This course provides students with the principal knowledge of homogeneous and heterogeneous catalysis. The course covers the definition of catalysis, adsorption-desorption, surface area, and porosity; Langmuir-Hinshelwood kinetics, kinetic modeling; characterization of catalysis; and reaction rate theory.

12.47. Computational Chemistry (Hóa tính toán):

- Mã môn học: **CHE2024IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước: CH011IU Chemistry for Engineers, CHE1091IU Organic Chemistry 2, CHE1043IU Physical Chemistry 2
- Mô tả nội dung môn học:

The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.

12.48. Computational Chemistry Lab (Thực hành Hóa tính toán):

- Mã môn học: **CHE2025IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CHE2024IU Computational Chemistry
- Mô tả nội dung môn học:

The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.

12.49. Simulation and Optimization (Mô phỏng và tối ưu hóa):

- Mã môn học: **CHE2034IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course aims at introducing students to use quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems.

This course is to introduce the fundamental methods used in deterministic operations research and to use of numerical analysis and linear algebra to solve industrial engineering problems. Topics to be covered include: problem formulations, simplex method in table form, big-M method, duality theory, an introduction to the geometry of the simplex method, sensitivity analysis, and integer program.

12.50. Simulation and Optimization Lab (Thực hành Mô phỏng và tối ưu hóa):

- Mã môn học: **CHE2035IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CHE2034IU Simulation and Optimization

- Mô tả nội dung môn học:

The lab aims to provide students with hands-on experience in applying various OR techniques and methods to solve real-world problems. Students will learn how to model and formulate optimization problems, analyze data, and implement OR algorithms.

The lab focuses on developing students' problem-solving skills within the context of operations research. This includes understanding problem structures, identifying appropriate mathematical techniques, and applying optimization algorithms to find optimal solutions. Students will gain proficiency in translating real-world problems into mathematical models. They will learn how to represent decision variables, objective functions, and constraints in mathematical notation, and formulate optimization models for different types of OR problems. The lab involves implementing OR algorithms using computational tools and software packages. Students will learn how to use OR software, coding languages, or optimization libraries to solve complex optimization problems efficiently.

12.51. Mass Transfer Operations (Quá trình và thiết bị truyền khối):

- Mã môn học: **CHE2041IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE2051IU Heat Transfer Operations
- Mô tả nội dung môn học:

Mass transfer processes are vital in chemical engineering because it is the method to separate or purify components from their mixtures. Through this course, students learn the principles of mass transfer and their application. The course integrates fluid dynamics and thermodynamics in order to develop rate expressions for mass transfer in multiphase and multicomponent systems. Based on Fick's law and phase equilibrium rules, the course provides knowledge of designing large scale separation processes such as distillation, extraction, drying, stripping and absorption to selectively obtain or remove specific components from mixtures.

12.52. Heat Transfer Operations (Quá trình và thiết bị truyền nhiệt):

- Mã môn học: **CHE2051IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1031IU Physical Chemistry 1
- Mô tả nội dung môn học:

The course will introduce the fundamental concepts of various modes of heat transfer: conduction, convection, and radiation. It will further elaborate these concepts with theories and applications to the solutions of practically relevant chemical engineering problems. Some aspects of process design principles of various heat transfer equipment will be taken

up in the later part of this course. Finally, to present a physical picture of the convection process, heat transfer in boundary layer flows will be addressed. Even though the course is primarily designed to meet the requirements of an undergraduate chemical engineering course on heat transfer, it will be useful for the practicing engineers to refresh with fundamental and technical information.

12.53. Chemical Reaction Engineering (Kỹ thuật phản ứng):

- Mã môn học: **CHE2061IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE2011IU Reaction Kinetics and Catalysis, CHE1043IU Physical Chemistry 2
- Mô tả nội dung môn học:

The fundamentals of chemical kinetics, as well as reactor analysis and design, are covered in detail and in depth in this course. Chemical kinetics covers a variety of topics, including rate constants, reaction order, rate equations for both simple and complex processes, kinetic data analysis, and product distribution. The primary areas of research in reactor analysis and design concern the ideal reactor systems and configurations, such as batch reactors, plug flow reactors, and continuous stirred tank reactors. The design component covers how to size such reactors, calculate conversion levels at various temperatures and pressures, and determine reaction kinetics from experimental data. It also covers how to choose the best reactor type and operating parameters to maximize the production of a desired product.

12.54. Mechanical Unit Operations (Các quá trình và thiết bị cơ học):

- Mã môn học: **CHE2071IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học song hành: CHE2041IU Mass Transfer Operations
- Mô tả nội dung môn học:

In chemical engineering processes, it is quite common that one must deal with fluids and solid particles in mixtures. In this course, students are provided with the basic knowledge of chemical engineering in fluid mechanics and mechanical process operations for heterogeneous systems. This subject is a vital part of background for a chemical engineer.

12.55. Occupational Introduction to Health Safety and Environment (An toàn sức khỏe nghề nghiệp và môi trường):

- Mã môn học: **CHE2081IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)

- Môn học trước: CHE2011IU Reaction Kinetics and Catalysis
- Mô tả nội dung môn học:

The course is to introduce students to the application of health safety and environment (HSE) concepts in engineering. It emphasizes mainly the management of risk associated with any hazardous products and processes throughout its life cycle. Generally, implementing an HSE program is to minimize and control the risks that come from any hazards of products and processes. This makes HSE an integral part of any engineering discipline.

12.56. Chemical Engineering Lab (Thực hành kỹ thuật hóa học):

- Mã môn học: **CHE2012IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học trước: CHE2041IU Mass Transfer Operations
- Mô tả nội dung môn học:

This course is designed for students pursuing a degree in chemical engineering and provides professional skills in applying fundamentals of chemical engineering via experimentation.

Students will be provided professional skills and techniques to understand fully and apply fundamentals of chemical engineering in various instruments/ machinery in different aspects such as reactions, heat transfer, mass transfer, etc.

12.57. Chemical Process Design and Simulation (Thiết kế và mô phỏng quá trình hóa học):

- Mã môn học: **CHE2092IU**
- Số tín chỉ: 3 tín chỉ (0 lý thuyết + 3 thực hành)
- Môn học trước: CHE2061IU Chemical Reaction Engineering; CHE2071IU, Mechanical Unit Operations; CE206IU Fluid mechanics
- Mô tả nội dung môn học:

To study the modeling & simulation techniques of chemical processes and to gain skills in using process simulators.

The goal of this course is to design and replicate an actual industrial procedure by utilizing open-source process simulation software. The process entails selecting appropriate units such as reactions and separation methods, fine-tuning operational parameters for optimization, and assessing the performance of these units based on criteria specified in the set requirements, such as production, selectivity, efficiency, and more. After determining these parameters, students will need to assess the economic viability of the studied process and relevant bibliographic data.

12.58. Green Chemical Engineering (Kỹ thuật hóa học xanh):

- Mã môn học: **CHE3111IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE2011IU Reaction Kinetics and Catalysis
- Mô tả nội dung môn học:

This course will introduce students with green chemical engineering in order to devise new technologies and methods of chemical processing that generate little or no pollution and also promote the practice of more sustainable engineering options. In particular, designing a chemical reactor to achieve maximum performance is the key for waste minimization. The course will focus on the principles of chemical reaction engineering with some key factors which influence reactor performance will be introduced.

12.59. Nanomaterials (Vật liệu nano):

- Mã môn học: **CHE3211IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1061IU Analytical chemistry 2, CHE2103IU Inorganic Chemistry, CHE1043IU Physical Chemistry 2
- Mô tả nội dung môn học:

This course will discuss the synthesis, properties characterization and applications of materials structured on the nanometer scale.

The course will discuss fabrication methods for nanomaterials, including physical and chemical methods. The optical, electronic, and catalytic properties of nanomaterials will be presented. The section dealing with the applications of nanomaterials is interactive: each group of students will be assigned a specific type or application of nanomaterials, which will be studied and presented to the class in a short lecture.

12.60. Biomaterials (Vật liệu sinh học):

- Mã môn học: **CHE3221IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

An engineer of chemical engineering major should understand biomaterials, and its surface modification for specific applications. Also, an engineer must understand how to choose materials and how to design a scaffold for specific implantation zone.

To explain basic principles of biocompatibility and implants performance, review different strategies to modify and/or design materials that are biocompatible. Also, this

course will explain what biodegradability is and how it affects biomaterial design. These allow students to understand material selection and structure-function relationships and read, understand and assimilate papers, publications and lectures in the biomaterials. Student will obtain enough knowledge to develop analysis and critical-thinking skills for the evaluation of relevant literature.

12.61. Organic Chemistry Synthesis (Tổng hợp hữu cơ):

- Mã môn học: **CHE3311IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1091IU Organic Chemistry 2
- Mô tả nội dung môn học:

This course provides the students with intermediate level of organic chemistry with an emphasis on organic synthesis. Organic synthesis is the process of building organic molecules from simpler starting materials through chemical reactions. This is an important subject since organic molecules form the basic fabric of life.

The students will gain understanding in fundamental reactions, mechanisms, and strategies of organic synthesis; will become proficient at reading organic chemistry literature and learn how to search for this information using modern information resources.

12.62. Advanced Engineering Drawing (Vẽ kỹ thuật nâng cao):

- Mã môn học: **CHE3414IU**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.

The aim of this course is to

- Provide the ability of effectively construct and manage the engineering drawing complied with TCVN and ISO by using AutoCAD software.

- Provide advanced knowledge for using and geometrical construction with the drawing instruments and AutoCAD software, the standard of presentation of engineering drawing.

12.63. Advanced Engineering Drawing Lab (Thực hành vẽ kỹ thuật nâng cao):

- Mã môn học: **CHE3415IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 thực hành)
- Môn học song hành: CHE3414IU Advanced Engineering Drawing
- Mô tả nội dung môn học:

This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.

The aim of this course is to

- Provide the ability of effectively construct and manage the engineering drawing complied with TCVN and ISO by using AutoCAD software.
- Provide advanced knowledge for using and geometrical construction with the drawing instruments and AutoCAD software, the standard of presentation of engineering drawing.

12.64. Environmental Chemistry 1 (Hóa môi trường 1):

- Mã môn học: **CHE3121IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1061IU Analytical chemistry 2
- Mô tả nội dung môn học:

This course is designed for students who are pursuing a degree in chemical engineering or any other related fields such as environmental chemistry, environmental science and environmental engineering.

Students are provided fundamental understanding of water chemistry including natural processes and pollution problems to water that will serve the students as a basis in all common phases of practice and research on environmental engineering, water pollution control, management, and monitoring water resource quality.

12.65. Environmental Chemistry 2 (Hóa môi trường 2):

- Mã môn học: **CHE3131IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course is designed for students pursuing a degree in chemical engineering and provides core knowledge in environmental monitoring with emphasizing on the chemistry

of atmosphere and solid waste. The knowledge of this course will be helpful for students to explain fate and behaviors of typical compounds in solid waste and ambient air.

Students will be provided with the knowledge about basic concepts related to atmospheric chemistry, solid waste and solid waste chemistry as well as basic compositions of solid waste and relevant solid waste treatment methods. Through this unit, students will know how to use chemical reaction occurring in environment to identify origin of products in solid waste treatment and atmosphere.

12.66. Heterogeneous Catalysis (Xúc tác dị thể):

- Mã môn học: **CHE3231IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước: CHE2011IU Reaction Kinetics and Catalysis

- Mô tả nội dung môn học:

More than 90% of all the chemical product formation processes are catalytic in nature and heterogeneous catalysis plays an enormous role. Heterogeneous catalysis plays a very important and defining role in most of the chemical industry. This course will be very useful for undergraduate and post-graduate students, and practitioners to understand heterogeneous catalytic processes. This course starts with basics of catalysis and goes deeper into various aspects of catalytic preparation and characterization techniques. Aspects of catalytic testing and reactor types are to be included. The topics will also include the study of reaction mechanism and kinetics of heterogeneous catalytic reactions. The effect of external and internal transport processes on reaction rates will be covered. Topics will include Modeling, parameter estimations and model discriminations. Catalyst deactivation, which is the main problem faced in heterogeneous catalytic process will be covered in detail. Various actual industrial catalytic processes will be discussed. New developments in catalysis will be covered. The concept of fuel cell catalysts, monolith catalysts and nanocatalysts will be introduced. The latest methods of catalyst design and corresponding simulations techniques will also be included in the course. Each topic will be developed progressively and associated with up-to-date information along with references. Wherever required the concepts will be illustrated with case studies and solved problems.

12.67. Methods for Natural Products and Drugs (Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc):

- Mã môn học: **CHE3327IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước: CHE1091IU Organic Chemistry 2; CHE1061IU Analytical Chemistry 2

- Mô tả nội dung môn học:

This course is to introduce the special methods and techniques used in studying of natural products and drugs. Topics to be covered include: typical methods for separation and isolation of natural products; structure determination of organic compound by modern analysis such as NMR, MS, IR,..; total synthesis of drugs and organic compounds.

The students will gain knowledge in separation and purification of natural products by using the chromatography techniques; be able to determinate structures of organic compounds by using instrument analysis methods; and to design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds; and can use lab equipment in isolation and synthesis of natural products and organic compounds.

12.68. Piping and Instruments System Design (Thiết kế đường ống và thiết bị):

- Mã môn học: **CHE3421IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước/môn học song hành/ môn học tiên quyết:

- Mô tả nội dung môn học:

This course equips students with principles and practices of designing “Piping and Instrumentation Diagram - P & ID Diagram” for the process industries. More specifically, the main contents of this course are:

1. Principles and practices for creating / designing P& ID diagrams that satisfy requirements on operability and controllability of the process, as well as requirement on process safety.

2. Knowledge related to drawing / presenting equipment and instruments on the P & ID, as well as presenting technical information that describes characteristics of equipment and instruments on the P&ID

3. Knowledge related to drawing P & ID.

12.69. Sustainable Energy (Năng lượng bền vững):

- Mã môn học: **CHE3141IU**

- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)

- Môn học trước/môn học song hành/ môn học tiên quyết:

- Mô tả nội dung môn học:

This course will introduce students with concepts of sustainable energy conversion. Some of the main energy conversion such as solar, wind, hydroelectricity, hydrogen, biomass and geothermal energy together with technologies of energy storage will be discussed.

12.70. Natural Gas Processing (Chế biến khí thiên nhiên):

- Mã môn học: **CHE3151IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course is to provide an overview of chemical processes typically implemented to process the natural gas extracted from the ground into a valuable commodity. This course includes basic elements of economic analysis, optimization, and the description of a few unit operations that are essential for the implementation of natural gas processing plants.

12.71. Bioinorganic Chemistry (Hóa sinh vô cơ):

- Mã môn học: **CHE3241IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1104IU Biochemistry; CHE2103IU Inorganic chemistry
- Mô tả nội dung môn học:

This course will take the students to the wonderland laying at the interface of inorganic chemistry and biochemistry. It first introduces the basic concepts of biochemistry and inorganic chemistry, which will serve as the basis for the extensive discussions on the diverse chemistry of metals in biology. As bioinorganic chemistry is a highly interdisciplinary field, this course cannot cover all aspects. This course focuses on the common themes found in the field. Some important systems and recent advances with potential applications will be highlighted.

12.72. Medicinal Chemistry (Hóa dược):

- Mã môn học: **CHE3331IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1104IU Biochemistry
- Mô tả nội dung môn học:

This course will cover the principles of drug actions and the design and development of potential therapeutics. The action and behavior of pharmaceutical compounds and the relationship between their structure and their chemical and therapeutic properties, and the chemical considerations in drug design will also be explored. Methods of drug discovery will be introduced including the development of drugs from natural products, computer modeling and rational drug design.

The students will be provided with fundamental knowledge of medicinal chemistry which allows to gain insights into how to choose a lead compound to be a medicinal drug, study its mechanism of action, identify the drug targets, evaluate its medicinal and toxic

effects, synthesize better analogues, and study the pathways for metabolism and elimination from the body.

12.73. Treatment Plant Operation (Vận hành nhà máy xử lý):

- Mã môn học: **CHE3431IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course provides the fundamentals for the cost-effective, safe, and lawful operation of wastewater or sanitation treatment systems. This course provides skills in experimental set-up used for operation units of wastewater treatment plants. It also provides the basics of environmental legislation and regulations, risk management, and HSE.

12.74. Corrosion Chemistry (Hóa học ăn mòn):

- Mã môn học: **CHE3251IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE1043IU Physical Chemistry 2; CHE2103IU Inorganic Chemistry; CHE1081IU Organic Chemistry 1
- Mô tả nội dung môn học:

This course will introduce students with concepts of corrosion. The mechanism of corrosion including active corrosion, galvanic corrosion, passivity and localized corrosion and electrochemical reduction reactions and environmentally assisted cracking will be covered. The methods of corrosion mitigation including cathodic protection, coatings, inhibitors and passivators as well as the influence of material's chemical composition and microstructure on corrosion behavior will also be discussed.

12.75. Project 1 (Đồ án môn học 1):

- Mã môn học: **CHE0042IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 Đồ án)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course is designed for chemical engineering students to supplement their knowledge and practical skills in research or design. The content of the project will vary depending on the requirements when organizing the course. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop inter-personal skills.

Students practice a project for research/ design topics, including identification of problem, specifying requirements, research/ technology proposal, and performing necessary experiment/calculation and design for main/principal contents/units in the project.

12.76. Project 2 (Đồ án môn học 2):

- Mã môn học: **CHE0072IU**
- Số tín chỉ: 2 tín chỉ (0 lý thuyết + 2 Đồ án)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This course is designed for chemical engineering students to supplement their knowledge and practical skills in research. The content of the project will vary depending on the requirements when organizing the class. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop interpersonal skills.

12.77. Environmental Pollution Control Engineering (Kỹ thuật Kiểm soát Ô nhiễm Môi trường):

- Mã môn học: **CHE3511IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước: CHE2041IU Mass Transfer Operations, CHE2071IU Mechanical Unit Operations
- Mô tả nội dung môn học:

This course provides additional knowledge and skills applicable to water and wastewater, air pollution and solid waste treatment for chemical engineering students.

This course will introduce students to a range of knowledge and skills applicable to water and wastewater, air pollution, and solid waste treatment. Students will gain an understanding of sources of pollution and the legislative framework. Principle and operation of key treatment units for water and wastewater, air pollution, and solid waste will be covered. Industrial pollution and waste treatment in some chemical and processing industries will be given as case studies.

12.78. Climate Change Mitigation and Adaptation (Giảm nhẹ và thích ứng với Biến đổi khí hậu):

- Mã môn học: **CHE3521IU**
- Số tín chỉ: 3 tín chỉ (3 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:

- Mô tả nội dung môn học:

This course provides knowledge about the science of the Earth's climate, driving forces of climate change, challenges and opportunities of climate change, effects of climate change on global natural resources and environments, and human's responding measures for climate change impacts.

12.79. Research Methodology (Phương pháp nghiên cứu khoa học):

- Mã môn học: **CHE0041U**
- Số tín chỉ: 2 tín chỉ (2 lý thuyết + 0 thực hành)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

Lectures include an introduction to scientific research, research planning and proposal development, experimental design and hypothesis testing, and publication procedures focusing on thesis/internship preparation. Students are requested to conduct a course project to evaluate how theory is applied in practice and develop interpersonal skills. Discussion of scientific misconduct is also an important part of this course.

The Research Methodology course is designed to provide participants with a comprehensive understanding of the fundamental principles, techniques, and processes involved in conducting rigorous and effective research across various disciplines. This course aims to equip students with the skills and knowledge necessary to design, execute, analyze, and interpret research studies ethically and methodologically soundly.

12.80. Research 1 (Nghiên cứu 1):

- Mã môn học: **CHE4012IU**
- Số tín chỉ: 1 tín chỉ (0 lý thuyết + 1 đồ án)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

This is a fully project-based course integrating six core digital competence modules aligned with the national digital competence framework. Students will engage in hands-on chemical engineering research projects from conception to presentation, while developing skills in data exploitation, digital collaboration, content creation, digital safety, problem-solving, and AI applications. The entire course revolves around a real-world research project carried out in teams, incorporating both laboratory and digital environments.

12.81. Internship 1 (Thực tập 1):

- Mã môn học: **CHE4062IU**
- Số tín chỉ: 2 tín chỉ (0 lý thuyết + 2 thực tập)
- Môn học trước/môn học song hành/ môn học tiên quyết:

- Mô tả nội dung môn học:

This course requires students to organize field trips by the School of Chemical and Environmental Engineering to learn about the functional activities in chemical engineering-related fields. By observing and exchanging information with officials and experts at research institutes and companies, students will better understand chemical engineering in practice and aggregate these understandings into a report.

12.82. Internship 2 (Thực tập 2):

- Mã môn học: **CHE4072IU**
- Số tín chỉ: 3 tín chỉ (0 lý thuyết + 3 thực tập)
- Môn học trước: CHE4062IU Internship 1
- Mô tả nội dung môn học:

Internships are opportunities for students to learn about and apply chemical engineering principles outside the classroom in the laboratory, workplace, and field. Before the internship, the faculty mentor assigns the student responsibilities previously agreed upon and approved by the department/school chair. These duties will vary depending on the particular discipline. The student will work accordingly under the guidance and direction of an internship mentor who is an employee of the internship site. In the end, students will submit to the department a written report and give an oral presentation in front of the committee of works done, as well as a report card including remarks and recommendations from the internship mentor.

12.83. Internship 3 (Thực tập 3):

- Mã môn học: **CHE4082IU**
- Số tín chỉ: 3 tín chỉ (0 lý thuyết + 3 thực tập)
- Môn học trước: CHE4072IU Internship 2, CHE2081IU Occupational Health Safety and Environment (HSE)
- Mô tả nội dung môn học:

The chemical engineering Internship program provides students with practical, hands-on experience in the field of chemical engineering. This course aims to bridge the gap between classroom learning and real-world application by offering students the opportunity to work in an industrial or research setting. Through this internship, students will gain valuable insights into the chemical engineering profession, enhance their technical skills, and develop a professional network.

12.84. Pre-thesis (Đề cương luận văn):

- Mã môn học: **CHE4512IU**
- Số tín chỉ: 2 tín chỉ (0 lý thuyết + 2 luận văn)
- Môn học trước/môn học song hành/ môn học tiên quyết:
- Mô tả nội dung môn học:

The Pre-Thesis in Chemical Engineering is a specialized course designed to guide students through the initial stages of their thesis research in the field of chemical engineering. Through interactive discussions, hands-on workshops, and expert guidance, students will develop a deep understanding of the research process, refine their research proposals, and lay the foundation for their upcoming thesis projects.

12.85. Thesis (Luận văn):

- Mã môn học: **CHE4522IU**
- Số tín chỉ: 10 tín chỉ (0 lý thuyết + 10 luận văn)
- Môn học trước: CHE4512IU Pre-thesis, Sinh viên đạt 90% số tín chỉ tích lũy của CTĐT
- Mô tả nội dung môn học:

A thesis is a semester-long course taken in the senior year following the success of the pre-thesis work. This is an independent work; students are expected to spend approximately 30 hours per week. Students work on a specific research topic whose plan has been developed in detail. Students and advisors meet to discuss together as much as needed. The work can be experiments and/or simulations to discover the effects of certain factors on a scientific issue. For unsatisfactory work, students must prolong the time until completion. In an unavoidable situation, students may require to change the topic or the advisor. The course culminates in a written thesis report. Students also defend their results in an oral presentation in front of a thesis defense committee, in due form.

TRƯỞNG KHOA

**KT. HIỆU TRƯỞNG
PHÓ HIỆU TRƯỞNG**

Huỳnh Kim Lâm

Đinh Đức Anh Vũ

Phụ lục 1
NỘI DUNG ĐIỀU CHỈNH
CHƯƠNG TRÌNH ĐÀO TẠO NGÀNH KỸ THUẬT HÓA HỌC
KHÓA 2025 SO VỚI KHÓA 2024
(Kèm theo Quyết định số /QĐ-ĐHQT ngày 04 tháng 9 năm 2025
của Hiệu trưởng Trường Đại học Quốc tế)

1. Các môn học loại bỏ khỏi chương trình đào tạo

TT	Mã môn học	Tên môn học	Loại MH	Số TC			Lý do
				Tổng	LT	TH	
1.	ENEE1019IU	Applied Statistics	Bắt buộc	2	2	0	Bỏ môn học này để thay thế bằng môn học chung của nhóm ngành Khoa học sự sống và hóa học. Về nội dung thì môn học mới không có thay đổi mà chỉ đổi mã môn học để đưa về BM Toán phụ trách giảng dạy cho cả nhóm ngành.
2.	ENEE1019IU	Applied Statistics Lab	Bắt buộc	1	0	1	Bỏ môn học này để thay thế bằng môn học chung của nhóm ngành Khoa học sự sống và hóa học. Về nội dung thì môn học mới không có thay đổi mà chỉ đổi mã môn học để đưa về BM Toán phụ trách giảng dạy cho cả nhóm ngành.
3.	CHE0052IU	Project 2	Tự chọn	1	0	1	Bỏ 02 môn học này để thay thế môn học khác tương đương 02 tín chỉ cùng nhóm môn tự chọn
4.	CHE0062IU	Project 3	Tự chọn	1	0	1	

2. Các môn học bổ sung vào chương trình đào tạo

TT	Mã môn học	Tên môn học	Loại MH	Số TC			Lý do
				Tổng	LT	TH	
1.	MA040IU	Applied Statistics	Bắt buộc	2	2	0	Môn học chung của nhóm ngành Khoa học sức khỏe và hóa học; Thay thế cho môn học “ENEE1019IU - Applied Statistics” với cùng nội dung, chỉ khác mã môn học để đưa về BM Toán phụ trách giảng dạy môn này
2.	MA041IU	Applied Statistics Lab	Bắt buộc	1	0	1	Môn học chung của nhóm ngành Khoa học sức khỏe và hóa học Thay thế cho môn học “ENEE1020IU - Applied Statistics Lab” với cùng nội dung, chỉ khác mã môn học để đưa về BM Toán phụ trách giảng dạy môn này
3.	CHE0072IU	Project 2	Tự chọn	2	0	2	Bổ sung môn học tự chọn 02 tín chỉ để có thể bù tín chỉ cho các môn cần xét tương đương/ thay thế giữa CTĐT các khóa sau khi điều chỉnh; việc điều chỉnh không làm thay đổi số tín chỉ của nhóm môn tự chọn và CTĐT

3. Các điều chỉnh khác

Cập nhật nhỏ và chỉnh sửa syllabus theo format mới của Trường (điều chỉnh nội dung và thời gian giảng dạy trong vòng 15 tuần bao gồm thời gian kiểm tra giữa kỳ, thay vì có 02 tuần thi riêng biệt + 15 tuần giảng dạy như hiện nay).

Điều chỉnh trình độ năng lực của các môn học cho phù hợp hơn. Cụ thể CTĐT cho kỹ sư (bậc 6) có sự thống nhất chung về trình độ năng lực của các môn học như sau:

- Về kiến thức: mức trình độ thấp nhất là mức 4
- Về kỹ năng, thái độ: mức trình độ thấp nhất là mức 3

Các mức trình độ theo cấu trúc chung sẽ tăng dần theo theo các khối kiến thức: các môn đại cương (kiến thức: 4 | kỹ năng, thái độ: 3) < các môn cơ sở ngành (kiến thức: 4 | kỹ năng, thái độ: 3-4) < các môn chuyên ngành (bắt buộc và tự chọn, kiến thức: 5 | kỹ năng, thái độ: 4) < Thực tập (thực tập 1 < thực tập 2 < thực tập 3, kiến thức: 3-5 | kỹ năng, thái độ: 3-5) < Đề cương luận văn (bậc 5) Luận văn (bậc 5)

Cập nhật đề cương môn học Research 1 với khung cấu trúc cũ và đưa vào các module về năng lực số như sau:

Module	Nội dung
Modul 1	Khai thác dữ liệu và thông tin
Modul 2	Giao tiếp và hợp tác trong môi trường số
Modul 3	Sáng tạo nội dung số
Modul 4	An toàn
Modul 5	Giải quyết vấn đề
Modul 6	Ứng dụng trí tuệ nhân tạo

4. Hướng xử lý cho các sinh viên khóa cũ khi chưa học các môn học bị loại bỏ khỏi chương trình đào tạo

TT	Mã môn học	Tên môn học	Số TC (LT, TH)	Hướng xử lý
1.	ENEE1019IU	Applied Statistics	2(2,0)	Sinh viên môn học thay thế: MA040IU - Applied Statistics
2.	ENEE1019IU	Applied Statistics Lab	1(0,1)	Sinh viên môn học thay thế: MA041IU - Applied Statistics Lab
3.	CHE0052IU	Project 2	1(0,1)	Môn học không xếp thời khóa biểu, sinh viên vẫn đăng ký theo mã môn cũ đúng với CTĐT.
4.	CHE0062IU	Project 3	1(0,1)	

Phụ lục 2
BẢNG MÔ TẢ SỐ TÍN CHỈ THỰC TẬP CỦA CHƯƠNG TRÌNH ĐÀO TẠO
ĐƯỢC THỂ HIỆN CỤ THỂ THEO MÔN HỌC ĐỂ ĐẢM BẢO
8 TÍN CHỈ THỰC TẬP THEO QUY ĐỊNH TẠI THÔNG TƯ 17/2021/TT-BGDĐT
(Kèm theo Quyết định số /QĐ-ĐHQT ngày 04 tháng 9 năm 2025
của Hiệu trưởng Trường Đại học Quốc tế)

TT.	Mã MH	Tên môn học		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ học trước (HT)/ song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực tập	
1	CHE4062IU	Internship 1	Thực tập 1	Bắt buộc	2	0	2	
2	CHE4072IU	Internship 2	Thực tập 2	Bắt buộc	3	0	3	HT: 1. CHE4062IU - Internship 1
3	CHE4082IU	Internship 3	Thực tập 3	Bắt buộc	3	0	3	HT: 1. CHE4072IU - Internship 2; 2. CHE2081IU - Occupational Introduction to Health Safety and Environment
	Tổng				8	0	8	

Phụ lục 3
MỨC ĐỘ ĐÁP ỨNG KHUNG NĂNG LỰC SỐ CỦA CHƯƠNG TRÌNH ĐÀO TẠO
(Kèm theo Quyết định số /QĐ-ĐHQT ngày 04 tháng 9 năm 2025
của Hiệu trưởng Trường Đại học Quốc tế)

* Đáp ứng Thông tư 02/2025/TT-BGDĐT ngày 24/01/2025 của Bộ Giáo dục và Đào tạo Quy định về Khung năng lực số cho người học.

I. Mức độ đáp ứng khung năng lực số của chương trình đào tạo

1. Miền năng lực 1: Khai thác dữ liệu và thông tin

* Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần (NLTP)		
			NLTP 1.1	NLTP 1.2	NLTP 1.3
1	CHE4012IU	Research 1 (CLO1)	4	4	4
2	CHE0041IU	Research Methodology (CLO2)	4	4	4

2. Miền năng lực 2: Giao tiếp và hợp tác trong môi trường số

* Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần					
			NLTP 2.1	NLTP 2.2	NLTP 2.3	NLTP 2.4	NLTP 2.5	NLTP 2.6
1	CHE4012IU	Research 1 (CLO3)	4	4	4	4	4	4
2	CHE0041IU	Research Methodology (CLO4)	4	4		4	4	

3. Miền năng lực 3: Sáng tạo nội dung số

** Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)*

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần			
			NLTP 3.1	NLTP 3.2	NLTP 3.3	NLTP 3.4
1	CHE4012IU	Research 1 (CLO4 và CLO2)	4	4	4	4
2	CHE0041IU	Research Methodology (CLO5)			4	

4. Miền năng lực 4: An toàn

** Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)*

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần			
			NLTP 4.1	NLTP 4.2	NLTP 4.3	NLTP 4.4
1	CHE4012IU	Research 1 (CLO6)	4	4	4	4

5. Miền năng lực 5: Giải quyết vấn đề

** Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)*

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần			
			NLTP 5.1	NLTP 5.2	NLTP 5.3	NLTP 5.4
1	CHE4012IU	Research 1 (CLO5)	4	4	4	4

6. Miền năng lực 6: Ứng dụng trí tuệ nhân tạo

* Đánh giá năng lực thành phần theo 8 bậc của Khung năng lực số (từ bậc 1 đến bậc 8)

STT	Mã MH	Tên MH (Tiếng Anh)	Năng lực thành phần		
			NLTP 6.1	NLTP 6.2	NLTP 6.3
1	CHE4012IU	Research 1 (CLO5)	4	4	4
2	CHE0041IU	Research Methodology (CLO2, CLO5)	4	4	4

II. Phương pháp đánh giá chuẩn đầu ra khung năng lực số

Miền năng lực	Năng lực thành phần (NLTP)	Môn học (Mã môn- Tên môn)	Hình thức đánh giá
1. Khai thác dữ liệu và thông tin	NLTP 1.1	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Assignments; Report Assignments
	NLTP 1.2	CHE4012IU- <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Project Assignments
	NLTP 1.3	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Project Assignments
2. Giao tiếp và hợp tác trong môi trường số	NLTP 2.1	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Assignments; Observation Assignments
	NLTP 2.2	CHE4012IU - <i>Research 1</i>	Assignments; Observation

Miền năng lực	Năng lực thành phần (NLTP)	Môn học (Mã môn- Tên môn)	Hình thức đánh giá
		<i>CHE0041IU - Research Methodology</i>	Assignments
	NLTP 2.3	<i>CHE4012IU- Research 1</i>	Assignments; Observation
	NLTP 2.4	<i>CHE4012IU - Research 1</i> <i>CHE0041IU - Research Methodology</i>	Assignments; Observation Assignments
	NLTP 2.5	<i>CHE4012IU - Research 1</i> <i>CHE0041IU - Research Methodology</i>	Assignments; Observation Assignments
	NLTP 2.6	<i>CHE4012IU- Research 1</i>	Assignments; Observation
3. Sáng tạo nội dung số	NLTP 3.1	<i>CHE4012IU - Research 1</i>	Digital product; Report
	NLTP 3.2	<i>CHE4012IU - Research 1</i>	Assignments; Observation
	NLTP 3.3	<i>CHE4012IU - Research 1</i> <i>CHE0041IU - Research Methodology</i>	Assignments; Observation Assignments
	NLTP 3.4	<i>CHE4012IU - Research 1</i>	Assignments; Observation
4. An toàn	NLTP 4.1	<i>CHE4012IU - Research 1</i>	Assignments; Report
	NLTP 4.2	<i>CHE4012IU - Research 1</i>	Assignments; Report
	NLTP 4.3	<i>CHE4012IU - Research 1</i>	Assignments; Report

Miền năng lực	Năng lực thành phần (NLTP)	Môn học (Mã môn- Tên môn)	Hình thức đánh giá
	NLTP 4.4	CHE4012IU - <i>Research 1</i>	Assignments; Report
5. Giải quyết vấn đề	NLTP 5.1	CHE4012IU - <i>Research 1</i>	Assignments; Report
	NLTP 5.2	CHE4012IU - <i>Research 1</i>	Assignments; Report
	NLTP 5.3	CHE4012IU - <i>Research 1</i>	Assignments; Report
	NLTP 5.4	CHE4012IU - <i>Research 1</i>	Assignments; Report
6. Ứng dụng trí tuệ nhân tạo	NLTP 6.1	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Assignments; Report Assignments
	NLTP 6.2	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Assignments; Report Assignments
	NLTP 6.3	CHE4012IU - <i>Research 1</i> CHE0041IU - <i>Research Methodology</i>	Assignments; Report Assignments

Phụ lục 4
ĐỀ CƯƠNG CHI TIẾT CÁC MÔN HỌC
(Kèm theo Quyết định số /QĐ-ĐHQT ngày 04 tháng 9 năm 2025
của Hiệu trưởng Trường Đại học Quốc tế)

STT	Mã MH	Tên môn học
1	PE015IU	Philosophy of Marxism and Leninism
2	PE016IU	Political economics of Marxism and Leninism
3	PE017IU	Scientific socialism
4	PE018IU	History of Vietnamese Communist Party
5	PE019IU	Ho Chi Minh's Thoughts
6	PE021IU	General Law
7	PE008IU	Critical Thinking
8	PE020IU	Engineering Ethics and Professional Skills
9	EN007IU	Writing AE1
10	EN008IU	Listening AE1
11	EN011IU	Writing AE2
12	EN012IU	Speaking AE2
13	MA001IU	Calculus 1
14	MA003IU	Calculus 2
15	PH013IU	Physics 1 - Mechanics
16	CH011IU	Chemistry for Engineers
17	CH012IU	Chemistry Laboratory
18	ENEE1013IU	Engineering Drawing
19	ENEE1014IU	Engineering Drawing Lab
20	MA040IU	Applied Statistics
21	MA041IU	Applied Statistics Lab
22	CHE0011IU	Applied Mechanics
23	CE205IU	Fluid Mechanics
24	CE206IU	Fluid Mechanics Lab
25	IT120IU	Entre- preneurship
26	ENEE4011IU	Engineering Project Management
27	BA115IU	Introduction to Business Administration
28	BA154IU	Entre- preneurship and Small Business Management
29	CHE0051IU	Entre- preneurship and Sustainability in Engineering
30	CHE1011IU	Introduction to Chemical Engineering
31	CHE2103IU	Inorganic Chemistry

STT	Mã MH	Tên môn học
32	CHE2104IU	Inorganic Chemistry Lab
33	CHE1081IU	Organic Chemistry 1
34	CHE1091IU	Organic Chemistry 2
35	CHE1092IU	Organic Chemistry Laboratory
36	CHE1051IU	Analytical Chemistry 1
37	CHE1061IU	Analytical Chemistry 2
38	CHE1062IU	Analytical Chemistry Laboratory
39	CHE1031IU	Physical Chemistry 1
40	CHE1043IU	Physical Chemistry 2
41	CHE1044IU	Physical Chemistry 2 Lab
42	CHE1104IU	Biochemistry
43	CHE1105IU	Biochemistry Lab
44	CHE1021IU	Process Instrumentation and Control
45	CHE1111IU	Industrial Chemistry
46	CHE2011IU	Reaction Kinetics and Catalysis
47	CHE2024IU	Computational Chemistry
48	CHE2025IU	Computational Chemistry lab
49	CHE2034IU	Simulation and Optimization
50	CHE2035IU	Simulation and Optimization Lab
51	CHE2041IU	Mass Transfer Operations
52	CHE2051IU	Heat Transfer Operations
53	CHE2061IU	Chemical Reaction Engineering
54	CHE2071IU	Mechanical Unit Operations
55	CHE2081IU	Occupational Introduction to Health Safety and Environment
56	CHE2012IU	Chemical Engineering Lab
57	CHE2092IU	Chemical Process Design and Simulation
58	CHE3111IU	Green Chemical Engineering
59	CHE3211IU	Nanomaterials
60	CHE3221IU	Biomaterials
61	CHE3311IU	Organic Chemistry Synthesis
62	CHE3414IU	Advanced Engineering Drawing
63	CHE3415IU	Advanced Engineering Drawing Lab
64	CHE3121IU	Environmental Chemistry 1
65	CHE3131IU	Environmental Chemistry 2
66	CHE3231IU	Heterogeneous Catalysis
67	CHE3327IU	Methods for Natural Products and Drugs
68	CHE3421IU	Piping and Instruments System Design
69	CHE3141IU	Sustainable Energy
70	CHE3151IU	Natural Gas Processing
71	CHE3241IU	Bioinorganic Chemistry
72	CHE3331IU	Medicinal Chemistry
73	CHE3431IU	Treatment Plant Operation
74	CHE3251IU	Corrosion Chemistry

STT	Mã MH	Tên môn học
75	CHE0042IU	Project 1
76	CHE0072IU	Project 2
77	CHE3511IU	Environmental Pollution Control Engineering
78	CHE3521IU	Climate Change Mitigation and Adaptation
79	CHE0041IU	Research Methodology
80	CHE4012IU	Research 1
81	CHE4062IU	Internship 1
82	CHE4072IU	Internship 2
83	CHE4082IU	Internship 3
84	CHE4512IU	Pre-thesis
85	CHE4522IU	Thesis

ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
KHOA CHÍNH TRỊ - HÀNH CHÍNH

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC
(Dành cho trường Đại học Quốc Tế)

1. Thông tin tổng quát

- Tên môn học:

+ Tiếng Việt

+ Tiếng Anh

- Mã số môn học: PE015IU

- Thuộc khối kiến thức/kỹ năng:

☒ Kiến thức cơ bản/giáo dục đại cương

☐ Kiến thức chuyên ngành

☐ Môn học chuyên về kỹ năng chung

- Số tín chỉ:

+ Lý thuyết

+ Thực hành (thuyết trình)

- Môn học tiên quyết: Không

- Môn học trước: Không

- Môn học song hành: Không

Triết học Mác-Lênin

Philosophy of Marxism – Leninism

☐ Kiến thức cơ sở ngành

☐ Kiến thức khác

☐ Môn học đồ án/luận văn tốt nghiệp

03

30 (trên lớp)

15 (trên lớp)

90 (về nhà)

2. Mô tả môn học

(vị trí của môn học đối với chương trình đào tạo (CTĐT), những mục đích và nội dung chính yếu của môn học)

Môn học thuộc phần kiến thức giáo dục đại cương thuộc mảng lý luận chính trị, trang bị cho sinh viên những kiến thức cơ bản về triết học Mác-Lênin. Môn học nghiên cứu những quy luật vận động, phát triển chung nhất của tự nhiên, xã hội, tư duy; gồm 3 chương: Triết học và vai trò của triết học trong đời sống xã hội, chủ nghĩa duy vật biện chứng và chủ nghĩa duy vật lịch sử.

3. Tài liệu học tập

(Các giáo trình, tài liệu tham khảo, các phần mềm, không quá 5 cuốn)

Giáo trình:

[1] Bộ Giáo dục và Đào tạo (2021), *Giáo trình Triết học Mác – Lênin*, (dùng cho khối không chuyên ngành lý luận chính trị), Nxb. Chính trị quốc gia, Hà Nội.

[2] Bộ Giáo dục và Đào tạo (2012), *Giáo trình Những Nguyên lý cơ bản của chủ nghĩa Mác – Lênin*, Nxb. Chính trị quốc gia, Hà Nội.

[3] Hội đồng Trung ương (2008), *Giáo trình Triết học Mác-Lênin*, Nxb. Chính trị quốc gia, Hà Nội.

Tài liệu khác:

[1] Triết học Mác-Lênin (Bộ câu hỏi hướng dẫn ôn thi môn triết học), Nxb Sự thật, Hà Nội, 1980

[2] Triết học Mác-Lênin, tập 1 và 2, Nxb Sách giáo khoa Mác - Lênin, Hà Nội, 1995



Phần mềm:**4. Mục tiêu môn học**

(các mục tiêu tổng quát của môn học, thể hiện sự liên quan với các chuẩn đầu ra (X.x.x) của CTĐT và trình độ năng lực (TĐNL) được phân bổ cho môn học)

Mục tiêu (1)	Mô tả mục tiêu (2)	CDR của môn học tương ứng CTĐT (3)	TĐNL tương ứng CTĐT (4)
G1	4.1 Về kiến thức Sinh viên hiểu được vai trò của triết học Mác - Lênin trong đời sống xã hội và những nội dung cơ bản về: Chủ nghĩa duy vật biện chứng và chủ nghĩa duy vật lịch sử.		
G2	4.2. Về kỹ năng Sinh viên vận dụng, phân tích được những tri thức cơ bản của triết học Mác - Lênin về chủ nghĩa duy vật biện chứng và chủ nghĩa duy vật lịch sử vào việc nhận thức, lý giải các hiện tượng, quy luật trong đời sống xã hội Việt Nam và thế giới.		
G3	4.3. Về thái độ/năng lực tự chủ và trách nhiệm Sinh viên đánh giá được giá trị, tính khoa học cách mạng và nhân văn của triết học Mác - Lênin đối với thực tiễn Việt Nam và nhân loại		

(1): Ký hiệu mục tiêu của môn học.

(2): Mô tả các mục tiêu bao gồm các động từ chủ động, các chủ đề CDR (X.x.x) và bối cảnh áp dụng tổng quát

(3), (4): Ký hiệu CDR của CTĐT và TĐNL tương ứng được phân bổ cho môn học.

5. Chuẩn đầu ra môn học

(các mục cụ thể hay CDR của môn học và mức độ giảng dạy I, T, U)

CDR (1)	Mô tả CDR (2)	Mức độ giảng dạy (3)
G1.1	Sinh viên hiểu những tri thức cơ bản về triết học nói chung, những điều kiện ra đời của triết học Mác – Lênin. Đồng thời giúp sinh viên phân tích, đánh giá được thực chất cuộc cách mạng trong triết học do C.Mác và Ph.Ăngghen thực hiện và các giai đoạn hình thành, phát triển triết học Mác – Lênin; Vai trò của triết học Mác trong đời sống xã hội và trong thời đại ngày nay.	I, T
G1.2	Sinh viên hiểu được quan điểm của chủ nghĩa duy vật biện chứng về vật chất, các hình thức, phương thức tồn tại của vật chất; nguồn gốc, bản chất của ý thức; mối quan hệ biện chứng giữa vật chất và ý thức.	I.T. U

	Sinh viên hiểu được những nội dung cơ bản của phép biện chứng duy vật; ý nghĩa phương pháp luận trong nhận thức và thực tiễn. Sinh viên hiểu những kiến thức cơ bản về lý luận nhận thức của chủ nghĩa duy vật biện chứng; ý nghĩa phương pháp luận.	
G1.3	Sinh viên hiểu những kiến thức về học thuyết hình thái kinh tế - xã hội; vận dụng ý nghĩa phương pháp luận vào thực tiễn của Việt Nam. Giúp sinh viên hiểu được những quan điểm cơ bản của triết học Mác – Lênin về giai cấp; về nhà nước và cách mạng xã hội; về dân tộc, quan hệ giai cấp - dân tộc – nhân loại; ý nghĩa phương pháp luận trong nhận thức những vấn đề cơ bản của cách mạng Việt Nam. Sinh viên hiểu những quan điểm cơ bản của triết học Mác – Lênin về con người, về ý thức xã hội, sự vận dụng vào cách mạng Việt Nam.	I, T, U
G2.1	Sinh viên phân tích mang tính khái quát hóa để rút ra <i>Từ khóa tri thức</i> đối với mỗi nội dung và tư duy có hệ thống.	U
G2.2	Sinh viên vận dụng trình bày, thuyết minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu dựa trên thực tiễn.	U
G2.3	Sinh viên vận dụng trong giao tiếp xã hội, hợp tác và làm việc nhóm, chia sẻ tri thức và kinh nghiệm, khả năng điều hành nhóm làm việc.	U
G3.1	Sinh viên phân tích, đánh giá được những nền tảng khoa học và cách mạng của chủ nghĩa duy vật biện chứng và chủ nghĩa duy vật lịch sử.	U
G3.2	Sinh viên vận dụng lập trường mácxít nhằm đấu tranh chống lại các quan điểm sai trái, xuyên tạc triết học Mác – Lênin.	U

(1): Ký hiệu CDR của môn học

(2): Mô tả CDR, bao gồm các động từ chủ động, các chủ đề CDR ở cấp độ 4 (X.x.x.x) và bối cảnh áp dụng cụ thể.

(3): I (Introduce): giới thiệu; T (Teach): dạy; U (Utilize): sử dụng

6. Đánh giá môn học

(các thành phần, các bài đánh giá, các tiêu chí đánh giá, chuẩn đánh giá, và tỷ lệ đánh giá, thể hiện sự tương quan với các CDR của môn học)

Thành phần đánh giá (1)	Bài đánh giá (2)	CDR môn học (3)	Tỷ lệ % (4)
A1. Đánh giá quá trình	- Chuyên cần (A1.1) - Tham gia học tập trên lớp tích cực, hăng hái phát biểu (A1.2) - Thuyết trình nhóm (A1.3)	G1.1, G1.2- G1.3, G2.1, G2.2- G2.3 G3.1-	30%

		G3.2	
A2. Đánh giá giữa kỳ	Hình thức tự luận hoặc trắc nghiệm (A2.1)	G1.1 G2.1- G2.2, G3.1- G3.2	20%
A3. Đánh giá cuối kỳ	- Hình thức tự luận, sinh viên được sử dụng tài liệu giấy, không sử dụng thiết bị nối mạng khi làm bài thi: 75 phút (A3.1) - Điểm thưởng (tối đa 20% của điểm cuối kỳ)	G1.2- G1.3, G2.1- G2.2, G3.1- G3.2	50%

(1): các thành phần đánh giá của môn học.

(2): các bài đánh giá

(3): các CDR được đánh giá.

(4): tiêu chí đánh giá.

(5): chuẩn đánh giá

(6): Tỷ lệ điểm của các bài đánh giá trong tổng điểm môn học

7. Kế hoạch giảng dạy chi tiết

(các nội dung giảng dạy theo buổi học, thể hiện sự tương quan với các CDR của môn học, các hoạt động dạy và học (ở lớp, ở nhà) và các bài đánh giá của môn học)

Lý thuyết

1	Nội dung (2)	CDR môn học (3)	Hoạt động dạy và học (4)	Bài đánh giá (5)
1/3 tiết	Giới thiệu về môn học Chương 1 TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI I. triết học và vấn đề cơ bản của triết học 1. Khái lược về triết học - Nguồn gốc ra đời của triết học 1. Khái lược về triết học	G1.1	Hoạt động dạy: - Giới thiệu đề cương môn học - Giới thiệu nội dung đề tài thuyết trình nhóm) - Trình chiếu, thuyết giảng Hoạt động học: - Chia nhóm - Giới thiệu nhóm học tập - Nghe giảng, phát biểu - Đọc trước mục I, II của chương 1	A1.1, A1.2, A2.1, A3.1
2/3 tiết	Chương 1 TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI	G1.1 G2.2 G2.3	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học:	A1.1, A1.2, A2.1, A3.1

	I. Triết học và vấn đề cơ bản của triết học (tt) 1. Khái lược về triết học - Khái niệm triết học 2. <i>Vấn đề cơ bản của triết học</i>		- Nghe giảng, phát biểu - Phác thảo nội dung thuyết trình nhóm - Đọc trước phần I, mục 3, chương 1.	
3/3 tiết	Chương 1 TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI (tiếp theo) I. Triết học và vấn đề cơ bản của triết học (tt) 3. <i>Biện chứng và siêu hình</i>	G1.1 G2.2 G2.3	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu - Phác thảo nội dung thuyết trình nhóm - Đọc trước phần II chương 1.	A1.1, A1.2, A2.1, A3.1
4/3 tiết	Chương 1 TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI (tiếp theo) II. Triết học Mác - Lênin và vai trò của triết học Mác - Lênin trong đời sống xã hội 1. <i>Sự ra đời và phát triển của triết học Mác - Lênin</i> - Giới thiệu nội dung mục 2.3	G1.1 G2.2 G2.3	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu - Phác thảo nội dung thuyết trình nhóm - Đọc trước phần I chương 1.	A1.1, A1.2, A2.1, A3.1
5/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN CHỨNG I. Vật chất và ý thức 1. <i>Vật chất và các hình thức tồn tại của vật chất</i> 2. <i>Nguồn gốc, bản chất và kết cấu của ý thức</i>	G1.2 G2.1 G2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước mục 3 phần I chương 2.	A1.1, A1.2, A2.1, A3.1
6/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN CHỨNG I. Vật chất và ý thức 3. <i>Mối quan hệ giữa vật chất và ý thức</i> II. Phép biện chứng duy vật 1. <i>Hai loại hình biện chứng và phép biện chứng duy vật</i>	G1.2 G2.1 G2.2 G3.1 G3.2 G1.3	- Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước mục 1,2 phần II chương 2.	A1.1, A1.2, A2.1, A3.1
7/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN	G1.3 G2.1	Hoạt động dạy: - Trình chiếu, thuyết	A1.1, A1.2,

	CHỨNG (tiếp theo) II. Phép biện chứng duy vật 2. Nội dung của phép biện chứng duy vật a. Hai nguyên lý. - Nguyên lý về mối liên hệ phổ biến - Nguyên lý về sự phát triển - Kiểm tra giữa kỳ	G.2.2 G3.1 G3.2	giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước mục 2 phần II chương 2.	A3.1
8/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN CHỨNG (tiếp theo) II. Phép biện chứng duy vật 2. Nội dung của phép biện chứng duy vật c. Các cặp phạm trù của PBCDV - Phạm trù cái riêng – cái chung - Phạm trù nguyên	G1.3 G2.1 G.2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước mục 2 phần II chương 2.	A1.1, A1.2, A3.1
9/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN CHỨNG (tiếp theo) II. Phép biện chứng duy vật 2. Nội dung của phép biện chứng duy vật c. Ba quy luật: - Quy luật Lượng – Chất. - Quy luật thống nhất và đấu tranh của các mặt đối lập	G1.3 G2.1 G.2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước phần III chương 2.	A1.1, A1.2, A3.1
10/3 tiết	Chương 2 CHỦ NGHĨA DUY VẬT BIỆN CHỨNG (tiếp theo) III. Lý luận nhận thức 1. Các nguyên tắc của lý luận nhận thức duy vật biện chứng 2. Nguồn gốc, bản chất của nhận thức 3. Thực tiễn và vai trò của thực tiễn đối với nhận thức - Giới thiệu mục 4.5	G1.3 G2.1 G.2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước phần I chương 3.	A1.1, A1.2, A3.1
11/3 tiết	Chương 3 CHỦ NGHĨA DUY VẬT LỊCH SỬ I. Học thuyết hình thái kinh tế - xã hội 1. Sản xuất vật chất là cơ sở của sự tồn tại và phát triển xã hội	G1.4 G2.1 G.2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình.	A1.1, A1.2, A3.1

	2. Biện chứng giữa lực lượng sản xuất và quan hệ sản xuất		- Đọc trước mục 3.4 phần I chương 3.	
12/3 tiết	Chương 3 CHỦ NGHĨA DUY VẬT LỊCH SỬ I. Học thuyết hình thái kinh tế - xã hội 3. Biện chứng giữa cơ sở hạ tầng và kiến trúc thượng tầng của xã hội 4. Sự phát triển các hình thái kinh tế - xã hội là một quá trình lịch sử - tự nhiên	G1.4 G2.1 G2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước phần II và phần III chương 3.	A1.1, A1.2, A1.3, A3.1
13/3 tiết	Chương 3 CHỦ NGHĨA DUY VẬT LỊCH SỬ (tiếp theo) -Giới thiệu các khái niệm II. Giai cấp và dân tộc 1. Vấn đề giai cấp và đấu tranh giai cấp 2. Dân tộc 3. Mối quan hệ giai cấp - dân tộc - nhân loại III. Nhà nước và cách mạng xã hội 1. Nhà nước	G1.4 G2.1 G2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước phần IV chương 3.	A1.1, A1.2, A1.3, A3.1
14/3 tiết	Chương 3 CHỦ NGHĨA DUY VẬT LỊCH SỬ (tiếp theo) IV. Ý thức xã hội 1. Khái niệm tồn tại xã hội và các yếu tố cơ bản của tồn tại xã hội 2. Ý thức xã hội và kết cấu của ý thức xã hội	G1.4 G2.1 G2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng Hoạt động học: - Nghe giảng, phát biểu, làm việc nhóm, thuyết trình. - Đọc trước phần V chương 3.	A1.1, A1.2, A1.3, A3.1
15/3 tiết	Chương 3 CHỦ NGHĨA DUY VẬT LỊCH SỬ (tiếp theo) V. Triết học về con người 1. Khái niệm con người và bản chất con người - Giới thiệu mục 2.3.4 - Ôn tập thi cuối kỳ	G1.4 G2.1 G2.2 G3.1 G3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng - Ôn tập thi cuối kỳ Hoạt động học: - Thuyết trình, thảo luận nhóm - Nghe giảng, ôn tập	A1.1, A1.2, A1.3, A3.1

(1): Thông tin về tuần/buổi học.

(2): Liệt kê nội dung giảng dạy theo chương, mục

(3): Liệt kê CDR liên quan của môn học (ghi ký hiệu Gx.x),

(4): Liệt kê các hoạt động dạy và học (ở lớp, ở nhà), bao gồm đọc trước tài liệu

(nếu có yêu cầu)

(5): Liệt kê các bài đánh giá liên quan (ghi ký hiệu Ax.x)

Thực hành

Tuần/Buổi học (1)	Nội dung (2)	CĐR môn học (3)	Hoạt động dạy và học (4)	Bài đánh giá (5)
...	Bài thực hành 1: ...	Gx.x ...	Dạy: ... Học ở lớp: ... Học ở nhà: ...	Ax.x ...

(1): Thông tin về tuần/buổi học. (2): Liệt kê nội dung thực hành theo bài thực hành

(3): Liệt kê CĐR liên quan của môn học (ghi ký hiệu Gx.x),

(4): Liệt kê các hoạt động dạy và học (ở lớp, ở nhà), bao gồm đọc trước tài liệu (nếu có yêu cầu)

(5): Liệt kê các bài đánh giá liên quan (ghi ký hiệu Ax.x)

8. Quy định của môn học

(Các quy định của môn học (nếu có), thí dụ: sinh viên không nộp bài tập và các báo cáo đúng hạn, được coi như không nộp bài; sinh viên vắng 2 buổi thực hành trở lên, không được phép dự thi cuối kỳ ...)

- Quy định về Bài thuyết trình nhóm:

- Thành lập nhóm: Số lượng sinh viên tùy vào sĩ số lớp, do giảng viên quy định. Hạn chót đăng ký đề tài nhóm quản lý trên forum là buổi 2 hoặc trực tiếp nộp cho GV buổi 1.
- Các nhóm thuyết trình theo thứ tự được phân công. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan khi thuyết trình.
- Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định thì sẽ bị điểm 0 chuyên cần.

9. Phụ trách môn học

- Khoa/Bộ môn: Bộ môn Lý luận và Khoa học chính trị, Khoa Chính trị - Hành chính

- Địa chỉ và email liên hệ: daotao.spas@vnuhcm.edu.vn

KT. Trưởng Bộ môn
Phó trưởng Bộ môn



TS. Mạch Thị Khánh Trinh

Tp. Hồ Chí Minh, ngày 01 tháng 10 năm 2023

KT. TRƯỞNG KHOA
PHÓ TRƯỞNG KHOA




TS. Nguyễn Đình Quốc Cường

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

(Dành cho Trường Đại học Quốc tế, ĐHQG-HCM)

1. Thông tin tổng quát

- Tên môn học:

+ Tiếng Việt

+ Tiếng Anh

- Mã số môn học:

- Thuộc khối kiến thức/kỹ năng:

☒ Kiến thức cơ bản/giáo dục đại cương

☐ Kiến thức chuyên ngành

☐ Môn học chuyên về kỹ năng chung

- Số tín chỉ:

+ Lý thuyết

+ Thực hành (thuyết trình)

- Môn học tiên quyết:

- Môn học trước:

- Môn học song hành:

Kinh tế chính trị Mác - Lênin

Political economics of Marxism and
Leninism

PE016IU

☐ Kiến thức cơ sở ngành

☐ Kiến thức khác

☐ Môn học đồ án/luận văn tốt nghiệp

02

21 (trên lớp)

09 (trên lớp)

60 (về nhà)

Triết học Mác – Lênin

2. Mô tả môn học

Môn học này cung cấp cho sinh viên những phân tích của Các Mác về phương thức sản xuất tư bản chủ nghĩa và chỉ ra giới hạn phát triển của phương thức sản xuất này. V.I.Lênin bổ sung học thuyết kinh tế chính trị của Mác trong tình hình mới – giai đoạn chủ nghĩa tư bản độc quyền thống trị. Dựa vào nội dung cơ bản của kinh tế chính trị Mác – Lênin, sinh viên được tìm hiểu về mô hình kinh tế tổng quát của Việt Nam trong thời kỳ quá độ - Kinh tế thị trường định hướng xã hội chủ nghĩa. Bên cạnh đó, môn học này cũng cung cấp cho sinh viên về tính tất yếu phải công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế trong bối cảnh CMCN lần thứ 4 và toàn cầu hóa diễn ra mạnh mẽ.

3. Tài liệu học tập



3.1. Giáo trình

- [1] Bộ Giáo dục và Đào tạo (2021), *Giáo trình Kinh tế chính trị Mác – Lênin*, (dùng cho khối không chuyên ngành lý luận chính trị) Nxb. Chính trị quốc gia, Hà Nội.
- [2] Bộ Giáo dục và Đào tạo (2012), *Giáo trình Những Nguyên lý cơ bản của chủ nghĩa Mác – Lênin*, Nxb. Chính trị quốc gia, Hà Nội.

3.2. Tài liệu khác

- [3] Các Mác, *Tư bản*, NXB Chính trị quốc gia Sự thật, Hà Nội, 2018
- [4] Klaus Schwab (2018), *Cách mạng công nghiệp lần thứ tư*, NXB Thế giới.
- [5] V.I.Lênin, Toàn tập – tập 27, NXB Chính trị Quốc gia Sự thật, 2005

3.3. Phần mềm: N/A

4. Mục tiêu môn học

(các mục tiêu tổng quát của môn học, thể hiện sự liên quan với các chuẩn đầu ra (X.x.x) của CTĐT và trình độ năng lực (TDNL) được phân bổ cho môn học)

Mục tiêu (1)	Mô tả mục tiêu (2)	CĐR của môn học tương ứng CTĐT (3)	TDNL tương ứng CTĐT (4)
G1	4.1 Về kiến thức Sinh viên hiểu được sự vận động và phát triển của phương thức sản xuất tư bản chủ nghĩa và giới hạn của nó theo phân tích của Mác – Lênin. Sinh viên cũng được hiểu rõ về mô hình kinh tế của Việt Nam thời kỳ quá độ lên chủ nghĩa xã hội đó là kinh tế thị trường định hướng xã hội chủ nghĩa. Ngoài ra, sinh viên cũng hiểu rõ về công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế của Việt Nam.		3.5
G2	4.2. Về kỹ năng Sinh viên vận dụng những kiến thức đã học có thể nhận định, phân tích và đánh giá các vấn đề kinh tế chính trị trong nước và quốc tế. Vận dụng kiến thức kinh tế chính trị Mác – Lênin để		3.0

	đánh giá chủ nghĩa tư bản đương đại cũng như phân tích, đánh giá được mô hình kinh tế của Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội. Ngoài ra, sinh viên còn vận dụng kiến thức kinh tế chính trị để phân tích quá trình công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế của Việt Nam.		
G3	4.3. Về thái độ/năng lực tự chủ và trách nhiệm Vận dụng kiến thức kinh tế chính trị Mác – Lênin để có thái độ tích cực trong việc góp phần vào xây dựng và bảo vệ con đường chủ nghĩa xã hội của Việt Nam. Đấu tranh bác bỏ những luận điệu xuyên tạc, chống phá Chủ nghĩa Mác – Lênin và sự lãnh đạo của Đảng Cộng sản Việt Nam.		4.0

(1): Ký hiệu mục tiêu của môn học. (2): Mô tả các mục tiêu bao gồm các động từ chủ động, các chủ đề CDR (X.x.x) và bối cảnh áp dụng tổng quát

(3), (4): Ký hiệu CDR của CTĐT và TĐNL tương ứng được phân bổ cho môn học.

5. Chuẩn đầu ra môn học

CDR (1)	Mô tả CDR (2)	Mức độ giảng dạy (3)
G1.1	G1.1.1. Hiểu rõ lịch sử của kinh tế chính trị và kinh tế chính trị Mác – Lênin.	I, T
	G1.1.2 Hiểu rõ về mục tiêu, phương pháp và chức năng của KTCT Mác - Lênin	I.T
G1.2	G1.2.1. Hiểu rõ hai thuộc tính của hàng hóa và cấu trúc của giá trị hàng hóa	I.T.U
	G1.2.2. Hiểu về mặt chất và mặt lượng của giá trị hàng hóa và các nhân tố ảnh hưởng đến mặt lượng giá trị hàng hóa	I, T
	G1.2.3. Hiểu rõ mối quan hệ giữa giá trị hàng hóa và tiền tệ	I, T, U
	G1.2.4. Hiểu về thị trường và các quy luật cơ bản của kinh tế thị trường	I, T, U

G1.3	G1.3.1. Hiểu rõ được công thức chung của tư bản và mâu thuẫn của nó	I, T
	G1.3.2. Hiểu rõ được nguồn gốc của giá trị thặng dư TBCN	I, T
	G1.3.3. Hiểu rõ hàng hóa sức lao động và tính chất đặc biệt của nó	I, T
	G1.3.4. Hiểu được bản chất và các hình thức của tiền công	I, T, U
	G1.3.5. Hiểu được các phương pháp sản xuất giá trị thặng dư TBCN	I, T
	G1.3.6. Hiểu rõ ý nghĩa của tuần hoàn và chu chuyển tư bản	I, T
	G1.3.7. Hiểu được mục đích của tích lũy tư bản	I, T, U
	G1.3.8. Hiểu rõ các hình thức biểu hiện của giá trị thặng dư TBCN là mối quan hệ của chúng	I, T
G1.4	G1.4.1. Hiểu rõ hai giai đoạn phát triển của CNTB	I, T
	G1.4.2. Hiểu được nguyên nhân hình thành CNTB độc quyền	I, T
	G1.4.3. Hiểu được 5 đặc điểm của CNTB độc quyền theo phân tích của V.I. Lênin	I, T
	G1.4.4. Hiểu được những nguyên nhân hình thành và đặc điểm của chủ nghĩa tư bản độc quyền nhà nước.	I, T
G1.5	G1.5.1. Hiểu rõ về mô hình kinh tế thị trường định hướng XHCN và các đặc trưng của nó	I, T
	G1.5.2. Hiểu rõ về vai trò của thể chế kinh tế thị trường định hướng XHCN và tại sao cần phải hoàn thiện nó	I, T
	G1.5.3. Hiểu rõ vai trò của lợi ích kinh tế và các quan hệ lợi ích kinh tế trong nền kinh tế thị trường.	I, T
G1.6	G1.6.1. Hiểu rõ lý do tại sao một quốc gia cần phải tiến hành CNH và các quốc gia CNH thành công tiêu biểu	I, T
	G1.6.2. Hiểu rõ lịch sử và đặc trưng của các cuộc CMCN và mối liên hệ giữa CMCN với CNH	I, T, U
	G1.6.3. Hiểu rõ quá trình CNH, HĐH của Việt Nam	I, T
	G1.6.4. Hiểu được tính tất yếu của Việt Nam phải hội nhập kinh tế quốc tế trong bối cảnh toàn cầu hóa	I, T
	G2.1. Vận dụng phương pháp trừu tượng hóa khoa học để phân tích các vấn đề kinh tế chính trị	U
	G2.2. Vận dụng kiến thức kinh tế chính trị Mác -	

G2	Lênin để đánh giá chủ nghĩa tư bản hiện nay và sự lựa chọn con đường tiến lên CNXH của Việt Nam	U
	G2.3. Vận dụng kiến thức về kinh tế thị trường định hướng XHCN để hiểu rõ con đường đi lên CNXH của Việt Nam từ đó đấu tranh chống lại các thế lực chống phá chủ nghĩa Mác - Lênin	U
	G2.4. Vận dụng kiến thức về CNH, HĐH và hội nhập kinh tế quốc tế để phân tích chiến lược phát triển của Việt Nam trong bối cảnh CMCN 4.0 và toàn cầu hóa diễn ra ngày càng sâu rộng	U
G3	G3.1. Vận dụng kiến thức kinh tế chính trị Mác - Lênin, đóng góp vào công cuộc xây dựng chủ nghĩa xã hội	U
	G3.2. Vận dụng kiến thức kinh tế chính trị Mác - Lênin đấu tranh chống lại các luận điệu xuyên tạc chủ nghĩa Mác - Lênin và con đường đi lên CNXH của Việt Nam	U

(1): Ký hiệu CDR của môn học

(2): Mô tả CDR, bao gồm các động từ chủ động, các chủ đề CDR ở cấp độ 4 (X.x.x.x) và bối cảnh áp dụng cụ thể.

(3): I (Introduce): giới thiệu; T (Teach): dạy; U (Utilize): sử dụng

6. Đánh giá môn học

(các thành phần, các bài đánh giá, các tiêu chí đánh giá, chuẩn đánh giá, và tỷ lệ đánh giá, thể hiện sự tương quan với các CDR của môn học)

Thành phần đánh giá (1)	Bài đánh giá (2)	CDR môn học (3)	Tỷ lệ % (4)
A1. Đánh giá quá trình	- Chuyên cần (A1.1) - Tham gia học tập trên lớp tích cực, hăng hái phát biểu (A1.2) - Thuyết trình nhóm (A1.3)	G1.1- G1.6; G2.1 - G2.4; G3.1- G3.2	30%
A2. Đánh giá giữa kỳ	Kiểm tra tự luận: 60 phút (A2.1)	G1.1, G1.2, G1.3	20%
A3. Đánh giá cuối kỳ	Tự luận sinh viên được sử dụng tài liệu khi làm bài thi: 60 phút (A3.1)	G1.1 - G1.6; G2.1-G2.4	50%

(1): Các thành phần đánh giá của môn học. (2): Các bài đánh giá

(3): Các CDR được đánh giá. (4): Tiêu chí đánh giá. (5): Chuẩn đánh giá

(6): Tỷ lệ điểm của các bài đánh giá trong tổng điểm môn học

7. Kế hoạch giảng dạy chi tiết

Tuần/Buổi học (1)	Nội dung (2)	CDR môn học (3)	Hoạt động dạy và học (4)	Bài đánh giá (5)
1/4 tiết	Giới thiệu về môn học Chương 1 ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU VÀ CHỨC NĂNG CỦA KINH TẾ CHÍNH TRỊ MÁC – LÊNIN I. Khái quát về sự hình thành và phát triển của kinh tế chính trị Mác – Lênin. II. Đối tượng, mục đích và phương pháp nghiên cứu của kinh tế chính trị Mác – Lênin III. Chức năng của kinh tế chính trị Mác – Lênin Chương 2 HÀNG HÓA, THỊ TRƯỜNG VÀ VAI TRÒ CỦA CÁC CHỦ THỂ THAM GIA THỊ TRƯỜNG I. Lý luận của C. Mác về sản xuất hàng hóa và hàng hóa 1. Sản xuất hàng hóa 2. Hàng hóa - <i>Khái niệm và thuộc tính của hàng hóa.</i> - <i>Tính hai mặt của lao động sản xuất hàng hóa.</i> - <i>Lượng giá trị và các nhân tố ảnh hưởng đến lượng giá trị của hàng hóa.</i>	G.1.1 G.1.2	Hoạt động dạy: - Giới thiệu về môn học, cơ cấu điểm, cách thức giảng dạy và học tập môn Kinh tế chính trị Mác – Lênin - Giới thiệu nội dung đề tài thuyết trình nhóm GHW) - Trình chiếu, thuyết giảng chương 1,2 và giải đáp thắc mắc. Hoạt động học: - Chia nhóm - Giới thiệu nhóm học tập - Nghe giảng, phát biểu, nêu thắc mắc - Đọc trước chương 2 và chương 3	A1.1 A1.2 A2.1 A3.1
	Chương 2 HÀNG HÓA, THỊ TRƯỜNG VÀ VAI TRÒ CỦA CÁC CHỦ THỂ THAM GIA THỊ TRƯỜNG (tiếp theo)		Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc	A1.1 A1.2

2/4 tiết	3. Tiền tệ 4. Dịch vụ và quan hệ trao đổi trong trường hợp một số yếu tố khác hàng hóa thông thường ở điều kiện ngày nay II. Thị trường và nền kinh tế thị trường. 1. Khái niệm, phân loại và vai trò của thị trường. 2. Nền kinh tế thị trường và một số quy luật chủ yếu của nền kinh tế thị trường - <i>Nền kinh tế thị trường.</i> - <i>Một số quy luật kinh tế chủ yếu của nền kinh tế thị trường.</i> III. Vai trò của một số chủ thể tham gia thị trường. 1. Người sản xuất 2. Người tiêu dùng 3. Các chủ thể trung gian trong thị trường. 4. Nhà nước.	G.1.2 G.2.1	mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW - Đọc trước chương 3.	A1.3 A2.1 A3.1
3/4 tiết	Chương 3 GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG I. Lý luận của Các Mác về giá trị thặng dư 1. Nguồn gốc của giá trị thặng dư. - <i>Công thức chung của tư bản</i> - <i>Hàng hóa sức lao động</i> - <i>Sự sản xuất giá trị thặng dư</i> - <i>Tư bản bất biến và tư bản khả biến</i> - <i>Tiền công</i> - <i>Tuần hoàn và chu chuyển tư bản</i> 2. Bản chất của giá trị thặng dư 3. Các phương pháp sản xuất giá trị thặng dư	G.1.3 G.2.2 G.3.1 G.3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW	A1.1 A1.2 A1.3 A2.1 A3.1

			- Đọc trước chương 4.	
4/4 tiết	Chương 3 GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG (tiếp theo) II. Tích lũy tư bản 1. Bản chất của tích lũy tư bản. 2. Những nhân tố ảnh hưởng đến quy mô tích lũy. 3. Một số hệ quả của tích lũy tư bản. III. Các hình thức biểu hiện của giá trị thặng dư trong nền kinh tế thị trường. 1. Lợi nhuận 2. Lợi tức. 3. Địa tô TBCN	G.1.3 G.2.2 G.3.1 G.3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW - Đọc trước chương 4.	A1.1 A1.2 A1.3 A2.1 A3.1
5/4 tiết	Chương 4 CẠNH TRANH VÀ ĐỘC QUYỀN TRONG NỀN KINH TẾ THỊ TRƯỜNG (tiếp theo) 1. Lý luận của V.I. Lê nin về đặc điểm kinh tế của độc quyền (tt). - <i>Xuất khẩu tư bản trở thành phổ biến</i> - <i>Cạnh tranh để phân chia thị trường thế giới là tất yếu giữa các tập đoàn độc quyền.</i> - <i>Lôi kéo, thúc đẩy các chính phủ vào việc phân định khu vực lãnh thổ ảnh hưởng là cách thức để bảo vệ lợi ích độc quyền.</i> 2. Lý luận của V.I. Lênin về đặc điểm kinh tế của độc quyền nhà nước trong CNTB	G.1.4 G.2.2 G.3.1 G.3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW - Đọc trước chương 5.	A1.1 A1.2 A1.3 A3.1

	- Sự kết hợp nhân sự giữa tổ chức độc quyền và nhà nước. - Sự hình thành, phát triển sở hữu nhà nước. - Độc quyền nhà nước trở thành công cụ để nhà nước điều tiết nền kinh tế. III. Biểu hiện mới của độc quyền, độc quyền nhà nước trong điều kiện ngày nay; vai trò lịch sử của CNTB. 1. Biểu hiện mới của độc quyền 2. Biểu hiện mới của độc quyền nhà nước dưới CNTB 3. Vai trò lịch sử của CNTB			
6/4 tiết	Chương 5 KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA VÀ CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM I. Kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam 1. Khái niệm về kinh tế thị trường định hướng XHCN ở Việt Nam. 2. Tính tất yếu khách quan của việc phát triển kinh tế thị trường định hướng XHCN ở Việt Nam. 3. Đặc trưng của kinh tế thị trường định hướng XHCN ở Việt Nam. II. Hoàn thiện thể chế kinh tế thị trường định hướng XHCN ở Việt Nam 1. Sự cần thiết phải hoàn thiện thể chế kinh tế thị trường định hướng XHCN ở Việt Nam. 2. Nội dung hoàn thiện thể chế kinh tế thị trường định hướng XHCN ở	G.1.5 G.2.3 G.3.1 G.3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW - Đọc trước chương 6.	A1.1 A1.2 A1.3 A3.1



	Việt Nam. III. Các quan hệ lợi ích kinh tế ở Việt Nam. 1. Lợi ích kinh tế và quan hệ lợi ích kinh tế. - <i>Lợi ích kinh tế</i>			
7/4 tiết	Chương 5 KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA VÀ CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM (tiếp theo) 1. Lợi ích kinh tế và quan hệ lợi ích kinh tế (tt). - <i>Quan hệ lợi ích kinh tế.</i> 2. Vai trò của nhà nước trong đảm bảo hài hòa các quan hệ lợi ích. - Bảo vệ lợi ích hợp pháp, tạo môi trường thuận lợi cho hoạt động tìm kiếm lợi ích của các chủ thể kinh tế. - Điều hòa lợi ích giữa cá nhân – doanh nghiệp – xã hội. - Kiểm soát, ngăn ngừa các quan hệ lợi ích có ảnh hưởng tiêu cực đối với sự phát triển của xã hội. Chương 6 CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA VÀ HỘI NHẬP KINH TẾ QUỐC TẾ CỦA VIỆT NAM I. Công nghiệp hóa, hiện đại hóa của Việt Nam. 1. Khái quát về cách mạng công nghiệp và công nghiệp hóa. - Khái quát về cách mạng công nghiệp - Công nghiệp hóa và các mô hình công nghiệp hóa trên thế giới	G.1.5 G.1.6 G.2.3 G.2.4 G.3.1 G.3.2	Hoạt động dạy: - Trình chiếu, thuyết giảng, giải đáp thắc mắc - Tổng kết nội dung thuyết trình nhóm Hoạt động học: - Nghe giảng, thảo luận, phát biểu, nêu thắc mắc. - Thuyết trình nhóm GHW - Đọc trước chương 6.	A1.1 A1.2 A1.3 A3.1
	Chương 6		Hoạt động dạy:	

8/2 tiết	CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA VÀ HỘI NHẬP KINH TẾ QUỐC TẾ CỦA VIỆT NAM (tiếp theo) 2. Tính tất yếu khách quan và nội dung công nghiệp hóa, hiện đại hóa ở Việt Nam. - <i>Tính tất yếu của công nghiệp hóa, hiện đại hóa ở Việt Nam.</i> - <i>Nội dung CNH, HĐH ở Việt Nam</i> II. Hội nhập kinh tế quốc tế của Việt Nam 1. Khái niệm và nội dung hội nhập kinh tế quốc tế. 2. Tác động của hội nhập kinh tế quốc tế đến quá trình phát triển của Việt Nam 3. Phương hướng nâng cao hiệu quả hội nhập kinh tế quốc tế trong phát triển của Việt Nam Ôn tập thi cuối kì		- Trình chiếu, thuyết giảng, tổng kết nội dung thuyết trình nhóm. - Giải đáp thắc mắc cho sinh viên - Công bố điểm quá trình. Hoạt động học: - Nghe giảng - Phát biểu, thảo luận - Nêu thắc mắc về môn học.	A1.1 A1.2 A1.3 A3.1
		G.1.6		
		G.2.4		
		G.3.1		
		G.3.2		



(1): Thông tin về tuần/buổi học. (2): Liệt kê nội dung giảng dạy theo chương, mục

(3): Liệt kê CĐR liên quan của môn học (ghi ký hiệu Gx.x),

(4): Liệt kê các hoạt động dạy và học (ở lớp, ở nhà), bao gồm đọc trước tài liệu (nếu có yêu cầu)

(5): Liệt kê các bài đánh giá liên quan (ghi ký hiệu Ax.x)

8. Quy định của môn học

- Quy định về Bài thuyết trình nhóm GHW:

+ Thành lập nhóm: 5 sinh viên/nhóm. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là buổi 1 hoặc trực tiếp nộp cho GV.

+ Tuần 2 (buổi thứ 2) thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.

+ Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần & nhiệt tình thảo luận, phát biểu xây dựng bài, nghiêm túc trong giờ học.

9. Phụ trách môn học

- Khoa/Bộ môn: Bộ môn Lý luận và Khoa học chính trị, Khoa Chính trị - Hành chính
- Email liên hệ: daotao.spas@vnuhcm.edu.vn.

KT. Trưởng Bộ môn
Phó trưởng Bộ môn



Lê Văn Thông

TP. Hồ Chí Minh, ngày 01 tháng 10 năm 2023

KT. TRƯỞNG KHOA
PHÓ TRƯỞNG KHOA



TS. Nguyễn Đình Quốc Cường

ĐẠI HỌC QUỐC GIA TP. HỒ CHÍ MINH
KHOA CHÍNH TRỊ - HÀNH CHÍNH

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC
(dành cho trường Đại học Quốc Tế)

1. Thông tin tổng quát

Tên môn học:

Tiếng Việt

Tiếng Anh

- Mã số môn học:

Thuộc khối kiến thức/kỹ năng:

☒ Kiến thức cơ bản/giáo dục đại cương

☐ Kiến thức chuyên ngành

☐ Môn học chuyên về kỹ năng chung

- Số tín chỉ:

Lý thuyết

Thực hành

- Môn học tiên quyết:

- Môn học trước:

- Môn học song hành:

Chủ nghĩa xã hội khoa học

Scientific socialism

PA21GEP03

☐ Kiến thức cơ sở ngành

☐ Kiến thức khác

☐ Môn học đồ án/luận văn tốt nghiệp

2 (30 tiết)

30 tiết

Triết học Mác – Lênin

2. Mô tả môn học

(Vị trí của môn học đối với chương trình đào tạo (CTĐT), những mục đích và nội dung chính yếu của môn học)

Môn học thuộc phần kiến thức giáo dục đại cương trong khối kiến thức cơ bản về lý luận chính trị.

Trang bị cho sinh viên những kiến thức cơ bản về chủ nghĩa xã hội khoa học: Đối tượng, phương pháp nghiên cứu, ý nghĩa của việc nghiên cứu chủ nghĩa xã hội khoa học; về sứ mệnh lịch sử của giai cấp công nhân; về chủ nghĩa xã hội và thời kỳ quá độ lên chủ nghĩa xã hội; về dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa; về cơ cấu xã hội - giai cấp và liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội; về vấn đề dân tộc và tôn giáo trong thời kỳ quá độ lên chủ nghĩa xã hội.

Môn học có mối quan hệ trực tiếp tới việc giáo dục lập trường, tư tưởng cho sinh viên, cũng như cung cấp kiến thức chuyên sâu cho sinh viên trong cách nhìn nhận các vấn đề chính trị xã hội.

3. Tài liệu học tập

(Các giáo trình, tài liệu tham khảo, các phần mềm, không quá 5 cuốn)

Giáo trình:

- Bộ Giáo dục và Đào tạo (2021), *Giáo trình Chủ nghĩa xã hội khoa học*, (dùng cho



khỏi không chuyên ngành lý luận chính trị) Nxb. Chính trị quốc gia, Hà Nội.
 - Bộ Giáo dục và Đào tạo (2012), *Giáo trình Những Nguyên lý cơ bản của chủ nghĩa Mác – Lênin*, Nxb. Chính trị quốc gia, Hà Nội.
 - Hội đồng Trung ương (2008), *Giáo trình Chủ nghĩa xã hội khoa học*, Nxb. Chính trị quốc gia, Hà Nội.

Tài liệu khác:

[1] Tên tác giả (năm xuất bản), *Tên giáo trình*. Nơi xuất bản: Tên nhà xuất bản

Phần mềm:

[..] Tên hãng phần mềm (năm phát hành/phiên bản). *Tên phần mềm...*

4. Mục tiêu môn học

(Các mục tiêu tổng quát của môn học, thể hiện sự liên quan với các chuẩn đầu ra (X.x.x) của CTĐT và trình độ năng lực (TĐNL) được phân bổ cho môn học)

Mục tiêu (1)	Mô tả mục tiêu (2)	CDR của môn học tương ứng CTĐT (3)
G1	Về kiến thức - Sinh viên hiểu một cách có hệ thống những nội dung cơ bản của học phần chủ nghĩa xã hội khoa học. Cùng các môn lý luận chính trị và các môn học khác giúp sinh viên có nhận thức tổng hợp, toàn diện về chủ nghĩa Mác-Lênin, tư tưởng Hồ Chí Minh và con đường đi lên CNXH ở Việt Nam. - Sinh viên hiểu những tri thức khoa học để luận giải sự ra đời tất yếu của chủ nghĩa xã hội, những nhiệm vụ, giải pháp cần thực hiện trong quá trình xây dựng chủ nghĩa xã hội nói chung và ở Việt Nam nói riêng. - Sinh viên hiểu những căn cứ khoa học để chống lại những nhận thức sai lệch và sự chống phá của các thế lực thù địch.	
G2	Về kỹ năng Sinh viên phân tích, đánh giá, giải quyết các vấn đề chính trị - xã hội nảy sinh trong thực tiễn. Và vận dụng quan điểm khoa học của chủ nghĩa Mác - Lênin để nhận diện được âm mưu diễn biến hòa bình của các thế lực phản động, thù địch.	
G3	Về thái độ/năng lực tự chủ và trách nhiệm Sinh viên đánh giá được sự cần thiết của việc học tập các môn lý luận chính trị; có niềm tin vào mục tiêu, lý tưởng xã hội chủ nghĩa và con đường đi lên chủ nghĩa xã hội; tin tưởng vào sự thành công của công cuộc đổi mới do Đảng Cộng sản Việt Nam khởi xướng và lãnh đạo.	

(1): Ký hiệu mục tiêu của môn học. (2): Mô tả các mục tiêu bao gồm các động từ chủ động, các chủ đề CDR (X.x.x) và bối cảnh áp dụng tổng quát

==
A1
HC
A1-1
19

(3), (4): Ký hiệu CDR của CTĐT và TĐNL tương ứng được phân bổ cho môn học.

5. Chuẩn đầu ra môn học

(Các mục cụ thể hay CDR của môn học và mức độ giảng dạy I, T, U)

CDR (1)	Mô tả CDR (2)	Mức độ giảng dạy (I, T, U) (3)
G1.1	Sinh viên hiểu những kiến thức cơ bản, hệ thống về sự ra đời, các giai đoạn phát triển; đối tượng, phương pháp nghiên cứu và ý nghĩa của việc học tập, nghiên cứu chủ nghĩa xã hội khoa học. Trên cơ sở đó tạo điều kiện để sinh viên nghiên cứu các phạm trù tiếp theo của chủ nghĩa xã hội khoa học.	I, T
G1.2	Sinh viên hiểu những nội dung cơ bản của lý luận về sứ mệnh lịch sử toàn thể giới của giai cấp công nhân, biểu hiện và ý nghĩa của sứ mệnh đó trong bối cảnh hiện nay.	I, T
G1.3	Sinh viên hiểu những kiến thức cơ bản và hệ thống quan điểm của chủ nghĩa Mác - Lênin về hình thái kinh tế - xã hội cộng sản chủ nghĩa, về chủ nghĩa xã hội, thời kỳ quá độ lên chủ nghĩa xã hội và quá độ lên chủ nghĩa xã hội bỏ qua chế độ tư bản chủ nghĩa ở Việt Nam.	T, U
G1.4	Sinh viên hiểu đầy đủ và đúng bản chất của nền dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa, quan điểm của Đảng Cộng sản Việt Nam về việc xây dựng và hoàn thiện nền dân chủ và nhà nước xã hội chủ ở Việt Nam hiện nay.	T, U
G1.5	Sinh viên hiểu những kiến thức nền tảng về cơ cấu xã hội - giai cấp và liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội. Giúp sinh viên hiểu rõ vị trí, vai trò của những giai cấp, tầng lớp cơ bản trong quá trình xây dựng đất nước và nội dung của liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam.	T, U
G1.6	Sinh viên hiểu quan điểm cơ bản chủ nghĩa Mác-Lênin về vấn đề dân tộc, tôn giáo. Sinh viên nắm được những nội dung cơ bản của chính sách dân tộc, tôn giáo của Đảng và Nhà nước ta.	T, U
G1.7	Sinh viên hiểu những quan điểm cơ bản của chủ nghĩa Mác - Lênin, tư tưởng Hồ Chí Minh và Đảng Cộng sản Việt Nam về gia đình, xây dựng gia đình trong thời kỳ quá độ lên chủ nghĩa xã hội, xây dựng gia đình ở Việt Nam hiện nay.	T, U
G2.1	Sinh viên phân tích lý luận – thực tiễn về các vấn đề đặt ra trong cuộc sống một cách đúng đắn và nhận diện những biến đổi xã hội ở nước ta	U

CĐR (1)	Mô tả CĐR (2)	Mức độ giảng dạy (I, T, U) (3)
	trong thời kỳ quá độ lên chủ nghĩa xã hội.	
G2.2	Sinh viên vận dụng những nội dung trong bài học để phân tích, giải thích những vấn đề trong thực tiễn một cách khách quan, có cơ sở khoa học.	U
G2.3	Sinh viên vận dụng kiến thức môn học để làm việc nhóm, quản lý nhóm	U
G3.1	Xây dựng và củng cố niềm tin vào lý tưởng cộng sản chủ nghĩa, vào con đường đi lên chủ nghĩa xã hội, góp phần xây dựng thành công chủ nghĩa xã hội ở Việt Nam.	T, U
G3.2	Có ý thức chính trị - xã hội, thái độ kiên định về lập trường, tư tưởng, có tinh thần đấu tranh bảo vệ lẽ phải, bảo vệ những quan điểm, chủ trương, chính sách đúng đắn của Đảng và Nhà nước; chống lại biểu hiện thờ ơ về chính trị và những quan điểm sai trái, thù địch cũng như những biểu hiện tiêu cực trong đời sống xã hội.	U
G3.3	Có năng lực dạy học, tự nghiên cứu các vấn đề liên quan đến chủ nghĩa Mác- Lênin, tư tưởng Hồ Chí Minh, đường lối, sách lược của Đảng, Nhà nước.	U

(1): Ký hiệu CĐR của môn học

(2): Mô tả CĐR, bao gồm các động từ chủ động, các chủ đề CĐR ở cấp độ 4 (X.x.x.x) và bối cảnh áp dụng cụ thể.

(3): I (Introduce): giới thiệu; T (Teach): dạy; U (Utilize): sử dụng

6.Đánh giá môn học

(Các thành phần, các bài đánh giá, các tiêu chí đánh giá, chuẩn đánh giá, và tỷ lệ đánh giá, thể hiện sự tương quan với các CĐR của môn học)

Thành phần đánh giá (1)	Bài đánh giá (2)	CĐR môn học (3)	Tỷ lệ % (6)
A1. Đánh giá quá trình	A1.1. Chuyên cần A1.2. Thuyết trình nhóm, bài tập lớn, thu hoạch...	G1.1 - G1.7, G2.1 - G2.3, G3.1- G3.3	30%
A2. Đánh giá giữa kỳ (Quiz)	A2.1. Trắc nghiệm (đề đóng) hoặc tự luận (được tham khảo tài liệu) thời gian làm bài 45 phút	G1.1 - G1.3, G2.1 - G2.3, G3.1- G3.3	20%
A3. Đánh giá cuối kỳ (FEX)	A3.1. Thi đề chung. Đề thi bao quát toàn bộ nội dung môn học bằng hình thức tự luận (đề mở). Thời gian 60 phút.	G1.1 - G1.7, G2.1 - G2.3, G3.1- G3.3	50%

(1): các thành phần đánh giá của môn học. (2): các bài đánh giá
 (3): các CDR được đánh giá. (4): tiêu chí đánh giá. (5): chuẩn đánh giá
 (6): Tỷ lệ điểm của các bài đánh giá trong tổng điểm môn học

6. Kế hoạch giảng dạy chi tiết

Tuần/Buổi học (1)	Nội dung (2)	Hoạt động dạy và học (3)	CDRMH (4)
1/ 2 tiết	Giới thiệu về môn học Chương 1: NHẬP MÔN CHỦ NGHĨA XÃ HỘI KHOA HỌC 1. SỰ RA ĐỜI CỦA CHỦ NGHĨA XÃ HỘI KHOA HỌC <i>1.1.. Hoàn cảnh lịch sử sự ra đời của chủ nghĩa xã hội khoa học</i> <i>1.2. Vai trò của C. Mác và Ăngghen</i>	Dạy: - Thông báo quy định giảng dạy, học tập. - Công bố quy định kiểm tra, đánh giá môn học - Giới thiệu nội dung môn học - Giới thiệu nội dung đề tài thuyết trình nhóm, chia nhóm Học ngoài lớp: - Đọc trước tài liệu chương 1. Dạy: thuyết giảng Học ở lớp: Thảo luận và phát biểu trên lớp.	G1.1 G2.1 G2.2 G3.1 G3.1 G3.3
2/2 tiết	Chương 1: NHẬP MÔN CHỦ NGHĨA XÃ HỘI KHOA HỌC 2. CÁC GIAI ĐOẠN PHÁT TRIỂN CƠ BẢN CỦA CHỦ NGHĨA XÃ HỘI KHOA HỌC <i>2.1. C.Mác và Ph.Ăngghen phát triển chủ nghĩa xã hội khoa học</i> <i>2.2. V.I.Lênin vận dụng và phát triển chủ nghĩa xã hội khoa học trong điều kiện mới</i> <i>2.3. Sự vận dụng và phát triển sáng tạo chủ nghĩa xã hội khoa học từ sau khi Lênin qua đời đến nay</i> 3. ĐỐI TƯỢNG, PHƯƠNG PHÁP VÀ Ý NGHĨA CỦA VIỆC NGHIÊN CỨU CHỦ NGHĨA XÃ HỘI KHOA HỌC <i>3.1. Đối tượng nghiên cứu của chủ nghĩa xã hội khoa học</i>	Dạy: thuyết giảng phần 1; 2.1. Hướng dẫn tự đọc phần còn lại. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: - Phác thảo nội dung thuyết trình nhóm GHW - Đọc trước tài liệu chương 2.	G1.1 G2.1 G2.2 G3.1 G3.1 G3.3



	3.2. Phương pháp nghiên cứu của chủ nghĩa xã hội khoa học 3.3. Ý nghĩa của việc nghiên cứu chủ nghĩa xã hội khoa học		
3/ 2 tiết	Chương 2 SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN 1. Quan điểm cơ bản của chủ nghĩa Mác - Lênin về giai cấp công nhân và sứ mệnh lịch sử thế giới của giai cấp công nhân 1.1. Khái niệm và đặc điểm của giai cấp công nhân 1.2. Nội dung và đặc điểm sứ mệnh lịch sử của giai cấp công nhân 1.3. Những điều kiện quy định sứ mệnh lịch sử của giai cấp công nhân. 2. Giai cấp công nhân và việc thực hiện sứ mệnh lịch sử của giai cấp công nhân hiện nay 2.1. Giai cấp công nhân hiện nay 2.2. Thực hiện sứ mệnh lịch sử của giai cấp công nhân trên thế giới hiện nay	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: - Đọc trước tài liệu mục 3, chương 2	G1.2 G2.1 G2.2 G3.1 G3.1 G3.3
4/ 2 tiết	Chương 2: SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN (tiếp theo) 3. SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN VIỆT NAM 3.1. Đặc điểm của giai cấp công nhân Việt Nam 3.2. Nội dung sứ mệnh lịch sử của giai cấp công nhân Việt Nam hiện nay 3.3. Phương hướng và một số giải pháp chủ yếu để xây dựng giai cấp công nhân Việt Nam hiện nay	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: - Đọc trước tài liệu chương 3	G1.2 G2.1 G2.2 G3.1 G3.1 G3.3
5/ 2 tiết	Chương 3: CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1. CHỦ NGHĨA XÃ HỘI 1.1. Chủ nghĩa xã hội, giai đoạn đầu của hình thái kinh tế - xã hội công sản chủ	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp:	G1.3 G2.1 G2.2 G3.1 G3.1 G3.3

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	nghĩa 1.2. Điều kiện ra đời chủ nghĩa xã hội Những đặt trưng cơ bản của chủ nghĩa xã hội 2. THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Tính tất yếu khách quan của thời kỳ quá độ lên chủ nghĩa xã hội 2.2. Đặc điểm của thời kỳ quá độ lên chủ nghĩa xã hội	- Đọc trước tài liệu mục 3, chương 3	
6/ 2 tiết	Chương 3: CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI (tiếp theo) 3. QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI Ở VIỆT NAM 3.1. Quá độ lên chủ nghĩa xã hội bỏ qua chế độ tư bản chủ nghĩa 3.2. Những đặc trưng cơ bản của chủ nghĩa xã hội và phương hướng xây dựng chủ nghĩa xã hội ở Việt Nam hiện nay	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: - ôn tập, chuẩn bị kiểm tra giữa kỳ	G1.3 G2.1 G2.2 G3.1 G3.1 G3.3
7/ 2 tiết	-Kiểm tra giữa kỳ -Hướng dẫn tự đọc các nội dung của chương 4.5.6	Dạy: Tổ chức kiểm tra giữa kỳ, hướng dẫn tự học Học ở lớp: Làn bài thi Học ngoài lớp: - Đọc trước tài liệu chương 4	G1.1, G1.2, G1.3 G2.1, G2.2, G2.3 G3.1, G3.1, G3.3
8 /2 tiết	Chương 4: DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA 1. DÂN CHỦ VÀ DÂN CHỦ XÃ HỘI CHỦ NGHĨA 1.1. Dân chủ và sự ra đời, phát triển của dân chủ 1.2. Dân chủ xã hội chủ nghĩa 2. NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA 2.1. Sự ra đời, bản chất, chức năng của nhà nước xã hội chủ nghĩa 2.2. Mối quan hệ giữa dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu mục 3, chương 4	G1.4 G2.1 G2.2 G3.1 G3.1 G3.3

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9/ 2 tiết	Chương 4: DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA (tiếp theo) 3. DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC PHÁP QUYỀN XÃ HỘI CHỦ NGHĨA Ở VIỆT NAM <i>3.1. Dân chủ xã hội chủ nghĩa ở Việt Nam</i> <i>3.2. Nhà nước pháp quyền xã hội chủ nghĩa ở Việt Nam</i> <i>3.3. Phát huy dân chủ xã hội chủ nghĩa, xây dựng nhà nước pháp quyền xã hội chủ nghĩa ở Việt Nam hiện nay</i>	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu chương 5	G1.4 G2.1 G2.2 G3.1 G3.1 G3.3
10/ 2 tiết	Chương 5: CƠ CẤU XÃ HỘI - GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1. CƠ CẤU XÃ HỘI GIAI CẤP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI <i>1.1. Khái niệm và vị trí của cơ cấu xã hội - giai cấp trong cơ cấu xã hội</i> <i>1.2. Sự biến đổi có tính quy luật của cơ cấu xã hội - giai cấp trong thời kỳ quá độ lên chủ nghĩa xã hội</i> 2. LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI <i>2.1. Tính tất yếu của liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội</i> <i>2.2. Nội dung của liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội</i>	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu mục 3, chương 5	G1.5 G2.1 G2.2 G3.1 G3.1 G3.3
11/ 2 tiết	Chương 5: CƠ CẤU XÃ HỘI - GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI (tiếp theo) 3. CƠ CẤU XÃ HỘI - GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu	G1.5 G2.1 G2.2 G3.1 G3.1 G3.3

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	TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI Ở VIỆT NAM 3.1. Cơ cấu xã hội - giai cấp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam. 3.2. Liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam.	chương 6	
12/ 2 tiết	Chương 6: VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1. DÂN TỘC TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1.1. Chủ nghĩa Mác - Lênin về dân tộc 1.2. Dân tộc và quan hệ dân tộc ở Việt Nam	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu mục 2, 3 chương 6	G1.6 G2.1 G2.2 G3.1 G3.1 G3.3
13/ 2 tiết	Chương 6: VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI (tiếp theo) 2. TÔN GIÁO TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Chủ nghĩa Mác - Lênin về tôn giáo. 2.2. Tôn giáo ở Việt Nam và chính sách tôn giáo của Đảng, Nhà nước ta hiện nay 3. QUAN HỆ DÂN TỘC VÀ TÔN GIÁO Ở VIỆT NAM 3.1. Đặc điểm quan hệ dân tộc và tôn giáo ở Việt Nam 3.2. Định hướng giải quyết mối quan hệ dân tộc và tôn giáo ở Việt Nam hiện nay.	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu chương 7	G1.6 G2.1 G2.2 G3.1 G3.1 G3.3
14/ 2 tiết	Chương 7: VẤN ĐỀ GIA ĐÌNH TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1. KHÁI NIỆM, VỊ TRÍ VÀ CHỨC NĂNG CỦA GIA ĐÌNH 1.1. Khái niệm gia đình 1.2. Vị trí của gia đình trong xã hội 1.3. Chức năng cơ bản của gia đình	Dạy: thuyết giảng, phát vấn, chấm phần biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Đọc trước tài liệu mục 3, chương 7	G1.7 G2.1 G2.2 G3.1 G3.1 G3.3



	2. CƠ SỞ XÂY DỰNG GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Cơ sở kinh tế - xã hội 2.2. Cơ sở chính trị - xã hội 2.3. Cơ sở văn hóa		
15/ 2 tiết	Chương 7: VẤN ĐỀ GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI (tiếp theo) 3. XÂY DỰNG GIA ĐÌNH VIỆT NAM TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 3.1. Sự biến đổi gia đình Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội 3.2. Phương hướng cơ bản xây dựng và phát triển gia đình Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội. - Ôn tập thi cuối kỳ	Dạy: thuyết giảng, phát vấn, chấm phản biện. Học ở lớp: Thảo luận và phát biểu trên lớp. Học ngoài lớp: Ôn tập thi cuối kỳ	G1.7 G2.1 G2.2 G3.1 G3.1 G3.3

(Các nội dung giảng dạy theo buổi học, thể hiện sự tương quan với các CDR của môn học, các hoạt động dạy và học (ở lớp, ở nhà) và các bài đánh giá của môn học)

Lý thuyết

- (1): Thông tin về tuần/buổi học. (2): Liệt kê nội dung giảng dạy theo chương, mục
(3): Liệt kê CDR liên quan của môn học (ghi ký hiệu Gx.x),
(4): Liệt kê các hoạt động dạy và học (ở lớp, ở nhà), bao gồm đọc trước tài liệu (nếu có yêu cầu)
(5): Liệt kê các bài đánh giá liên quan (ghi ký hiệu Ax.x)

Thực hành

Tuần/Buổi học (1)	Nội dung (2)	CDR môn học (3)	Hoạt động dạy và học (4)	Bài đánh giá (5)

- (1): Thông tin về tuần/buổi học. (2): Liệt kê nội dung thực hành theo bài thực hành
(3): Liệt kê CDR liên quan của môn học (ghi ký hiệu Gx.x),
(4): Liệt kê các hoạt động dạy và học (ở lớp, ở nhà), bao gồm đọc trước tài liệu (nếu có yêu cầu)
(5): Liệt kê các bài đánh giá liên quan (ghi ký hiệu Ax.x)

7. Quy định của môn học

- Quy định về Bài thuyết trình nhóm GHW:
- + Thành lập nhóm: Số lượng sinh viên tùy tình hình thực tế của lớp, giảng viên quy định. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2 hoặc trực tiếp nộp cho GV buổi 1.
- + Các nhóm thuyết trình theo thứ tự, giảng viên quy định. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.
- + Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV.
- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học:
- + Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế.
- + Có đầy đủ các phần điểm quá trình, điểm kiểm tra giữa kỳ điểm thi kết thúc học phần.
- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Lý luận và khoa học chính trị và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn

8. Phụ trách môn học

- Khoa/Bộ môn: Bộ môn Lý luận và khoa học chính trị - Khoa Chính trị - Hành chính (ĐHQG TP.HCM)
- Địa chỉ và email liên hệ: Tầng 7, nhà Điều hành ĐHQG. Khu phố 1. Phường Linh Trung, TP. Thủ Đức. Đại chỉ mail: daotao.spas@vnuhcm.edu.vn

KT. Trưởng Bộ môn
Phó trưởng Bộ môn (phụ trách)



TS. Mạch Thị Khánh Trinh

Tp. Hồ Chí Minh, ngày 14 tháng 10 năm 2023

KT. TRƯỞNG KHOA
PHÓ TRƯỞNG KHOA



TS. Nguyễn Đình Quốc Cường

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC
(DÀNH CHO TRƯỜNG ĐẠI HỌC QUỐC TẾ, ĐHQG-HCM)

1. THÔNG TIN CHUNG (General information)

- Tên môn học:
- + Tiếng Việt
 - + Tiếng Anh
- Mã số môn học:
- Thuộc khối kiến thức/kỹ năng:
- ☒ Kiến thức cơ bản/giáo dục đại cương
- ☐ Kiến thức chuyên ngành
- ☐ Môn học chuyên về kỹ năng chung
- Số tín chỉ:
- + Lý thuyết
 - + Thực hành (thuyết trình)
- Môn học tiên quyết:
- Môn học trước:
- Môn học song hành:
- Lịch sử Đảng Cộng sản Việt Nam**
History of Vietnamese communist party
PE018IU
- ☐ Kiến thức cơ sở ngành
- ☐ Kiến thức khác
- ☐ Môn học đồ án/luận văn tốt nghiệp
- 02
- 20 tiết
- 10 tiết (trên lớp)
- 60 tiết (về nhà)
- Không
- Không

2. MÔ TẢ MÔN HỌC (Course description)

Môn học nằm trong khối kiến thức giáo dục đại cương thuộc mảng lý luận chính trị. Môn học với những kiến thức cơ bản, hệ thống về Lịch sử Đảng Cộng sản Việt Nam như: sự ra đời của Đảng Cộng sản Việt Nam, sự lãnh đạo của Đảng trong đấu tranh giành chính quyền, giải phóng dân tộc và xây dựng chủ nghĩa xã hội từ năm 1930 đến năm nay.

3. MỤC TIÊU MÔN HỌC (Course Goals)

Mục tiêu (1)	Mô tả mục tiêu (2)	CDR của môn học tương ứng CTĐT (3)
G1	Về kiến thức Sinh viên hiểu được những tri thức cơ bản, có tính hệ thống về sự ra đời của Đảng Cộng sản Việt Nam (1920-1930), sự lãnh đạo của Đảng đối với cách mạng Việt Nam trong thời kỳ đấu tranh giành chính quyền chính quyền (1930-1945), trong hai cuộc kháng chiến chống thực dân	

	Pháp và đế quốc Mỹ xâm lược (1945-1975), trong sự nghiệp xây dựng, bảo vệ Tổ quốc thời kỳ cả nước quá độ lên chủ nghĩa xã hội, tiến hành công cuộc đổi mới (1975 đến nay).	
G2	Về kỹ năng Sinh viên vận dụng phương pháp tư duy khoa học về lịch sử để lựa chọn, khái quát hóa tài liệu nghiên cứu, học tập môn học; đồng thời sinh viên phân tích, đánh giá, vận dụng kiến thức lịch sử vào công tác thực tiễn.	
G3	Về thái độ/năng lực tự chủ và trách nhiệm Sinh viên đánh giá được sự thật khách quan và nâng cao lòng tự hào, niềm tin đối với sự nghiệp lãnh đạo của Đảng và phê phán những quan niệm sai trái về lịch sử của Đảng.	

4. CHUẨN ĐẦU RA MÔN HỌC (Course learning outcomes)

CDR (1)	Mô tả CDR (2)	Mức độ giảng dạy (3)
G1.1	Hiểu được đối tượng, chức năng, nhiệm vụ nội dung và phương pháp nghiên cứu, học tập môn Lịch sử Đảng Cộng sản Việt Nam	I,U
G1.2	Hiểu được quá trình ra đời của Đảng Cộng sản Việt Nam (1920-1930), nội dung cơ bản, giá trị lịch sử của Cương lĩnh chính trị đầu tiên của Đảng và quá trình Đảng lãnh đạo cuộc đấu tranh giành độc lập, giành chính quyền (1930-1945)	I, T,U
G1.3	Hiểu được quá trình lãnh đạo của Đảng đối với hai cuộc kháng chiến chống thực dân Pháp và đế quốc Mỹ xâm lược, hoàn thành giải phóng dân tộc, thống nhất đất nước thời kỳ 1945-1975	I, T,U
G1.4	Hiểu được quá trình phát triển đường lối và sự lãnh đạo của Đảng để đưa cả nước quá độ lên chủ nghĩa xã hội và tiến hành công cuộc đổi mới từ sau ngày thống nhất đất nước năm 1975 đến nay. Những thành tựu và bài học kinh nghiệm trong quá trình lãnh đạo từ năm 1930 đến nay.	I, T,U
G2.1	Vận dụng kiến thức đã học để nhận thức, hành động theo đường lối của Đảng.	U
G2.2	Vận dụng, phân tích với tư duy độc lập trong nghiên cứu nhằm giải quyết các vấn đề khi làm việc theo nhóm và trình bày kết quả nghiên cứu.	U
G3.1	Đánh giá được sự lãnh đạo đúng đắn của Đảng Cộng sản Việt Nam đối với cách mạng nước ta. Quyết tâm phấn đấu thực hiện đường lối cách mạng của Đảng.	U

G3.2	Đánh giá được tầm quan trọng của sự nghiêm túc trong học tập và nghiên cứu, tự rèn luyện bản thân trở thành người có phẩm chất chính trị và đạo đức tốt.	U

5. ĐÁNH GIÁ MÔN HỌC

Thành phần đánh giá (1)	Bài đánh giá (2)	CDR môn học (3)	Tỷ lệ % (4)
A1. Đánh giá quá trình	- Chuyên cần (A1.1) - Tham gia học tập trên lớp tích cực, hăng hái phát biểu (A1.2) - Thuyết trình nhóm (A1.3)	G1.1, G1.2- G1.3, G2.1, G2.2- G2.3 G3.1-G3.2	30%
A2. Đánh giá giữa kỳ	Kiểm tra giữa kỳ (A2.1)	G1.1 G2.1-G2.2, G3.1-G3.2	20%
A3. Đánh giá cuối kỳ	Thi cuối học kỳ (A3.1)	G1.2-G1.3, G2.1-G2.2, G3.1-G3.2	50%

6. KẾ HOẠCH GIẢNG DẠY CHI TIẾT

Tuần/Buổi học (1)	Nội dung (2)	Hoạt động dạy và học (3)	CDRMH (4)
1/2 tiết	Chương nhập môn ĐỐI TƯỢNG, CHỨC NĂNG, NHIỆM VỤ, NỘI DUNG VÀ PHƯƠNG PHÁP NGHIÊN CỨU, HỌC TẬP LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM I. Đối tượng nghiên cứu của môn học lịch sử Đảng Cộng sản Việt Nam II. Chức năng, nhiệm vụ của môn học lịch sử Đảng Cộng sản Việt Nam III. Phương Pháp nghiên cứu, học tập môn lịch sử Đảng Cộng sản Việt Nam	Hoạt động dạy: - Giới thiệu đề cương môn học - Giới thiệu nội dung đề tài thuyết trình nhóm) - Trình chiếu, thuyết giảng Hoạt động học: - Chia nhóm - Giới thiệu nhóm học tập - Nghe giảng, phát biểu - Đọc trước mục 1, 2 phần I của chương 1	G1.1 G2.1 G2.2 G3.1 G3.2
	Chương 1 ĐẢNG CỘNG SẢN VIỆT NAM RA ĐỜI VÀ LÃNH ĐẠO	Hoạt động dạy: - Trình chiếu, thuyết giảng mục	

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2/2 tiết	ĐẤU TRANH GIÀNH CHÍNH QUYỀN (1930-1945) I. Đảng cộng sản Việt Nam ra đời và cương lĩnh chính trị đầu tiên của Đảng (tháng 2 – 1930) 1. Bối cảnh lịch sử 2. Nguyễn Ái Quốc chuẩn bị các điều kiện để thành lập Đảng	1,2 phần I của chương 1 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 3,4 phần I của chương 1	G1.2 G2.1 G2.2 G3.1 G3.2
3/2 tiết	Chương 1 (tiếp theo) I. Đảng cộng sản Việt Nam ra đời và cương lĩnh chính trị đầu tiên của Đảng (tháng 2 – 1930) (tt) 3. Thành lập Đảng Cộng sản Việt Nam và Cương lĩnh chính trị đầu tiên của Đảng 4. Ý nghĩa lịch sử của việc thành lập Đảng Cộng sản Việt Nam	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 3,4 phần I của chương 1 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 1, 2 phần II của chương 1	G1.1 G1.2 G2.1 G2.2 G3.1 G3.2
4/2 tiết	Chương 1 (tiếp theo) II. Lãnh đạo đấu tranh giành chính quyền (1930-1945) 1. Phong trào cách mạng 1930-1935 và khôi phục phong trào 1932-1935 2. Phong trào dân chủ 1936-1939	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1, 2 phần II của chương 1 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 3, 4 phần II của chương 1	G1.2 G2.1 G2.2 G3.1 G3.2

5/2 tiết	II. Lãnh đạo đấu tranh giành chính quyền (1930-1945) (tt) 3. Phong trào giải phóng dân tộc 1939-1945 4. Tính chất, ý nghĩa và kinh nghiệm của Cách mạng Tháng Tám năm 1945	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 3, 4 phần II của chương 1 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 1,2 phần I của chương 2	G1.2 G1.3 G2.1 G2.2 G3.1 G3.2
6/2 tiết	Chương 2 ĐẢNG LÃNH ĐẠO HAI CUỘC KHÁNG CHIẾN, HOÀN THÀNH GIẢI PHÓNG DÂN TỘC, THỐNG NHẤT ĐẤT NƯỚC (1945-1975) I. Lãnh đạo xây dựng, bảo vệ chính quyền cách mạng, kháng chiến chống thực dân Pháp xâm lược 1945-1954 1. Xây dựng và bảo vệ chính quyền cách mạng 1945-1946 2. Đường lối kháng chiến toàn quốc và quá trình tổ chức thực hiện từ năm 1946 đến năm 1950	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1, 2 phần I của chương 2 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 3, 4 phần I của chương 2	G1.3 G2.1 G2.2 G3.1 G3.2
7/2 tiết	Chương 2 (tiếp theo) I. Lãnh đạo xây dựng, bảo vệ chính quyền cách mạng, kháng chiến chống thực dân Pháp xâm lược 1945-1954 (tt) 3. Đẩy mạnh cuộc kháng chiến đến thắng lợi 1951-1954 4. Ý nghĩa lịch sử và kinh nghiệm của Đảng trong lãnh đạo kháng chiến chống Pháp và can thiệp Mỹ	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 3, 4 phần I của chương 2 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 1 phần II của chương 2	G1.3 G2.1 G2.2 G3.1 G3.2

8/2 tiết	Chương 2 (tiếp theo) II. Lãnh đạo xây dựng chủ nghĩa xã hội ở miền bắc và kháng chiến chống đế quốc Mỹ xâm lược, giải phóng miền nam, thống nhất đất nước (1954-1975) <i>1. Sự lãnh đạo của Đảng đối với cách mạng hai miền Nam – Bắc 1954-1965</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1 phần II của chương 2 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 2,3 phần II của chương 2	G1.3 G2.1 G2.2 G3.1 G3.2
9/2 tiết	Chương 2 (tiếp theo) II. Lãnh đạo xây dựng chủ nghĩa xã hội ở miền bắc và kháng chiến chống đế quốc Mỹ xâm lược, giải phóng miền nam, thống nhất đất nước (1954-1975) (tt) <i>2. Lãnh đạo cách mạng cả nước giai đoạn 1965-1975</i> <i>3. Ý nghĩa lịch sử và kinh nghiệm lãnh đạo của Đảng thời kỳ 1954-1975</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 2,3 phần II của chương 2 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Ôn tập nội dung chương 1,2	G1.3 G2.1 G2.2 G3.1 G3.2
10/2 tiết	Chương 3 ĐẢNG LÃNH ĐẠO CẢ NƯỚC QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI VÀ TIẾN HÀNH CÔNG CUỘC ĐỔI MỚI (1975 ĐẾN NAY) I. Lãnh đạo cả nước xây dựng chủ nghĩa xã hội và bảo vệ tổ quốc (1975-1986) <i>1. Xây dựng chủ nghĩa xã hội và bảo vệ Tổ quốc 1975-1981</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1 phần I của chương 3 - Đặt vấn đề và giải quyết vấn đề - Tổ chức kiểm tra giữa kỳ Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Thực hiện kiểm tra giữa kỳ - Đọc trước mục 2	G1.4 G2.1 G2.2 G3.1 G3.2

		phần I của chương 3	
11/2 tiết	Chương 3 (tiếp theo) I. Lãnh đạo cả nước xây dựng chủ nghĩa xã hội và bảo vệ tổ quốc (1975-1986) (tt) 1. <i>Xây dựng chủ nghĩa xã hội và bảo vệ Tổ quốc 1975-1981 (tt)</i> 2. <i>Đại hội đại biểu toàn quốc lần thứ V của Đảng và các bước đột phá tiếp tục đổi mới kinh tế 1982-1986</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1 phần I của chương 3 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 1 phần II của chương 3	G1.4 G2.1 G2.2 G3.1 G3.2
12/2 tiết	Chương 3 (tiếp theo) II. Lãnh đạo công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế (1986 đến nay) 1. <i>Đổi mới toàn diện, đưa đất nước ra khỏi khủng hoảng kinh tế - xã hội 1986-1996</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1 phần II của chương 3 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 2 phần II của chương 3	G1.4 G2.1 G2.2 G3.1 G3.2
13/2 tiết	Chương 3 (tiếp theo) II. Lãnh đạo công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế (1986 đến nay) (tt) 1. <i>Đổi mới toàn diện, đưa đất nước ra khỏi khủng hoảng kinh tế - xã hội 1986-1996 (tt)</i> 2. <i>Tiếp tục công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế 1996 đến nay</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 1, 2 phần II của chương 3 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước mục 3 phần II của chương 3	G1.4 G2.1 G2.2 G3.1 G3.2

		3	
14/2 tiết	Chương 3 (tiếp theo) II. Lãnh đạo công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế (1986 đến nay) (tt) 2. <i>Tiếp tục công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế 1996 đến nay (tt)</i> 3. <i>Thành tựu, kinh nghiệm của công cuộc đổi mới</i>	Hoạt động dạy: - Trình chiếu, thuyết giảng mục 2,3 phần II của chương 3 - Đặt vấn đề và giải quyết vấn đề Hoạt động học: - Nghe giảng, thuyết trình, thảo luận nhóm. - Đọc trước phần kết luận	G1.4 G2.1 G2.2 G3.1 G3.2
15/2 tiết	KẾT LUẬN 1. <i>Những thắng lợi vĩ đại của cách mạng Việt Nam.</i> 2. <i>Những bài học lớn về sự lãnh đạo của Đảng</i>	Hoạt động dạy: - Hướng dẫn sv tự học - Ôn tập tổng kết môn học - Công bố bảng điểm chi tiết các hoạt động - Giải đáp thắc mắc Hoạt động học: - Nghe giảng, phát biểu - Ôn tập toàn bộ nội dung môn học tại nhà	G1.1 G1.2 G1.3 G1.4 G2.1 G2.2 G3.1 G3.2

7. QUY ĐỊNH CỦA MÔN HỌC (Course requirements and expectations)

- Quy định về Bài thuyết trình nhóm:

- Thành lập nhóm: Số lượng sinh viên tùy vào sĩ số lớp, do giảng viên quy định. Hạn chót đăng ký đề tài nhóm Quản lý trên forum/Moodle là Buổi 2 hoặc trực tiếp nộp cho GV buổi 1.
- Các nhóm thuyết trình theo thứ tự được phân công. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan khi thuyết trình.
- Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị điểm 0 chuyên cần.

8. TÀI LIỆU HỌC TẬP, THAM KHẢO (Reference)

Giáo trình:

[1] Bộ Giáo dục và Đào tạo (2021), *Giáo trình Lịch sử Đảng Cộng sản Việt Nam* (dành cho bậc đại học hệ không chuyên lý luận chính trị), NXB. Chính trị Quốc gia Sự Thật, Hà Nội.

Tài liệu khác:

[1] Hội đồng Trung ương chỉ đạo biên soạn giáo trình quốc gia các môn khoa học Mác – Lênin, Tư tưởng Hồ Chí Minh (2019), *Giáo trình Lịch sử Đảng Cộng sản Việt Nam* (tái bản có sửa chữa, bổ sung), Nxb. Chính trị quốc gia, Hà Nội.

[2] Bộ Giáo dục và Đào tạo (2017), *Giáo trình Đường lối cách mạng của Đảng Cộng sản Việt Nam*, Nxb Chính trị quốc gia, Hà Nội.

Tp. Hồ Chí Minh, ngày 01 tháng 10 năm 2023

KT. Trưởng Bộ môn
Phó trưởng Bộ môn



Lê Văn Thông

KT. TRƯỞNG KHOA
PHÓ TRƯỞNG KHOA



TS. Nguyễn Đình Quốc Cường

ĐỀ CƯƠNG CHI TIẾT HỌC PHẦN
(DÀNH CHO TRƯỜNG ĐẠI HỌC QUỐC TẾ)

1. Thông tin về giảng viên (cung cấp cho sinh viên khi giảng dạy)

- Họ và tên:
- Chức danh, học hàm, học vị:
- Đơn vị công tác: **Khoa Chính trị - Hành chính, ĐHQG-HCM**
- Thời gian và địa điểm làm việc:...
- Địa chỉ liên hệ:
- Điện thoại, email:
- Thông tin về trợ giảng (nếu có) (họ và tên, địa chỉ liên hệ, điện thoại, e-mail):

2. Thông tin chung về học phần

- Mã học phần: PE019IU
- Tên học phần: **Tư tưởng Hồ Chí Minh**
- Tên học phần bằng tiếng Anh: **Ho Chi Minh's Thoughts**
- Số tín chỉ: 02 (30 tiết).
- Cấu trúc/cơ cấu học phần:
 - Số tiết lý thuyết: *30 tiết*
 - Số tiết thực hành:
 - Số tiết bài tập:
 - Khác: Số tiết tự học: *60 tiết*
- Loại học phần thuộc khối kiến thức (check vào các ô):
 - Kiến thức đại cương: ☒
 - Kiến thức cơ sở ngành: ☐
 - Kiến thức chuyên ngành: ☐
 - Kiến thức bổ trợ: ☐
 - Khóa luận tốt nghiệp: ☐
 - Đồ án/dự án/seminar tốt nghiệp: ☐
 - Khác:....
- Các học phần tiên quyết: **không** hoặc **có**, nếu **có** thì điền các thông tin sau
- Các học phần học trước học phần này: **không** hoặc **có**, nếu **có** thì điền các thông tin sau
 -
 -
- Học phần song hành: **không** hoặc **có**, nếu **có** thì điền các thông tin sau
 -



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- Các yêu cầu khác (nếu có):.....

- Bộ môn phụ trách học phần: Lý luận và Khoa học chính trị, Khoa Chính trị - Hành chính

3. Mô tả vắn tắt nội dung học phần: (trình bày ngắn gọn vai trò, vị trí học phần/môn học, kiến thức sẽ trang bị cho sinh viên, quan hệ với các học phần/môn học khác trong chương trình đào tạo)

Môn học thuộc phần kiến thức giáo dục đại cương trong khối kiến thức cơ bản về lý luận chính trị. Trang bị cho sinh viên những kiến thức cơ bản về: Đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh; về cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh; về độc lập dân tộc và chủ nghĩa xã hội; về Đảng Cộng sản và Nhà nước Việt Nam; về đại đoàn kết dân tộc và đoàn kết quốc tế; về văn hóa, đạo đức, con người.

4. Mục tiêu của học phần

- Mục tiêu chung:

+ Sinh viên **hiểu** được những nội dung cơ bản của tư tưởng Hồ Chí Minh về con đường cách mạng Việt Nam; về độc lập dân tộc gắn liền với chủ nghĩa xã hội; về Đảng Cộng sản Việt Nam; về Nhà nước pháp quyền xã hội chủ nghĩa Việt Nam; về đại đoàn kết dân tộc và đoàn kết quốc tế; về văn hóa, đạo đức và con người...

+ Sinh viên **vận dụng** được những kiến thức cơ bản của tư tưởng Hồ Chí Minh vào trong nhận thức và trong hoạt động thực tiễn của bản thân.

+ Sinh viên **phân tích, đánh giá** được giá trị, tính khoa học cách mạng và nhân văn của tư tưởng Hồ Chí Minh đối với thực tiễn Việt Nam và nhân loại.

- Mục tiêu cụ thể:

Ký hiệu mục tiêu của học phần (G)	Mô tả/nội dung mục tiêu học phần	Mức độ năng lực đạt được (theo thang đánh giá Bloom)	Ghi chú
KIẾN THỨC			
G1.1	Sinh viên hiểu những kiến thức cơ bản về khái niệm; cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh; tư tưởng Hồ Chí Minh về độc lập dân tộc gắn liền với chủ nghĩa xã hội;	2	
G1.2	Sinh viên hiểu những nội dung cơ bản của tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt Nam; về Nhà nước của nhân dân, do nhân dân, vì nhân dân; về sự vận dụng của Đảng Cộng sản Việt Nam trong cách mạng dân tộc dân chủ và cách mạng xã hội chủ nghĩa, trong công cuộc đổi mới đất nước hiện nay.	2	
G1.3	Sinh viên hiểu những nội dung cơ bản của tư tưởng Hồ Chí Minh về đại đoàn kết dân tộc và đại đoàn kết quốc tế; hiểu những nội dung cơ bản của tư tưởng Hồ Chí Minh về văn hóa, đạo đức và con	2	

	người.		
KỸ NĂNG			
G2.1	Sinh viên vận dụng giá trị của tư tưởng Hồ Chí Minh trong hoạt động lý luận và thực tiễn; Sinh viên phân tích, nhận diện và phản bác những luận điệu xuyên tạc về tư tưởng Hồ Chí Minh về độc lập dân tộc và chủ nghĩa xã hội.	3	
G2.2	Sinh viên phân tích được một cách khoa học những vấn đề về xây dựng Đảng cộng sản Việt Nam và xây dựng Nhà nước pháp quyền xã hội chủ nghĩa của nhân dân, do nhân dân, vì nhân dân trong thời kỳ đổi mới đất nước.	4	
G2.3	Sinh viên vận dụng tư tưởng Hồ Chí Minh về đại đoàn kết dân tộc và đoàn kết quốc tế trong giai đoạn hiện nay; Sinh viên vận dụng được phương pháp tư duy mới trong học tập, nghiên cứu; tự mình biết đào sâu lý luận gắn với thực tiễn với tinh thần độc lập, sáng tạo.	3	
THÁI ĐỘ			
G3.1	Sinh viên vận dụng, học tập và làm theo tư tưởng, đạo đức, phong cách Hồ Chí Minh trong học tập và cuộc sống hằng ngày.	3	
G3.2	Sinh viên đánh giá được bản chất khoa học và cách mạng của tư tưởng Hồ Chí Minh, từ đó có bản lĩnh chính trị vững vàng, có lòng yêu nước nồng nàn, trung thành với mục tiêu lý tưởng của Đảng, của dân tộc. Trung thực, thẳng thắn, xây dựng tập thể đoàn kết. Trân trọng, giữ gìn và phát huy di sản tư tưởng của Hồ Chí Minh trong hoạt động thực tiễn.	5	
G3.3	Sinh viên vận dụng bản chất khoa học và cách mạng của tư tưởng Hồ Chí Minh trong việc đấu tranh chống lại các âm mưu xuyên tạc tư tưởng Hồ Chí Minh, chủ trương, đường lối của Đảng. Có hành vi đạo đức chuẩn mực. Có năng lực học tập, tự nghiên cứu các vấn đề chuyên môn.	3	

(*) 1. Ghi nhớ (Remembering), 2. Hiểu (Understanding), 3. Vận dụng (Applying), 4. Phân tích (Analyzing), 5. Đánh giá (Evaluating), 6. Sáng tạo (Creating).

5. Chuẩn đầu ra (CDR) của học phần

Thứ tự các	Ký hiệu CDR	Mô tả/nội dung CDR học phần	Mức độ giảng dạy	Liên kết giữa CDR	Liên kết giữa CDR học

CDR	học phần (CHP)		(I, T, U) *	học phần và mục tiêu học phần	phần và CDR chương trình đào tạo
KIẾN THỨC					
1	CHP1	Hiểu được khái niệm, đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh.	I	G1.1	
2	CHP2	Hiểu được cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh.	I, T, U	G1.1	
3	CHP3	Hiểu được kiến thức cơ bản tư tưởng Hồ Chí Minh về độc lập dân tộc và chủ nghĩa xã hội. Sự vận dụng của Đảng vào trong sự nghiệp cách mạng hiện nay.	I, T,U	G1.1	
4	CHP4	Hiểu được kiến thức cơ bản tư tưởng Hồ Chí Minh về Đảng Cộng Sản Việt Nam và Nhà nước của nhân dân, do nhân dân, vì nhân dân. Sự vận dụng tư tưởng Hồ Chí Minh vào công tác xây dựng Đảng và xây dựng Nhà nước.	I, T,U	G1.2	
5	CHP5	Hiểu được kiến thức cơ bản tư tưởng Hồ Chí Minh về đại đoàn kết toàn dân tộc và đoàn kết quốc tế. Sự vận dụng của Đảng vào trong sự nghiệp cách mạng hiện nay;	I, T,U	G1.3	
6	CHP6	Hiểu được kiến thức cơ bản tư tưởng Hồ Chí Minh về văn hóa, đạo đức, con người. Sự vận dụng tư tưởng Hồ Chí Minh trong việc xây dựng văn hóa, đạo đức, con người Việt Nam hiện nay.	I, T,U	G1.3	
KỸ NĂNG					
7	CHP7	Phân tích mang tính khái quát hóa để rút ra <i>Từ khóa tri thức</i> đối với mỗi nội dung và tự duy có hệ thống.	T, U	G2.1; G2.2; G2.3	
8	CHP8	Vận dụng kiến thức học phần để trình bày, thuyết	U	G2.1; G2.2;	

		minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu dựa trên thực tiễn.		G2.3	
9	CHP9	Vận dụng kiến thức học phần để giao tiếp xã hội, hợp tác và làm việc nhóm, chia sẻ tri thức và kinh nghiệm, khả năng điều hành nhóm làm việc.	U	G2.1; G2.2; G2.3	
THÁI ĐỘ					
10	CHP10	Phân tích, đánh giá và có ý thức trách nhiệm bảo vệ tính khoa học, cách mạng, nhân văn của tư tưởng Hồ Chí Minh.	T, U	G3.1 G3.2 G3.3	
11	CHP11	Vận dụng kiến thức đã học gắn với trách nhiệm cá nhân đối với tập thể, cộng đồng.	U	G3.1 G3.2 G3.3	
12	CHP12	Phân tích, đánh giá được sự cần thiết của việc học tập, nghiên cứu suốt đời và vận dụng tư tưởng Hồ Chí Minh trong cuộc sống.	T, U	G3.1 G3.2 G3.3	

(*) I (Introduce): giới thiệu; T (Teach): dạy; U (Utilize): sử dụng

6. Hình thức, phương pháp và trọng số đánh giá kết quả học phần

Hình thức đánh giá	Nội dung chi tiết	Phương pháp đánh giá (đánh dấu X)				Ký hiệu bài đánh giá	Trọng số đánh giá	Ghi chú
		Viết	Trắc nghiệm	Vấn đáp	Khác			
Đánh giá quá trình	- Chuyên cần - Tham gia học tập trên lớp tích cực, hăng hái phát biểu. -Thuyết trình nhóm					ĐG1 (tổng điểm từ ĐG1.1 đến ĐG1.6)	30%	
Điểm kiểm tra giữa kỳ		X	X	X		ĐG1.1	20%	

Đánh giá tổng kết	Điểm cuối học kỳ	X				ĐG2	50%	Điểm bài thi + điểm thường (tối đa 20%=2 điểm)

7. **Thang điểm đánh giá:** theo thang điểm 100.

8. **Kế hoạch giảng dạy chi tiết của học phần :** Ghi chi tiết đến 2 cấp (chương và bài).

STT Buổi (3 tiết/ buổi)	Tên bài giảng của học phần (Ghi chi tiết tên chương và bài giảng của mỗi chương)	Liên kết với CĐR học phần	Hoạt động dạy và học						Phương pháp dạy học (thuyết trình; thảo luận; các phương pháp dạy học tích cực/lấy người học làm trung tâm...)	Bài đánh giá
			Số tiết lên lớp				SV tự nghiên cứu, tự học			
			Lý thuyết	Thực hành/ thực tập	Bài tập	Thảo luận/ khác	Số tiết	Ghi chú (nếu có)		
1/2	Chương 1. Khái niệm, đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh		02						Thuyết trình	ĐG1.1; ĐG1.6; ĐG2
2/2	Chương 2. Cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh		02						Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
3/2	Chương 2 (tiếp)		01			01			Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
4/2	Chương 2 (tiếp)		02						Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
5/2	Chương 3. Tư tưởng Hồ Chí								Thuyết trình,	ĐG1.1; ĐG1.3;

	Mình về độc lập dân tộc và chủ nghĩa xã hội		02					thảo luận nhóm	ĐG1.5; ĐG1.6; ĐG2
6/2	Chương 3(tiếp)		01			01		Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
7/2	Chương 3(tiếp)		01			01			
8/2	Chương 4. Tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt Nam và Nhà nước của nhân dân, do nhân dân và vì nhân dân		02					Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
9/2	Chương 4 (tiếp)		02					Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
10/2	Chương 4 (tiếp)					02		Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
11/2	Chương 5. Tư tưởng Hồ Chí Minh về đại đoàn kết toàn dân tộc và đoàn kết quốc tế		02					Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
12/2	Chương 5 (tiếp)		01			01		Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
13/2	Chương 6. Tư tưởng Hồ Chí Minh về văn hóa, đạo đức, con người		02					Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
14/2	Chương 6 (tiếp)		02					Thuyết trình, thảo luận nhóm	ĐG1.1; ĐG1.3; ĐG1.5; ĐG1.6; ĐG2
15/2	Chương 6 (tiếp)					02		Thuyết trình, thảo luận	ĐG1.1; ĐG1.3; ĐG1.5;

									luyện nhóm	ĐG1.6; ĐG2
	Tổng cộng số tiết		22	...	...	08	...	...		

9. Tài liệu học tập

STT	Tên tác giả	Năm xuất bản	Tên giáo trình	Tên Nhà xuất bản	Giáo trình chính/Tài liệu tham khảo/Khác	Nơi có thể có tài liệu/trang web
1	Bộ Giáo dục và Đào tạo	2021	<i>Giáo trình Tư tưởng Hồ Chí Minh</i>	Nxb. Chính trị quốc gia Sự thật, Hà Nội.	Giáo trình chính	
2	Hồ Chí Minh	2011	<i>Toàn tập</i>	Nxb. Chính trị quốc gia Sự thật, Hà Nội.	Tài liệu tham khảo	Báo điện tử Đảng Cộng sản Việt Nam, https://hochiminh.vn/tac-pham-cua-ho-chi-minh/ho-chi-minh-toan-tap
3	Hồ Chí Minh	2016	<i>Biên niên tiểu sử</i>	Nxb. Chính trị quốc gia Sự thật, Hà Nội.	Tài liệu tham khảo	

10. Quy định của môn học

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Lý luận và Khoa học chính trị và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn
- Quy định về Bài thuyết trình nhóm:
 - + Thành lập nhóm: Theo tình hình thực tế của lớp học.
 - + Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2.
 - + Bắt đầu từ tuần 4 thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến bài tập khi đi thuyết trình.
 - + Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV
- Quy định về đánh giá môn học: theo Quy định về việc giảng dạy và học tập các môn Lý luận chính trị của khoa Chính trị - Hành chính.

KT. Trưởng Bộ môn
Phó trưởng Bộ môn



Lê Văn Thông

Tp. Hồ Chí Minh, ngày 01 tháng 10 năm 2023

KT. TRƯỞNG KHOA
PHÓ TRƯỞNG KHOA



TS. Nguyễn Đình Quốc Cường



VIETNAM NATIONAL UNIVERSITY HCMC INTERNATIONAL UNIVERSITY

COURSE SYLLABUS

General Law

PE021IU

1. General information

Department	Office of Academic Affairs
Course classification	Foundation course
Course designation	Face to face
Semester(s) in which the course is taught	All semesters in each academic year
Person responsible for the course	Dr. Vo Tuong Huan LLM. Bui Doan Danh Thao
Language	English
Relation to curriculum	Compulsory
Teaching methods	Student-centred approach
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 hours Contact hours (lecture, in class discussions): 37.5 hours (=45 periods) Private study including examination preparation, specified in hours ¹ : 90 hours
Credit points	3
Required and recommended prerequisites for joining the course	N/A

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The overarching aims of this course are to: • Provide essential knowledge of Vietnamese legal system through integrated technology and real cases for social and cultural sustainability. • Raise awareness of responsibility toward others and how to stand for ending all types of legal violations, especially corruption in various social contexts. • Practice necessary skills to act as an ambassador to ensure social fairness and global equitable rights. • Use integrated online legal resources and communication tools to help the community to identify issues and develop countermeasures.	
Course learning outcomes	Upon the successful completion of this course, students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Apply appropriate legal knowledge in the Vietnamese legal system to solve legal issues in various social contexts for a fair sustainable lifelong being. CLO1.1. Apply general knowledge on state and law to solve legal issues in various social contexts for a fair sustainable lifelong being. CLO1.2. Apply principle legal norms in some law branches such as constitution, civil, criminal, labor and administrative law to solve legal issues in various social contexts for a fair sustainable lifelong being.
	Skill	CLO2. Communicate knowledge in the Vietnamese legal system to encourage people to raise their legal rights aiming for fair social/cultural moves. CLO3. Integrate ICTs to solve legal issues in various social contexts .
	Attitude	CLO4. Detect the responsibility to ensure social and cultural fairness, including ending corruption , in various social contexts through understanding importance of law in social contexts. CLO5. Respond to the base for coexistence in various social contexts .
Content	The course will introduce students to Vietnamese legal systems. In particular, students will understand their rights and obligations in the Constitution, Criminal law, administrative law, civil law, labor law and enterprise law of Vietnam. From this, students will raise awareness towards their responsibility to ensure justice, including ending corruption , in society.	
Examination forms	Multiple choice questions Case-based exams Essay exams Oral exams	

Study and examination requirements	To pass this course, the students must: • Achieve a composite mark of at least 50; and • Make a satisfactory attempt at all assessment tasks (see below). GRADING POLICY Grades can be based on the following: <table border="1"> <tr> <td>Assignment</td><td>20%</td></tr> <tr> <td>Midterm examination</td><td>30%</td></tr> <tr> <td>Final examination</td><td>50%</td></tr> <tr> <td>Total</td><td>100%</td></tr> </table> COURSE POLICIES Attendance Regular and punctual attendance at lectures and seminars is expected in this course. University regulations indicate that if students attend less than eighty percent of scheduled classes they may be refused final assessment. Exemptions may only be made on eligible medical grounds. Workload It is expected that the students will spend at least <i>six</i> hours per week studying this course. This time should be made up of reading, research, working on exercises and problems, and attending classes. In periods where they need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a cause of failure for many students. They should take the required workload into account when planning how to balance study with part-time jobs and other activities. General Conduct and Behaviour The students are expected to conduct themselves with consideration and respect for the needs of fellow students and teaching staff. Conduct which unduly disrupts or interferes with a class, such as ringing or talking on mobile phones, is not acceptable and students will be asked to leave the class. The use of laptops is also encouraged during law lessons only to search for materials online. More information on student conduct is available on the university webpage. Keeping informed The students should take note of all announcements made in lectures or on the course's Blackboard, and another announced mean of communications. From time to time, the university will send important announcements to their university e-mail addresses without providing a paper copy. The students will be deemed to have received this information. Academic honesty and plagiarism Plagiarism is the presentation of the thoughts or work of another as one's own. Students are also reminded that careful time management is an important part of the study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and	Assignment	20%	Midterm examination	30%	Final examination	50%	Total	100%
Assignment	20%								
Midterm examination	30%								
Final examination	50%								
Total	100%								

	the proper referencing of sources in preparing all assessment items. The university regards plagiarism as a form of academic misconduct and has very strict rules regarding plagiarism. Special consideration Requests for special consideration (for final examination only) must be made to the Office of Academic Affairs within one week after the examination. General policy and information on special consideration can be found at the Office of Academic Affairs. Absence on the Mid-term is not allowed, or in special cases approved by Lecturer can be replaced with relevant Assignment. Meeting up with the lecturers after classes Students must make an appointment via emails if they want to meet up with the lecturer after classes and be on time. If there are any changes to the scheduled time, students must inform the lecturer immediately.
Reading list	Please note that it is very important to gain familiarity with the subject matter in the readings and cases available on Blackboard and the internet <i>before</i> attendance in classes. Required Course Texts and Materials <u>Legal Texts:</u> 1. Constitution of Vietnam - 2013 2. Civil Code of Vietnam - 2015 3. Criminal Code of Vietnam – 2015 (amended in 2017) 4. Law on Law on Handling of Administrative Violations 2012 5. Law on Enterprises – 2020 6. Labour Code 2019 7. Law on anti-corruption 2018 Available at https://luatvietnam.vn/ or Blackboard <u>Books:</u> • PGS.TS. Phan Trung Hien, <i>Giáo trình Pháp Luật Đại cương</i>, NXB Chính Trị Quốc Gia Sự Thật 2022. • Mai Hong Quy (Chief Editor) (2nd 2017), <i>Introduction to Vietnamese Law</i>, Hong Duc Publishing House. <u>Additional materials provided in Blackboard</u> The lecturer will attempt to make lecture notes and additional reading available on Blackboard. However, this is not an automatic entitlement for students doing this subject. Note that this is not a distance learning course, and you are expected to attend lectures and take notes. This way, you will get the added benefit of class interaction and demonstration. Optional Course Texts and Materials <u>Recommended Internet sites</u> UNCTAD (United Nations Conference on Trade and Development) WTO (World Trade Organization) MOIT - Vietnam (Official website of Ministry of Industry and Trade) MPI - Vietnam (Official website of Ministry of Planning and Investment)

	<u>Other Resources, Support and Information</u> Additional learning assistance is available for students in this course and will be made available on Blackboard. Academic journal articles are available through connections via the VNU - Central Library. Recommended articles will be duly informed to the students. <u>Books:</u> • Nguyen Phu Trong, <i>Kiên quyết, kiên trì đấu tranh phòng, chống tham nhũng, tiêu cực, góp phần xây dựng đảng và nhà nước ta ngày càng trong sạch, vững mạnh</i>, NXB Chính Trị Quốc Gia Sự Thật 2023. • University of Law Ho Chi Minh City, <i>Giáo trình luật Hiến pháp Việt nam</i>, NXB Hồng Đức 2023. • University of Law Ho Chi Minh City, <i>Giáo trình Luật hành chính</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật hình sự Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật dân sự Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật lao động Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình pháp luật về chủ thể kinh doanh</i>, NXB Hồng Đức 2022.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (SLO) (1-5) and Program/Student Learning Outcomes (PLO/SLO) (1 - 10) is shown in the following table:

	PLO/SLO									
SLO	1	2	3	4	5	6	7	8	9	10
1	R,M					R,M	R,M	R,M	R,M	R,M
2			R,M							
3			R,M							
4				R,M						
5					R,M					

R: Reinforced

M: Mastery

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to State • What is State? • Nature of state • Forms of state • Functions of state • Introduction to structure of Vietnamese state	1-5 (level I - introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard

2	Introduction to law? • What is law? • Nature of law • Forms of law • Structure of law • Categorization of legal system. • Enforcement • Breach of law and liabilities for breach of law • Introduction to structure of Vietnamese legal system	1-5 (level I - introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard
3	Constitutional Law • General introduction on Vietnamese Constitution and its nature and basic principles. • Political, economic and other regimes of Vietnam • Basic rights and responsibilities of citizens. Relationship between citizens and the State. • Structure, functions and duties of Vietnamese state, especially in prevention of corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPTs – Constitutional law available on Blackboard Constitution 2013 available on Blackboard
4	Constitutional Law (Cont) • Structure and functions and duties of Vietnamese state • Duties of the state in prevention of corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPTs – Constitutional law available on Blackboard Constitution 2013 available on Blackboard
5	Administrative Law • Definition and nature of administrative law • Administrative law violations • Liabilities for breach of administrative law, exemption from the liability	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies and law on anti-corruption	PPT– Administrative law available on Blackboard Law on handling administrative violations 2012, and Law on anti-corruption 2018 available on Blackboard
6	Criminal Law • Definition and nature of criminal law	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance	Discussions Case studies, especially cases related	PPT– Criminal law available on Blackboard

	- Crimes - Punishments		evaluations	to corruption	Criminal code 2015 available on Blackboard
7	Criminal Law (Cont) - Crimes related to corruption - Punishments for corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies, especially cases related to corruption	PPT– Criminal law available on Blackboard Criminal code 2015 available on Blackboard
8	Revision for mid-term exam		Quizzes Projects		
9	Civil Law (Part I) - Definition and nature Civil law relationship - Subject of civil law - Property and ownership - Civil transactions	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
10	Civil Law (Part II) - Contracts - Definitions - Formation of contracts - Validity of contracts - Liability for breach of contracts	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
11	Civil Law (Part III) - Inheritance - Testamentary inheritance - Intestacy	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
12	Law on Enterprises - Introduction to law on enterprises - Introduction to forms, features, establishment, reorganization and dissolution of an enterprise	1-5 (Level I - Introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Law on enterprises available on Blackboard Law on enterprises 2020 available on Blackboard
13	Labor Law - Definition, and nature of labour law - Employees and employers - Working time, and resting time - Salary (including salary for overtime working hours)	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Labor law available on Blackboard Labor code 2019 available on Blackboard
14	Labour Law (Cont.)	1-5 (Level M -	Tests Peer evaluations	Discussions Case studies	PPT– Labor law available on

	• Employment contracts • Labor disciplines • Dispute settlements	Mastery)	Class-performance evaluations		Blackboard Labor code 2019 available on Blackboard
15	Revision/ Tutoring classes		Quizzes Projects		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In class evaluation (20%)	70% pass	80% pass	100% pass	100% pass	100% pass
Midterm examination (30%)	70% pass	80% pass	100% pass	100% pass	100% pass
Final examination (50%)	70% pass	80% pass	100% pass	100% pass	100% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

No.	CLOs	Criteria	COMPLETELY FAIL Below 30%	INADEQUATE 30% – 49%	ADEQUATE 50% - 69%	ABOVE AVERAGE 70% - 89%	EXEMPLARY ≥ 90%
1	CLO 1	Organisation and clarification	No evidence of organization and coherence	Does not organise ideas logically and with clarification Limited evidence of coherence Ideas lack consistence	Generally organised logically, with evidence of progression Occasionally, there may be a lack of focus or ideas may be tangential	Clear organization and progression. Responds appropriately and relevantly, although some ideas are underdeveloped	Response is focused, detailed and non-tangential. Shows a high degree of attention to logic and reasoning of points. Clearly leads the reader to the conclusion and stirs thought regarding the topic
2		Originality and usefulness of the analysis	Shows no ability to identify legal issues or a clear inability to gather the facts	Demonstrates an incomplete grasp of the task. There is no overall sense of creative coherence. Arguments are addressed incompletely.	Shows ability to identify legal issues, gather the facts and develop claims. Argument are addressed well but no links with evidence	Shows strong ability to identify legal issues, gather the fact and develop claims as well as link claims with evidence. Overall, an acceptable solution is offered and explained	Shows strong ability to identify legal issues, gather the facts and develop claims as well as link claims with evidence. Satisfactory solutions are offered and supported
3		Use of data/information	Shows no effort to incorporate information from primary and secondary sources	Shows little information from sources. Poor handling of sources	Shows moderate amount of source information incorporated. Some key points supported by sources. Quotations may be poorly integrated into paragraphs. Some possible problems with source citations	Draws upon sources to support most points. Some evidence may not support arguments or may appear where inappropriate. Quotations integrated well into paragraphs. Sources cited correctly	Draws upon primary and secondary source information in useful and illuminating ways to support key points. Excellent integration of quoted material into paragraphs. Source cited correctly
4	CLO2	Use of frameworks	Shows no effort to structure	Shows limited ability to structure	Shows effort to link problems with the theoretical	Shows ability to structure problems in	Shows ability to structure problems in correspondence to

			problems in correspondence to theoretical frameworks	problems in correspondence to theoretical frameworks	frameworks. There are still some mistakes	correspondence to theoretical frameworks correctly. Minor mistakes in resolving problems	theoretical frameworks correctly. The problems are well resolved
5		Quality of arguments	Shows no effort to construct logical arguments. Fails to support analysis	Shows little attempt to offer support for key claims or to relate evidence to analysis. Reasons offered are irrelevant.	Shows argument of poor quality. Weak, undeveloped reasons are offered to support key claims	Shows clear, relevant and logical arguments.	Shows identifiable, reasonable and sound arguments. Clear reasons are offered to support key claims.

Ho Chi Minh City, May 2023
Head of Office of Academic Affairs



Huỳnh Khả Tú



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Languages

COURSE SYLLABUS
Course Name: Critical Thinking
Course Code: PE008IU

1. General information

Course name	- <i>Critical Thinking</i> - <i>Tư duy Biện luận</i>
Course designation	<i>This course provides students with the knowledge and practice necessary to sharpen their observation and judgment skills, enabling them to evaluate arguments effectively and construct compelling arguments of their own. Additionally, the course helps students evaluate information from diverse sources to obtain reliable data and avoid fallacies.</i>
Course type	☒ General knowledge / College Foundation Courses ☐ Fundamental/ English Foundation courses & English Core courses ☐ Specialized knowledge/ Specialization Core Courses & Specialization ☐ Electives ☐ Internship/Project/Thesis Others:.....
Semester(s) in which the course is taught	1, 2, and 3
Person responsible for the course	Assoc.Prof.Dr.Nguyễn Thị Thủy Assoc.Prof.Dr.Phạm Ngọc Trần Thanh Tú (Ph.D) Nguyễn Văn Tiếp (Ph.D) Phạm Thanh Tùng (Ph.D) Đỗ Thị Diệu Ngọc (MA)
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective

Teaching methods	Lectures Discussion Pair work Group work Project-based learning								
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 hours Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 periods lectures Private study including examination preparation, specified in hours ¹ : 90 hours								
Credit points	3 credits (Theory: 3 + Practice: 0) 4.62 ECTS (<i>optional</i>)								
Number of periods	Theory: 45 Practice: 0								
Required and recommended prerequisites for joining the course	- Prerequisites: (Course code – Course name) EN007IU Writing AE1 and EN008IU Listening AE1 - Corequisites: (Course code – Course name) none - Previous course (Course code – Course name) none								
Course objectives	<i>This course will enable students to</i> • know basic concepts of critical thinking • identify, construct, analyze, and evaluate inductive and deductive arguments in spoken and written forms • recognize common fallacies in everyday reasoning								
Course learning outcomes	Upon the successful completion of this course students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1: identify standards of and barriers to critical thinking, and argument types belonging to deductive and inductive reasoning CLO2: identify logical fallacies of relevance and insufficient evidence</td></tr> <tr> <td>Skill</td><td>CLO3: relate statements and evaluate the validity of deductive arguments using Venn diagram and truth tables CLO4: relate statements, summarize and evaluate deductive & inductive arguments</td></tr> <tr> <td>Attitude</td><td>CLO5: Display discipline, responsibilities, and ethical practices as an individual and a team member in attending class regularly and actively participating in class activities</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1: identify standards of and barriers to critical thinking, and argument types belonging to deductive and inductive reasoning CLO2: identify logical fallacies of relevance and insufficient evidence	Skill	CLO3: relate statements and evaluate the validity of deductive arguments using Venn diagram and truth tables CLO4: relate statements, summarize and evaluate deductive & inductive arguments	Attitude	CLO5: Display discipline, responsibilities, and ethical practices as an individual and a team member in attending class regularly and actively participating in class activities
Competency level	Course learning outcome (CLO)								
Knowledge	CLO1: identify standards of and barriers to critical thinking, and argument types belonging to deductive and inductive reasoning CLO2: identify logical fallacies of relevance and insufficient evidence								
Skill	CLO3: relate statements and evaluate the validity of deductive arguments using Venn diagram and truth tables CLO4: relate statements, summarize and evaluate deductive & inductive arguments								
Attitude	CLO5: Display discipline, responsibilities, and ethical practices as an individual and a team member in attending class regularly and actively participating in class activities								

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Introduction to Critical thinking	1	I, T, U
	Recognizing arguments	1	I, T, U
	Basic logical concepts	1	I, T, U
	A little categorical logic	1	I, T, U
	A little propositional logic	1	I, T, U
	Logical fallacies I	1	I, T, U
	Logical fallacies II	1	I, T, U
	Analyzing arguments	1	I, T, U
	Evaluating arguments and truth claims	1	I, T, U
	Inductive reasoning	1	I, T, U
Group presentations + Review for exams	5	U	
Examination forms	Written exams and project presentations		
Study and examination requirements	<i>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</i> <i>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</i>		
Reading list	[1]. Bassham, J., Irwin, W., Nardone, H., & Wallace, J. M. (2022). <i>Critical Thinking: A Student's Introduction</i> (7th ed.). McGraw-Hill Education References: [2]. Moore, B.N., & Parker, R. (2009). <i>Critical thinking</i> (9th ed.). Boston: McGraw-Hill [3]. Hurley, P. J. (2012). <i>A concise introduction to logic</i> (11th ed.). Wadsworth: Cengage Learning. + Relevant web resources		

2. Learning Outcomes Matrix (optional)

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Critical thinking	1, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 1
2	Recognizing arguments	1, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 2
3	Basic logical concepts	2, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 3
4	A little categorical logic Quiz 1	3, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 9
5	A little propositional logic	3, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 10
6	Logical fallacies I	2, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 5
7	Logical fallacies II Quiz 2	2, 5	Ongoing assessment & Midterm exam	Lecture, Discussion	[1] Chapter 6
8	Review for midterm exam Sample test	1, 2, 3, 5	Ongoing assessment & Midterm exam		
	Midterm exam				
9	Analyzing arguments	4, 5	Ongoing assessment & Final exam	Lecture, Discussion	[1] Chapter 7
10	Evaluating arguments and truth claims	4, 5	Ongoing assessment & Final exam	Lecture, Discussion	[1] Chapter 8
11	Inductive reasoning Quiz 3	4, 5	Ongoing assessment & Final exam	Lecture, Discussion	[1] Chapter 11
12-14	Group presentations	1-5	Ongoing assessment & Final exam	Presentation, Discussion	
15	Review for final exam Sample test	1-5	Ongoing assessment & Final exam		
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Ongoing assessment (30%)	X 60%Pass	X 60%Pass	X 60%Pass	X 60%Pass	X 60%Pass
Midterm exam (30%)	X 50%Pass		X 50%Pass		
Final exam (40%)		X 50%Pass		X 50%Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

Marks for multiple choice questions:

CLO1: 2pts/correct answer

CLO2: 2pts/correct answer

CLO3: 3pts/correct answer

CLO4: 4pts/correct answer

6. Date revised: April 20th, 2024

7. Course coordinator/Lecturer: Đỗ Thị Diệu Ngọc

- School of Languages
- Email: dtdngoc@hcmiu.edu.vn

Ho Chi Minh City, / /2024

DEAN OF SCHOOL OF LANGUAGES

(Signature)

Dr. Nguyễn Huy Cường



VIETNAM NATIONAL UNIVERSITY HCMC INTERNATIONAL UNIVERSITY

COURSE SYLLABUS

Course Name: Engineering Ethics and Professional Skills

Course Code: PE020IU

1. General Information

Module designation	PE020IU – Engineering Ethics and Professional Skills This course is designed to introduce engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering, and apply classical moral theory and decision making for engineering issues encountered in academic and professional careers. This course also provides students with the professional skills: sharing ideas and concepts, team working, and presentation skills.	
Semester(s) in which the module is taught	All semesters in each academic year	
Person responsible for the module	Dr. Nguyen, Hoai Nghia, Dr. Huynh, Vo Trung Dung	
Language	English	
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	Lecture, presentation, and assignments.	
Workload (incl. contact hours, self-study hours)	Total workload: 127.5 Contact hours (lecture): 37.5 Private study including examination preparation, specified in hours: 90	
Credit points	3 credits/4.64 ECTS	
Required and recommended prerequisites for joining the module	None	
Module objectives/intended learning outcomes	Overall objectives are to equip IU students with knowledge about the philosophies of ethics, professional practice, and world culture. Students who complete the course will be able to perform the following tasks: (1) Having knowledge of the definition of engineering ethics,	

	codes of ethics, ethic philosophies, intellectual property, copyright, and fair use of copyrighted materials and research data. (2) Using different problem-solving techniques to solve ethical dilemmas. (3) Analyzing social, environmental, legal aspects, safety and sustainability issues of engineering activities.																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (teach); U (Utilize) <table><tr><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>Introduction to engineering professionalism and ethics</td><td>1</td><td>I</td></tr><tr><td>Engineers in Society</td><td>1</td><td>T, U</td></tr><tr><td>Moral choices and codes of ethics</td><td>1</td><td>T, U</td></tr><tr><td>Philosophical ethics</td><td>2</td><td>I, T, U</td></tr><tr><td>Ethical problem-solving techniques</td><td>1</td><td>T, U</td></tr><tr><td>Engineers at the Workplaces - Leadership</td><td>2</td><td>T, U</td></tr><tr><td>Truth in actions and words Academic and Research Ethics</td><td>1</td><td>T</td></tr><tr><td>Commitment to Safety</td><td>1</td><td>T, U</td></tr><tr><td>Internet ethics, Privacy Issues and Intellectual Property Rights</td><td>1</td><td>T, U</td></tr><tr><td>Environmental ethics Sustainable engineering</td><td>1</td><td>T</td></tr><tr><td>Review</td><td>1</td><td>T</td></tr></table>	Topic	Weight	Level	Introduction to engineering professionalism and ethics	1	I	Engineers in Society	1	T, U	Moral choices and codes of ethics	1	T, U	Philosophical ethics	2	I, T, U	Ethical problem-solving techniques	1	T, U	Engineers at the Workplaces - Leadership	2	T, U	Truth in actions and words Academic and Research Ethics	1	T	Commitment to Safety	1	T, U	Internet ethics, Privacy Issues and Intellectual Property Rights	1	T, U	Environmental ethics Sustainable engineering	1	T	Review	1	T
Topic	Weight	Level																																			
Introduction to engineering professionalism and ethics	1	I																																			
Engineers in Society	1	T, U																																			
Moral choices and codes of ethics	1	T, U																																			
Philosophical ethics	2	I, T, U																																			
Ethical problem-solving techniques	1	T, U																																			
Engineers at the Workplaces - Leadership	2	T, U																																			
Truth in actions and words Academic and Research Ethics	1	T																																			
Commitment to Safety	1	T, U																																			
Internet ethics, Privacy Issues and Intellectual Property Rights	1	T, U																																			
Environmental ethics Sustainable engineering	1	T																																			
Review	1	T																																			
Examination forms	Constructed-response test																																				
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this module.																																				
Reading list	Textbook: [1] M. W. Martin and R. Schinzinger (2010). <i>Introduction to engineering ethics</i> McGraw-Hill Education 2nd edition [2] C. B. Fleddermann. (2011). <i>Engineering Ethics</i>, Pearson 4th edition																																				

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (1-3) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1		2							2	
Skill (Level: 1-7)	2			3						3	
Attitudes (Level: 1-5)	3		4							4	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion *			M	M						M	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to engineering professionalism and ethics	1		Lecture, Discussion	[1] Chapter 1
2	Engineers in Society	1	HW1 and/or Quiz1	Lecture, HW1 and/or Quiz1	[1] Chapter 4
3	Moral choices and codes of ethics	1	Presentation 1	Lecture, Presentation1	[1] Chapter 2
4, 5	Philosophical ethics	1, 2	HW2 and/or Quiz2	Lecture, HW2 and/or Quiz2	[1] Chapter 3
6	Ethical problem-solving techniques	2	Presentation 2, HW3 and/or Quiz3	Lecture, HW3 and/or Quiz3	[4] Chapter 4
7, 8	Engineers at the Workplaces - Leadership	1	Quiz4	Lecture, Discussion Quiz4	[1] Chapter 6
9-10	FINAL EXAM				
11-12	Truth in actions and words Academic and Research Ethics	1, 3	Quiz5	Lecture, Quiz5	[1] Chapter 7
13	Commitment to Safety	1, 3	Quiz6	Lecture, Discussion Quiz6	[1] Chapters 5, 6
14-15	Internet Ethics Privacy Issues and Intellectual Property Rights	1, 3	Quiz7	Lecture, Discussion Quiz7	[1] Chapter 13
16	Environmental ethics Sustainable engineering	1, 3	Quiz8	Lecture, Discussion Quiz8	[1] Chapter 9

Week	Topic	CLO	Assessments	Learning activities	Resources
17	Review				
18-19	FINAL EXAM				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (10%)	Qz1, Qz4, 50%Pass	Qz2, Qz3 50%Pass	Qz5, Qz6, Qz7, Qz8, 50%Pass
Homework exercises/ Presentation (20%)	Presentation 1 50%Pass	Presentation 2 50%Pass	
Midterm exam (20%)	MCQ, Case study 50% Pass	MCQ, Case study 50% Pass	
Final exam (50%)			MCQ, Case study 50% Pass

Note: %Pass: % students have scores greater than 50 out of 100.

5. Date revised: August 14, 2023

Ho Chi Minh City, 14/08/2023
HEAD OF UNDERGRADUATE
ACADEMIC AFFAIRS



Huỳnh Khả Tú



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Writing AE1

Course Code: EN007IU

1. General information

Course name	- <i>(in English)</i> Writing AE1 - <i>(in Vietnamese)</i> Tiếng Anh chuyên ngành 1
Course designation	This course provides students with comprehensive instructions and practice in essay writing, including transforming ideas into different functions of writing such as process, cause-effect, comparison-contrast, and argumentative essays.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☒ Semester 2 ☒ Summer
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☒ Lesson ☒ Project ☐ Seminar
	Others, please specify:

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	2	2				
	<i>ECTS</i>	3.09					
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS						
Number of periods	Theory: 30 Practice: 0						
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Throughout the whole course, students are required to read university-level texts to develop the ability to read critically and to respond accurately, coherently and academically in writing. Through providing them with crucial writing skills such as brainstorming, paraphrasing, idea developing, revising, and editing, this course prepares the students for research paper writing in the next level of AE2 writing.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Understand and follow different steps in the writing process to produce a complete essay. [Understanding]					

¹ Level of competence *content and the* according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO2. Employ different methods to improve their writing such as peer feedback and teacher comments. [Mechanism]</td></tr><tr><td>Attitude</td><td>CLO3. Read critically, analyze and annotate an academic text. [Organization]</td></tr></table>	Skill	CLO2. Employ different methods to improve their writing such as peer feedback and teacher comments. [Mechanism]	Attitude	CLO3. Read critically, analyze and annotate an academic text. [Organization]																																				
Skill	CLO2. Employ different methods to improve their writing such as peer feedback and teacher comments. [Mechanism]																																								
Attitude	CLO3. Read critically, analyze and annotate an academic text. [Organization]																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (1.67 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>The process of Academic Writing</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Using Outside Sources</td><td>3</td><td>T, U</td></tr><tr><td>3</td><td>From Paragraph to Essay</td><td>4</td><td>T, U</td></tr><tr><td>4</td><td>Process Essays</td><td>4</td><td>T, U</td></tr><tr><td>5</td><td>Cause/Effect Essays</td><td>4</td><td>T, U</td></tr><tr><td>6</td><td>Comparison/ Contrast Essays</td><td>4</td><td>T, U</td></tr><tr><td>7</td><td>Argumentative Essays</td><td>6</td><td>T, U</td></tr><tr><td>8</td><td>Summarizing</td><td>2</td><td>U</td></tr><tr><td>9</td><td>Review & Correction</td><td>2</td><td>U</td></tr></table>	No.	Topic	Weight	Level	1	The process of Academic Writing	1	I, T, U	2	Using Outside Sources	3	T, U	3	From Paragraph to Essay	4	T, U	4	Process Essays	4	T, U	5	Cause/Effect Essays	4	T, U	6	Comparison/ Contrast Essays	4	T, U	7	Argumentative Essays	6	T, U	8	Summarizing	2	U	9	Review & Correction	2	U
No.	Topic	Weight	Level																																						
1	The process of Academic Writing	1	I, T, U																																						
2	Using Outside Sources	3	T, U																																						
3	From Paragraph to Essay	4	T, U																																						
4	Process Essays	4	T, U																																						
5	Cause/Effect Essays	4	T, U																																						
6	Comparison/ Contrast Essays	4	T, U																																						
7	Argumentative Essays	6	T, U																																						
8	Summarizing	2	U																																						
9	Review & Correction	2	U																																						
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																																	
☐ Multiple-choice questions	☐ Oral examination																																								
☐ Report	☒ Written examination																																								
☐ Presentation	☐ Others, please specify:																																								
☐ Assignments																																									
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																								
Reading list	I. Textbooks [1] Oshima, A., & Hogue, A. (2017). Longman Academic Writing Series, Level 4: Essays (5th ed.). New Jersey, NJ: Pearson Longman.																																								

	[2] Oshima, A., & Hogue, A. (2006). Longman Academic Writing Series, Level 4: Essays (4th ed.). New Jersey, NJ: Pearson Longman. II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1							
Skills (Level: 1-7)	2			4				
Attitudes (Level: 1-5)	3							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*				H				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	The process of Academic Writing Step 1: Creating (Prewriting) Step 2: Planning (Outlining) Step 3: Writing Step 4: Polishing Using Outside Sources Paraphrasing Plagiarism and how to avoid plagiarism	1, 4			[2] pp. 265-279 [1] pp. 58-65
2.	2	Using Outside Sources (Cont'd) Strategies for writing a successful summary				[1] pp. 58 - 72
3.	3-4	Review/ Correction: Lecturer gives feedback to one or two students' writings in class. From Paragraph to Essay The introductory paragraph: - General statements & Introductory techniques - Thesis statements & Logical division of ideas Body paragraphs: - Topic sentences The concluding paragraph: - Restatement - Final thoughts Outlines of essays				[1] pp. 74 – 100

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	5	Process Essays Introduction Analyzing the models Thesis statements for process essays Transitional signals Write together: Writing from a diagram (p.115)				[1] pp. 101 - 115
5.	6	Process Essays (Cont'd) Review/ Correction: Lecturer gives feedback to one or two students' writings in class. In-class Assignment: Write a process essay about one of these topics or a topic of the lecturer's choice: • How to cook a favorite food • How to do a favorite hobby • How to succeed in your major area or professional field • How to accomplish an academic task (register for classes, apply for a scholarship, pass an exam, etc.)				[1] pp. 101 - 115
6.	7	Cause/ Effect Essays Introduction Analyzing the models Organization Signal words and phrases Write together: Write the introduction, ONE body paragraph and the conclusion on one of the topics below			In-class writing assignment	[1] pp. 116 - 132

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		or a topic of the lecturer's choice: • The cause of obesity • The effects of involvement in sports on young children • The causes of stress in college students • The effects of regular reading on students' lives				
7.	8	Cause/ Effect Essays (Cont'd) Review/ Correction: Lecturer gives feedback to one or two students' writings in class. In-class Writing: Write the introduction, ONE body paragraph and the conclusion on one of the two topics left (except for the ones that has been worked on in class and assigned as homework) or a topic of the lecturer's choice: • The cause of obesity • The effects of involvement in sports on young children • The causes of stress in college students The effects of regular reading on students' lives				[1] pp. 116 - 132
8.		Midterm				
9.	9	Comparison/ Contrast Essays				[1] pp. 133 - 151

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Introduction Analyzing the models Organization: • Points of comparison • Point-by-point organization • Block organization Comparison and Contrast signal words Write together: Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice: • Compare and contrast the relationship between parents and children in two different cultures. • Compare and contrast the university culture in two different countries. • Compare and contrast the culture of a small town and a big city.				
10.	10	Comparison/ Contrast Essays (Cont'd) Review/ Correction: Lecturer gives feedback to one or two students' writings in class. In-class Assignment: Write a compare and contrast essay on the topic left or a topic of the lecturer's choice:			In-class writing assignment	[1] pp. 133 - 151

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		• Compare and contrast the relationship between parents and children in two different cultures • Compare and contrast the university cultures in two different countries • Compare and contrast the cultures of a small town and a big city				
11.	11-12	Argumentative Essays Introduction Analyzing the model Organization: Block vs. Point-by- point pattern The elements of an argumentative essay: • An explanation of the issue • A clear thesis statement • A summary of the opposing arguments • Rebuttals to the opposing arguments • Your own arguments The introductory paragraph: Thesis Statement Statistics as support Write together: Write the introduction, ONE body paragraph and the conclusion on one of the topics below				[1] pp. 152-168

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		or a topic of the lecturer's choice: • Can same-sex parenting negatively influence a child's mentality? • Do famous artists have an innate talent, or do they put in great effort to improve their skills? • Is homework helpful?				
12.	13	Argumentative Essays (Cont'd) Review/Correction: Lecturer gives feedback to one or two students' writings in class. In-class Writing: Write an argumentative essay on the topic left or a topic of the lecturer's choice: • Can same-sex parenting negatively influence a child's mentality? • Do famous artists have an innate talent, or do they put in great effort to improve their skills? • Is homework helpful?				
13.	14	Review & Practice: Summarizing				
14.	15	Review/Correction: Lecturer gives feedback to one or two students' argumentative essays + sample final test in class.				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Lecturer has students check their own assignment scores.				
15.		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes (10%)				80% Pass	
Homework exercises (20%)	80% Pass	80% Pass	80% Pass		
Midterm exam (30%)				80% Pass	80% Pass
Final exam (40%)				80% Pass	80% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

a. Midterm exam rubrics (100 points)

TASK 1: Write 3 topic sentences and the restatement from a thesis statement: 40 points

Parts/ Points	Answers/ Criteria	CLO
Topic sentence 1 10 pts	○ The topic sentence introduces the topic and the controlling idea (1), starting with a transition signal*.	CLO 1
Topic sentence 2 10 pts	○ The topic sentence introduces the topic and the controlling idea (2), starting with a transition signal*.	CLO 1
Topic sentence 3 10 pts	○ The topic sentence introduces the topic and the controlling idea (3), starting with a transition signal*.	CLO 1
Restatement 10 pts	○ The 3 subtopics are well paraphrased: different words and structures while the meaning kept the same.	CLO 1

Notes:

**The students are supposed to use a variety of connecting devices (single word, phrase, clause, or sentence) to show their flexibility and expertise in writing.*

TASK 2: Write a Cause/Effect essay: 60 points

Answers/ Criteria	Parts/ Points	CLO
Language use and Mechanics A wide variety of sentence patterns and vocabulary are presented correctly. Language used for <i>Cause-Effect Essay</i> is good and Meaning is clear. Spelling, capitalization, punctuation are correct.	10	CLO 1,4
Content The essay fulfills the requirements of the assignment & the topic is fully addressed. (15) The essay is interesting to read and originally written by the student. (5)	20	CLO 1,4,5
Organization <i>Introduction:</i> The introduction ends with a thesis statement. (10) <i>Body:</i> Each paragraph discusses a particular point and begins with a clear topic sentence. (5) Each paragraph has specific supporting details (fact, examples, etc.) (5) Each paragraph has cohesion and coherence. (5) <i>Conclusion:</i> The conclusion summarizes the main points/paraphrases the thesis statement, begins with a conclusion signal, and leaves the readers with the writer's thoughts on the topic. (5)	30	CLO 1,4
Total	60	

b. Final exam rubrics: Write an argumentative essay: 100 points

Criteria/ word count	300-350 words (100%)	200-299 words (80%)	Under 200 words (60%)	CLO
Language use and mechanics (20) A wide variety of sentence patterns and vocabulary are presented correctly. Language control is good, and meaning is clear. Spelling, capitalization and punctuation are correct.	20	16	12	CLO 1,4

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Listening AE1

Course Code: EN008IU

1. General information

Course name	- <i>(in English)</i> Listening AE1 - <i>(in Vietnamese)</i> Tiếng Anh chuyên ngành 1
Course designation	The course is designed to prepare students for effective listening and note-taking skills, so that they can pursue the courses in their majors without considerable difficulty. The course is therefore lecture-based in that the teaching and learning procedure is built up on lectures on a variety of topics such as business, science, and humanities.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☒ Semester 2 ☒ Summer
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☒ Lecture ☒ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify:																																										
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>			Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
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Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																										
Number of periods	Theory: 30 Practice: 0																																										
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																										
Course objectives	There are a number of objectives embedded in various teaching activities in Listening AE1 course: Pre-listening activities: aim to activate students' current knowledge of the topic, and to provide them with lecture language and effective strategies in listening and note-taking to prepare themselves for the coming lecture. These activities include reading (this can be done before class meetings), discussing and reviewing what they have learned from the reading. While-listening and post-listening activities: aim to enable students to put their newly activated knowledge and acquired strategies into work by taking notes on the lecture, using the outline given by the teacher or prepared by themselves. They are later on asked to assess their understanding based on their notes and discuss them with their classmates. Finally, as an optional activity, depending on time and students' needs, students are asked to summarize the lecture. Follow-up activities: students are required to discuss the lecture topic and to prepare arguments for or against the topic in the debate. The purpose is to enhance students' comprehension of the lecture, and to allow them to put their acquired academic language into practice, and to experience the atmosphere of a university lecture class.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to:																																										

	Competency level ¹	Course learning outcome (CLO)		
	Knowledge	CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes. [Applying] CLO2. Improve their specialized knowledge of academic lectures. [Applying]		
	Skill	CLO3. Respond to academic lectures with appropriate strategies. [Mechanism] CLO4. Communicate effectively with their classmates and professors. [Mechanism]		
	Attitude	CLO5. Respond to academic lectures with confidence. [Organization]		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	<u>Weight</u> : lecture session (1.67 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Orientation & Introduction of strategies and techniques in note-taking	2	I, T, U
	2	Chapter 1: New Trends in Marketing Research	3	T, U
	3	Chapter 2: Business Ethics	3	T, U
	4	Chapter 3: Trends in Children’s Media Use	2	T, U
5	Chapter 4: The Changing Music Industry	2	T, U	

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	6	Chapter 5: The Placebo Effect	2	T, U
	7	Midterm Sample Test & Review	2	T, U
	8	Chapter 6: Intelligent Machines	3	T, U
	9	Chapter 7: Sibling Relationships	3	T, U
	10	Chapter 8: Multiple Intelligences	3	T, U
	11	Chapter 9: The Art of Graffiti	3	T, U
	12	Final Sample Test & Review	2	T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Frazie, L., & Leeming, S. (2013). Lecture ready 3. Oxford: Oxford University Press. References: [2] Frazie, L., & Leeming, S. (2013). Lecture ready 1, 2. Oxford: Oxford University Press. II. References N/A			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1							
	2							
Skills (Level: 1-7)	3			4				
	4			4				
Attitudes (Level: 1-5)	5							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*				H				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	ORIENTATION				
2.	2	Chapter 1 New Trends in Marketing Research				
3.	3	Chapter 2 Business Ethics				
4.	4	REVIEW				
5.	5	Chapter 3 Trends in Children's Media Use				
6.	6	Chapter 4 The Changing Music Industry				
7.	7	Chapter 5 The Placebo Effect				
8.	8	Sample test correction WRAP-UP AND REVIEW				
		Midterm				
9.	9	Chapter 6 Intelligent Machines				
10.	10	REVIEW				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
11.	11	Chapter 7 Sibling Relationships				
12.	12	Chapter 8 Multiple Intelligences				
13.	13	REVIEW				
14.	14	Chapter 9 The Art of Graffiti				
15.	15	WRAP-UP AND REVIEW				
16.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes (10%)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass
Homework exercises (20%)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass
Midterm exam (30%)	80% Pass		80% Pass		
Final exam (40%)	80% Pass		80% Pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

6. **Revision Date:** June 10, 2025

7. **Course coordinator/Lecturer**

- School/Department: School of Languages
- Vice-Dean: Dr. Vu Hoa Ngan
- Email: vhngan@hcmiu.edu.vn

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Writing AE2

Course Code: EN011IU

1. General information

Course name	- <i>(in English)</i> Writing AE2 - <i>(in Vietnamese)</i> Tiếng Anh chuyên ngành 2
Course designation	This course introduces basic concepts in research paper writing, especially the role of generalizations, definitions, classifications, and the structure of a research paper to students who attend English- medium college or university. It also provides them with methods of developing and presenting an argument, a comparison or a contrast.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☒ Semester 2 ☒ Summer
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☒ Lecture ☒ Lesson ☒ Project ☐ Seminar

Teaching methods	Others, please specify:																																										
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
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Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																										
Number of periods	Theory: 30 Practice: 0																																										
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																										
Course objectives	Students are required to work on the tasks selected to maximize their exposure to written communication and are expected to become competent writers in the particular genre: the research paper. As writing is part of an integrated skill of reading and writing where reading serves as input to trigger writing, this course is designed to familiarize non-native students with academic literature in their major study by having them read and critically respond to texts of a variety of topics ranging from natural sciences such as biology to social sciences and humanities like education, linguistics and psychology.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td></td><td></td></tr> </table>	Competency level ¹	Course learning outcome (CLO)																																								
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¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Knowledge	CLO1. Understand the structure of a research paper and employ appropriate academic language in writing a research paper. [Understanding]		
	Skill	CLO2. Read critically, analyze, and annotate academic articles and journals. [Mechanism] CLO3. Employ the research writing skills obtained to work on their own paper in their major study. [Mechanism]		
	Attitude	CLO4. Reason around ethical issues in writing research paper and avoid committing plagiarism. [Internalizing values]		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u> : lecture session (1.67 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Unit 1: The Academic Writing Process Introduction	4	I, T, U
	2	Unit 2: Researching and Writing	2	T, U
	3	Unit 3: Fundamentals & Feedback	2	T, U
	4	Unit 4: Definitions, Vocabulary & Clarity	2	T, U
	5	Unit 5: Generalizations, Facts and Honesty	4	T, U
	6	Unit 6: Seeing Ideas and Sharing Texts	2	T, U
	7	Unit 7: Description, Methods & Reality	2	T, U
	8	Unit 8: Results, Discussion & Relevance	2	T, U
	9	Unit 9: The Whole Academic Text	2	T, U
	10	Unit 10: Creating the Whole Text	4	T, U
	11	Course Review	2	U
Examination forms	☐ Multiple-choice questions ☐ Oral examination			

	☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Hamp-Lyons, L., & Heasley, B. (2006). Study Writing. Cambridge, UK: Cambridge University Press [2] Articles and Essays taken from The Allyn and Bacon Guide to Writing by Ramage et al (2009), Pearson Longman. [3] Cormack, J. & Slaught, J. (2009). English for academic study: Extended writing and research skills. Cambridge: Cambridge University Press. Garnet Education [4] Folse, K. S. & Pugh, T. (2010). Great writing 5: Greater essays. Boston: Heinle, Cengage Learning. [5] Keezer, S. (Ed.) (2003). Write your research report: A real-time guide. New Jersey: Pearson Learning Group. [6] Kumar, R. (2019). Research methodology: A step-by-step guide for beginners. Sage Publications II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1							
Skills (Level: 1-7)	2			4				
	3			4				
Attitudes (Level: 1-5)	4							
	5							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*				H				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation of the Course Unit 1: The Academic Writing Process Introduction				
2.	2	Unit 1: The Academic Writing Process (Cont.) Thinking about writing processes Distinguishing between academic and personal styles of writing Grammar of academic discourse				
3.	3	Unit 2: Researching and Writing Recognizing categories and classification The language of classification The structure of a research paper				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	4	Unit 3: Fundamentals & Feedback Exploring comparison and contrast structures The language of comparison and contrast Using comparisons and contrasts to evaluate and recommend				
5.	5	Unit 3: Fundamentals & Feedback (Cont.) The research paper Identifying a research gap The writing process				
6.	6	Unit 4: Definitions, Vocabulary & Clarity The clarity principle The language of definition The place of definition The writing process				
7.	7	Unit 5: Generalizations, Facts and Honesty Honesty principle The language of generalization				
8.	8	Unit 5: Generalizations, Facts and Honesty (Cont.) Writing a literature review The writing process Brainstorming and clustering APA 7th Style Guidelines – see https://www.apastyle.org/				
9.		Midterm				
10.	9	Unit 6: Seeing Ideas and Sharing Texts				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Writing about events in time Connecting events Learning about peer reviews				
11.	10	Unit 7: Description, Methods & Reality Describing processes and products The language for writing about processes Writing the Methods section Giving and getting formal peer feedback				
12.	11	Unit 8: Results, Discussion & Relevance What is an argument? The language of argument The Results and Discussion sections Finding an academic voice				
13.	12	Unit 9: The Whole Academic Text S-P-S-E: Focus on structure S-P-S-E in the introduction The language of coherence and connection Teacher evaluation				
14.	13	Unit 10: Creating the Whole Text Structure of the research paper Creating your own research				
15.	14	Unit 10: Creating the Whole Text Plagiarism Creating citations				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Paraphrase and summary Authorial identity				
16.	15	Course Review				
17.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	80% Pass	80% Pass	80% Pass	
Homework exercises (20%)	80% Pass	80% Pass	80% Pass	
Midterm exam (30%)	80% Pass		80% Pass	80% Pass
Final exam (40%)	80% Pass		80% Pass	80% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics :

a. Midterm exam sample rubrics (100 points)

TASK 1: 30 points

CATEGORIES	CRITERIA	POINTS	CLO
Category	Farm animals seem to have more complex cognitive and social skills	7.5	CLO 1,2
Sub-category 1	1. Sheep experience stress a. increase stress (when isolated from the flock) b. reduce stress (when seeing familiar sheep faces)	7.5	

Sub-category 2	2. Cows' co-operative partnerships & physiological response on learning something new a. Those learning tasks experience an increase in heart rate (when facing same situation). b. Those not learning tasks do not experience a heart rate increase.	7.5	CLO 1,2
Sub-category 3	3. Pigs' different reactions react differently based on past experience a. avoid the place where they have been shut for long b. go for the place where they were released from quickly.	7.5	CLO 1,2
Total		30	

TASK 2: 70 points

CATEGORIES	CRITERIA	POINTS	CLO
Content	All main points relevant to topic Essay question fully answers	20	CLO 1,3,4
Organization	Topic and purpose of the essay discussed in the introduction Each main point discussed in a paragraph All main points summarized and rephrased in the conclusion	20	CLO 1,3,4
Coherence	Paragraphs ordered in a systematic manner based on, for example, importance, priority, etc. Comparison/contrast transitions are properly used.	15	CLO 1,3,4
Style and Tone	Formal writing with full forms Polite writing Academic vocabulary	15	CLO 1,3,4
Total		70	

b. Final exam rubrics: 100 points

CATEGORIES	CRITERIA	POINTS	CLO
Content	Presenting his/her view on the question clearly and persuasively	20	CLO 1,3,4
Structure of ideas	- Introduction with thesis statement, and conclusion with summary and comment - Topic sentences well supported with explanations, examples, etc.	40	CLO 1,3,4
Convincing argumentative techniques, e.g., counterargument		20	CLO 1,3,4
Language use: <i>use vocabulary and grammatical structures</i>		20	CLO 1,3,4
Total		100	

6. Revision Date: June 10, 2025

7. Course coordinator/Lecturer

- School/Department: School of Languages
- Vice-Dean: Dr. Vu Hoa Ngan
- Email: vhngan@hcmiu.edu.vn

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Languages

COURSE SYLLABUS

Course Name: Speaking AE2

Course Code: EN012IU

1. General information

Course name	- <i>(in English)</i> Speaking AE2 - <i>(in Vietnamese)</i> Tiếng Anh chuyên ngành 2
Course designation	Giving presentations today becomes a vital skill for students to succeed not only in university but also at work in the future. Speaking AE2, therefore, provides students with the knowledge and skills needed to deliver effective presentations (informative and persuasive presentations).
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☒ Semester 2 ☒ Summer
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify:																																										
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
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Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																										
Number of periods	Theory: 30 Practice: 0																																										
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																										
Course objectives	Speaking AE2 aims at introducing and training students in many aspects of giving a presentation: building up confidence, preparing and planning, using the appropriate language, applying effective visual aids, applying delivery techniques, dealing with questions and responding, performing body language, and so on.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Understand many aspects of giving a presentation: building up confidence, preparing and planning, using the</td></tr> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Understand many aspects of giving a presentation: building up confidence, preparing and planning, using the																																						
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¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		appropriate language, applying effective visual aids, applying delivery techniques, dealing with questions and responding, performing body language. [Understanding]																																																												
	Skill	CLO2. Prepare and deliver effective, formal, structured presentations that are appropriate to the specific environment and audience. [Mechanism]																																																												
	Attitude	CLO3. Deliver both informative and persuasive speech with confidence. [Origination]																																																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (1.67 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Orientation & Introduction Needs analysis</td><td>2</td><td>I, T, U</td></tr><tr><td>2</td><td>Building up confidence</td><td>2</td><td>T, U</td></tr><tr><td>3</td><td>The first few minutes</td><td>2</td><td>T, U</td></tr><tr><td>4</td><td>Organizing what you want to say</td><td>2</td><td>T, U</td></tr><tr><td>5</td><td>Summarizing and concluding</td><td>2</td><td>T, U</td></tr><tr><td>6</td><td>Using equipment</td><td>2</td><td>T, U</td></tr><tr><td>7</td><td>Delivery techniques: Putting it all together</td><td>2</td><td>T, U</td></tr><tr><td>8</td><td>Group presentations for the instructor’s evaluation and advice</td><td>2</td><td>U</td></tr><tr><td>9</td><td>Introduction to persuasive speeches</td><td>2</td><td>T, U</td></tr><tr><td>10</td><td>Methods of persuasion</td><td>2</td><td>T, U</td></tr><tr><td>11</td><td>Maintaining interest</td><td>2</td><td>T, U</td></tr><tr><td>12</td><td>Dealing with problems and questions</td><td>2</td><td>T, U</td></tr><tr><td>13</td><td>Body language</td><td>2</td><td>T, U</td></tr><tr><td>14</td><td>Individual presentations for the instructor’s evaluation and advice</td><td>4</td><td>U</td></tr></table>		No.	Topic	Weight	Level	1	Orientation & Introduction Needs analysis	2	I, T, U	2	Building up confidence	2	T, U	3	The first few minutes	2	T, U	4	Organizing what you want to say	2	T, U	5	Summarizing and concluding	2	T, U	6	Using equipment	2	T, U	7	Delivery techniques: Putting it all together	2	T, U	8	Group presentations for the instructor’s evaluation and advice	2	U	9	Introduction to persuasive speeches	2	T, U	10	Methods of persuasion	2	T, U	11	Maintaining interest	2	T, U	12	Dealing with problems and questions	2	T, U	13	Body language	2	T, U	14	Individual presentations for the instructor’s evaluation and advice	4	U
No.	Topic	Weight	Level																																																											
1	Orientation & Introduction Needs analysis	2	I, T, U																																																											
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7	Delivery techniques: Putting it all together	2	T, U																																																											
8	Group presentations for the instructor’s evaluation and advice	2	U																																																											
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13	Body language	2	T, U																																																											
14	Individual presentations for the instructor’s evaluation and advice	4	U																																																											
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☒ Oral examination ☐ Written examination ☐ Others, please specify:																																																													

Other requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Lowe, S, & Pile, L. (2010). Presenting. Singapore: Cengage Learning [2] Comfort, J. (1997). Effective presentations. Oxford: Oxford University Press [3] Lucas, S. (2014). The art of public speaking (12th edition). New York: McGraw-Hill Education. [4] Harrington, D., & Lebeau, C. (2009). Speaking of speech. Macmillan II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1							
Skills (Level: 1-7)	2			4				
Attitudes (Level: 1-5)	3							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*				H				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	· Orientation & Introduction · Needs analysis				[1] <i>Presenting</i> , p. 5
2.	2	Building up confidence				
3.	3	Unit 1: The first few minutes				• <i>Presenting</i>, pp. 8-13 <i>Effective Presentations</i> : p.7 + video clip; p.13+ video clip
4.	4	Unit 3: Organizing what you want to say				• <i>Presenting</i>, pp. 22- 27) <i>Effective Presentations</i> : p.19 + video clip
5.	5	Unit 6: Summarizing and concluding				• <i>Presenting</i>, pp. 40- 45 <i>Effective Presentations</i> : p.41 + video clip
6.	6	Unit 2: Using equipment				• <i>Presenting</i>, pp. 14- 21) <i>Effective Presentations</i> : p.31 + video clip
7.	7	Delivery techniques: Putting it all together				[2] <i>Effective Presentations</i> : p.50 + video clip Assignment: Topic(s) for group presentation)
8.	8	Group presentations for the instructor's				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		evaluation and advice				
		Midterm				
9.	9	Introduction to persuasive speeches				[3] <i>The art of public speaking</i> , Chapter 15 (Handout given by the instructor)
10.	10	Methods of persuasion				[3] <i>The art of public speaking</i> , Chapter 16 (Handout given by the instructor)
11.	11	Unit 4: Maintaining interest				• <i>Presenting</i>: pp. 28- 33) <i>Effective Presentations</i> : p.25 + video clip)
12.	12	Unit 5: Dealing with problems and questions				○ <i>Presenting</i>: pp. 34- 39) <i>Effective Presentations</i> : p.44 (Question time)
13.	13	Unit 6: Body language				[2] <i>Effective Presentations</i> : pp.36-39
14.	14	Practice				
15.	15	Wrap-up and advice				
16.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (10%)	80% Pass	80% Pass	80% Pass
Homework exercises (20%)	80% Pass	80% Pass	80% Pass

Assessment Type	CLO1	CLO2	CLO3
Midterm exam (30%)	80% Pass	80% Pass	80% Pass
Final exam (40%)	80% Pass	80% Pass	80% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

a. Midterm exam rubrics and marksheets

	Very Poor	Poor	Average	Good	Excellent
Pronunciation, Voice Techniques (Pauses, Volume, Speed Change, Stress, Tone, Etc)	- Mumbles, often mispronounces, very difficult to understand. - Dead person talking, voice to text software does better	- Slurred speech, mispronounces some words. Difficult to understand. - Quiet, monotone, sing/song, little or no expression, boring.	- Clear voice, few pronunciation errors. Some slurring. Most can understand the presentation - Some use of voice to show interest	- Crisp, clear voice, correct, precise pronunciation, all can understand. - proper volume; steady rate; enthusiasm; confidence	- Native like
Grammar & Vocabulary (Usage And Appropriateness For Audience)	- Frequent grammar or spelling errors - Inappropriate level for the audience, Misuse vocabulary	- Noticeable Errors - Often too simple or sophisticated, inconsistent. Some vocabulary incorrectly used	- Minor errors - Generally appropriate, little variation or creativity	- No errors, but simple language - Always appropriate for the audience. Excellent use of vocabulary	- No errors. Excellent use of grammar to support ideas - Creative use of language
Body Language, Gestures, Eye Contact (Turns back to audience and reads screen – 0)	- Dead person on stage - Almost no eye contact, reads notes/screen	- Excessive movement or many distracting gestures - Occasionally eye contact, mostly reads notes/screen	- Some distracting gestures, and some movement and useful gestures - Generally maintains eye contact frequently reads notes/screen	- No distracting gestures. Body language supports speech - Excellent eye contact, seldom uses notes	- Excellent use of body language - Constant eye contact, no use of notes
Organization: Intro, Main, Ending, Coherence (see RATING CHECKLIST)	- Difficult to follow as disorganized	- Generally follows outline, poor introduction or conclusion.	- Follows outline, material generally well organized. Some use of transitions and linkage of ideas. Conclusion acceptable	- Follows outline, material well organized. - Ideas clearly linked. Some use of transitions	- Excellent, clear linkage of ideas. - Good transitions Arouses interest in Introduction, and summarizes clearly main points in conclusion
Content: Relevant/ Interesting/ Accurate	- Several errors or lacks critical information	- Some errors and has irrelevant information	- Information is generally accurate, minor errors, generally meets needs of the audience	- Accurate information, related to needs of audience	- No errors, answers all needs of the audience
Visual Aids: Appropriate, Clear (Movies, sound – 0)	- Slides consist of full paragraphs of text, no or superfluous graphics - Tiny font	- Slides have full sentences and occasional superfluous graphics, Difficult to read	- Slides have short phrases, Graphics relate to text and presentation. Easily read	- Attractive, informative graphics, only key words, easily understood, Good use of masking	- Professional quality, Excellent use of visual, no unrelated graphics, easily read, supports presentation
Overall effectiveness	- Ineffective, alienated audience	- Little positive effect or exchange of info.. Audience bored	- Audience learned something, no change in attitude	- Audience generally positive and learned from presentation	- Audience was kept interested and would remember key points



ACADEMIC YEAR 2021 - 2022

DATE: _____

Student name : _____
Topic : _____

Student ID : _____

Wt/g.	Criteria	Very poor	Poor	Average	Good	Excellent	Comments
15	Pronunciation & Voice Techniques (Pause, Volume, Speed Change, Stress, Tone, etc.)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
15	Language use: Grammar & Vocabulary (usage and appropriateness for audience)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
10	Body Language: Gestures, Eye contact, Facial expressions (turns back to the audience and reads from screen: 0 pt)	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	
20	Organization: Intro, Body, Ending, Coherence (see below)	(1-4)	(5-8)	(9-12)	(13-16)	(17-20)	
20	Content: Relevance, Accuracy	(1-4)	(5-8)	(9-12)	(13-16)	(17-20)	
10	Visual aids: Appropriateness, Clarity (Movies, sound: 0 pt)	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	
10	Overall effectiveness	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	
	FINAL SCORE: /100						

Negative points: ♦ Timing <3m: -1.5pts 3m - 3m29: -10pts 3m30 - 3m59: -5pts 4m - 6m: OK >6m: -5pts

Organization:

A. Introduction

- a. Greeting, name, position (*Good morning ladies and gentlemen. My name is __. I'm a __*)
- b. Purpose/ Objective (*The purpose of this talk is to __*)
- c. Connect with the audience (*I can see that all of you love to __*)
- d. Outline/ Main part (*I've divided my presentation into __ parts*)
- e. Questions (*Should you have any questions, please save them until the end of my presentation*)

B. Body (Transitions: *Let's start with __/ That brings me to __/ Firstly, Secondly, Next, Lastly*)

C. Ending

- a. Signaling the end (*That brings me to the end of my presentation*)
- b. Summary (*Let me just run over the key points again*)
- c. Closing (*Thank you very much for your attention*)
- d. Inviting questions (*I'd be glad to answer any questions you might have*)

Yes No

☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

Examiner :

b. Final exam rubrics and marksheets

	Very Poor	Poor	Average	Good	Excellent
Pronunciation, Voice Techniques (Pauses, Volume, Speed Change, Stress, Tone, etc.)	- Mumbles, often mispronounces, very difficult to understand. - Dead person talking, voice to text software does better	- Slurred speech mispronounces some words. Difficult to understand. - Quiet, monotone, sing-song, little or no expression, boring.	- Clear voice, few pronunciation errors. Some slurring. Most can understand the presentation. - Some use of voice to show interest	- Crisp, clear voice, correct, precise pronunciation, all can understand. - Proper volume; steady rate; enthusiasm; confidence	Native like
Grammar & Vocabulary (Usage and Appropriateness for Audience)	- Frequent grammar or spelling errors - Inappropriate level for the audience. Misuse vocabulary	- Noticeable Errors - Often too simple or sophisticated, inconsistent. Some vocabulary incorrectly used	- Minor errors - Generally appropriate, little variation or creativity	- No errors, but simple language - Always appropriate for the audience. Excellent use of vocabulary	- No errors. Excellent use of grammar to support ideas - Creative use of language
Body Language: Posture, Gestures, Eye contact, Facial expression (Turns back to audience and reads screen – 0)	- Dead person on stage - Almost no eye contact, reads notes/screen	- Excessive movement or many distracting gestures - Occasionally eye contact, mostly reads notes/screen	- Some distracting gestures, and some movement and useful gestures - Generally maintains eye contact frequently reads notes/screen	- No distracting gestures. Body language supports speech - Excellent eye contact, seldom uses notes	- Excellent use of body language - Constant eye contact, no use of notes
Organization: Intro, Main, Ending, Coherence (see RATING CHECKLIST)	Difficult to follow as disorganized	Generally follows outline, poor introduction or conclusion.	- Follows outline, material generally well organized. Some use of transitions and linkage of ideas. - Conclusion acceptable	- Follows outline, material well organized. - Ideas clearly linked. Some use of transitions	- Excellent, clear linkage of ideas. - Good transitions Arouses interest in Introduction, and summarizes clearly main points in conclusion
Content: Relevant/Accurate, Informative and Persuasive	Several errors or lacks critical information	- Some errors and has irrelevant information - Just focus on giving information	- Information is generally accurate, minor errors - Give reasons with little or no emphasis on persuasion	- Accurate information, related to needs of audience - Give frequent emphasis on persuasion	- No errors, answers all needs of the audience - Persuade the audience well
Visual Aids: Appropriateness, Clarity (Use of video clip exceeding 20 seconds – 0)	- Slides consist of full paragraphs of text, no or superfluous graphics - Tiny font	- Slides have full sentences and occasional superfluous graphics, - Difficult to read	Slides have short phrases; Graphics relate to text and presentation. Easily read	Attractive, informative graphics, only key words, easily understood, good use of masking	Professional quality, Excellent use of visual, no unrelated graphics, easily read, supports presentation
Question response	Welcomes the question	Listens carefully, doesn't interrupt	- Thinks before answering - Clarifies, rephrases as needed	Answers correctly and briefly	Checks to see if questioner is satisfied



ACADEMIC YEAR 2021 – 2022
DATE: _____

Student name : Student ID :
Topic :

Wtg.	Criteria	Very poor	Poor	Average	Good	Excellent	Comments
15	Pronunciation & Voice Techniques (Pause, Volume, Speed Change, Stress, Tone, etc.)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
10	Language use: Grammar & Vocabulary (usage and appropriateness for audience)	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	
15	Body Language: Posture, Gestures, Eye contact, Facial expression (turns back to the audience and reads from screen: 0 pt)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
15	Organization: Intro, Body, Ending, Coherence (see below)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
20	Content: Relevant, Accurate, Informative and Persuasive	(1-4)	(5-8)	(9-12)	(13-16)	(17-20)	
15	Visual aids: Appropriateness, Clarity (Movies, sound: 0 pt)	(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	
10	Question response	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	
SCORE (max.100): _____		BONUS (max.10): _____		TOTAL SCORE (max.100): _____			

Deduction points: ♦ No references: -10 ♦ Timing: <5m: -15pts 5m - 5m 29: -10pts 5m 30 - 5m 59: -5pts >8m: -5pts

Bonus points: Up to 10pts for creativity, which involves PowerPoint design, Organization of information, Presentation style ...

Organization:

A. Introduction

- Greeting, name, position (Good morning, ladies and gentlemen. My name is ___. I'm a ___)
- Connect with the audience (I can see that all of you love to ___)
- Purpose / Objective (The purpose of this talk is to ___)
- Time length (My presentation should last for ___)
- Outline / Main part (I've divided my presentation into ___ parts)
- Questions (Should you have any questions, please save them until the end of my presentation)

B. Body (Transitions: Let's start with ___ / That brings me to ___ / Firstly, Secondly, Next, Lastly)

C. Ending

- Signaling the end (That brings me to the end of my presentation)
- Summary (Let me just run over the key points again)
- Closing (Thank you very much for your attention)
- Inviting questions (I'd be glad to answer any questions you might have)

Yes No

☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

Examiner : _____

6. Revision Date: June 10, 2025

7. Course coordinator/Lecturer

- School/Department: School of Languages
- Vice-Dean: Dr. Vu Hoa Ngan
- Email: vhngan@hcmiu.edu.vn

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
Department of Mathematics

COURSE SYLLABUS
Course Name: Calculus 1
Course Code: MA001IU

1. General information

Course designation	This course equips students with basic concepts of calculus: limits, continuity, differentiation, and integration. Applications of these concepts are extensively discussed.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Lecturer of Department of Mathematics
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 170 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 50 (lectures) Private study including examination preparation, specified in hours: 120
Credit points	4 credits/6.18 ECTS
Required and recommended prerequisites for joining the course	None

Course objectives	1. To provide students with the main ideas and techniques of calculus. These include limits, continuity, differentiation, and integration. 2. To introduce practical applications of these ideas and techniques, through practical examples taken from many areas of engineering, business, and life sciences. 3. To develop skills in mathematical modelling and problem solving, ability to think logically, and adapt these skills creatively to new situations								
Course learning outcomes	Upon the successful completion of this course students will be able to: <table> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Comprehend basic knowledge of limits and derivatives. [Applying] CLO2. Comprehend basic knowledge of definite/indefinite integrals. [Applying]</td></tr> <tr> <td>Skill</td><td>CLO3. Compute often used limits, can define and compute derivatives. [Guided Response] CLO4. Compute standard types of integrals. Use integrals in practical situations. [Guided Response]</td></tr> <tr> <td>Attitude</td><td>CLO5. Display confidence when dealing with derivatives and integrals. Display confidence with using derivatives and integrals in practical situations. [Organization]</td></tr> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Comprehend basic knowledge of limits and derivatives. [Applying] CLO2. Comprehend basic knowledge of definite/indefinite integrals. [Applying]	Skill	CLO3. Compute often used limits, can define and compute derivatives. [Guided Response] CLO4. Compute standard types of integrals. Use integrals in practical situations. [Guided Response]	Attitude	CLO5. Display confidence when dealing with derivatives and integrals. Display confidence with using derivatives and integrals in practical situations. [Organization]
Competency level ¹	Course learning outcome (CLO)								
Knowledge	CLO1. Comprehend basic knowledge of limits and derivatives. [Applying] CLO2. Comprehend basic knowledge of definite/indefinite integrals. [Applying]								
Skill	CLO3. Compute often used limits, can define and compute derivatives. [Guided Response] CLO4. Compute standard types of integrals. Use integrals in practical situations. [Guided Response]								
Attitude	CLO5. Display confidence when dealing with derivatives and integrals. Display confidence with using derivatives and integrals in practical situations. [Organization]								

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (4 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Review: Set theory and mapping.	1	I, T
	Functions and Graphs, Inverse Functions, Exponential and Logarithmic Functions		
	Parametric Curves, Limit. One-sided Limits, Laws of Limits	1	I, T
	Evaluating Limits. The Squeeze Theorem. Continuity. The Intermediate Value Theorem	1	T, U
	Tangent Lines and Velocity Problems. Rates of Change, Derivative.	1	T, U
	Higher-Order Derivatives, Rules of Differentiation. Rates of Change in the Natural and Social Sciences	1	T, U
	Implicit Differentiation, Differentiation of Inverse Functions,	1	T, U
	Logarithmic Differentiation, Linear Approximations. Differentials.	1	T, U
	Related Rates, Maxima and Minima. Critical Point, The Mean Value Theorem.	1	T, U
	The First and Second Derivative Test, Concavity. Shapes of Curves, Curve Sketching	1	T, U
	Indeterminate Forms and l'Hôpital's Rules, Maxima and Minima Problems, Newton's Method	1	T, U
	Anti-derivatives and Indefinite Integrals, The Definite Integral	1	I, T
	Properties of the Definite Integral. The Fundamental Theorem of Calculus, Integration by Substitution	1	I, T, U
Integration by Parts, Partial Fractions, Numerical Integration,	1	T, U	
Improper Integrals, Areas between Curves Areas Enclosed by Parametric Curves	1	T, U	
Volumes, Arc Length, Applications to Engineering, Economics and Science	1	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		

Reading list	J. Stewart, <i>Calculus</i> , Thomson Learning, 7 th edition, 2012.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3				
	4					3		
Attitudes (Level: 1-5)	5							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	3.0	0.0	0.0
L,M,H conversion*		M		M		M		

3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Review: Set theory and mapping. Functions and Graphs, Inverse Functions Exponential and Logarithmic Functions	1,3		Lecture
2	Parametric Curves, Limit. One-sided Limits. Laws of Limits.	1,3	Quiz	Lectures and Quiz
3	Evaluating Limits. The Squeeze Theorem. Continuity. The Intermediate Value Theorem	3, 5	Quiz	Lectures and Quiz

4	The Tangent and Velocity Problems. Rates of Change, The Derivative.	3, 5	HW1	Lectures and HW
5	Higher-Order Derivatives, Rules of Differentiation. Rates of Change in the Natural and Social Sciences	3, 5	Quiz	Lectures and Quiz
6	Implicit Differentiation, Differentiation of Inverse Functions,	3, 5	HW2	Lectures and HW
7	Logarithmic Differentiation, Linear Approximations. Differentials.	3, 5	Quiz	Lectures and Quiz
8	Related Rates, Maxima and Minima. Critical Point, The Mean Value Theorem.	3, 5	HW3	Lectures and HW
Midterm Exam				
9	The First and Second Derivative Test, Concavity. Shapes of Curves, Curve Sketching	2, 4	Quiz	Lectures and Quiz
10	Indeterminate Forms and l'Hôpital's Rules, Maxima and Minima Problems, Newton's Method	2, 4	Quiz	Lectures and Quiz
11	Anti-derivatives and Indefinite Integrals, The Definite Integral	4, 5	HW4	Lectures and HW
12	Properties of the Definite Integral. The Fundamental Theorem of Calculus, Integration by Substitution	2, 4	Quiz	Lectures and Quiz
13	Integration by Parts, Partial Fractions, Numerical Integration,	4, 5	Quiz	Lectures and Quiz
14	Improper Integrals, Areas between Curves Areas Enclosed by Parametric Curves	2, 4, 5	HW5	Lectures and HW
15	Volumes, Arc Length, Applications to Engineering, Economics and Science	1, 2, 3, 4, 5	Exercises	
Final Exam		1, 2, 3, 4, 5		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	

					CLO5
In-class exercises/ quizzes (10%)	Qz1->Qz4 80% Pass	Qz5->Qz8 80%Pass	Qz1->Qz4 80% Pass	Qz5->Qz8 80% Pass	Qz2, 4, 6, 8 70% Pass
Homework exercises (10%)	HW1->H3 70% Pass	HW4, HW5 70%	HW1->HW3 70% Pass	HW4, HW5 70%	HW1->HW5 60% Pass
Midterm exam (30%)	Q1, Q2 80% Pass		Q3, Q4 70% Pass		Q5 50%
Final exam (50%)		Q1, Q2 80%Pass		Q3, Q4 70%Pass	Q5 50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Date revised: May 2025

Ho Chi Minh City, 03/06/2025

Department of Mathematics

Pham Huu Anh Ngoc



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
Department of Mathematics

COURSE SYLLABUS
Course Name: Calculus 2

Course Code: **MA003IU**

1. General information

Course designation	This course is a continuation of Calculus 1. Its aim is to equip student with basic concepts of sequence, series, vector functions, functions of several variables, multiple integrals and their applications
Semester(s) in which the course is taught	1, 2
Person responsible for the course	<i>Assoc. Prof. Mai Duc Thanh, Assoc. Prof. Tran Vu Khanh, Dr. Nguyen Minh Quan, Dr. Nguyen Anh Tu, Dr. Ta Quoc Bao.</i>
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 170 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 50 (lectures) Private study including examination preparation, specified in hours: 120
Credit points	4 credits/6.18 ECTS
Pre-courses	Calculus 1

Course objectives	1. To provide students with the main ideas and techniques of calculus. These include sequences, series, functions of several variables, optimal problems, multiple integrals, vector calculus. 2. To introduce practical applications of these ideas and techniques, through practical examples taken from many areas of engineering, business, and life sciences. 3. To develop skills in mathematical modeling and problem solving, ability to think logically, and adapt these skills creatively to new situations								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Comprehend basic knowledge of series, functions of several variables, multiple integrals. [Applying] CLO2. Comprehend basic knowledge of vector calculus. [Applying]</td></tr> <tr> <td>Skill</td><td>CLO3. Perform computation of partial derivatives, multiple integral. [Guided Response] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Guided Response]</td></tr> <tr> <td>Attitude</td><td>CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]</td></tr> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Comprehend basic knowledge of series, functions of several variables, multiple integrals. [Applying] CLO2. Comprehend basic knowledge of vector calculus. [Applying]	Skill	CLO3. Perform computation of partial derivatives, multiple integral. [Guided Response] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Guided Response]	Attitude	CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]
Competency level ¹	Course learning outcome (CLO)								
Knowledge	CLO1. Comprehend basic knowledge of series, functions of several variables, multiple integrals. [Applying] CLO2. Comprehend basic knowledge of vector calculus. [Applying]								
Skill	CLO3. Perform computation of partial derivatives, multiple integral. [Guided Response] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Guided Response]								
Attitude	CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]								

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (4 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Sequences and Convergence	1	I, T
	Series	1	I, T
	Tests for Convergence	1	T, U
	Power series	1	T, U
	Representations of Functions as Power series	1	T, U
	Taylor and Maclaurin series	1	T, U
	Vector Functions and Space Curves, Limit and continuity of vector functions	1	I, T
	Derivatives and Integrals of vector functions, Length of space curves	1	T, U
	Functions of Several Variables, Limits and Continuity	1	I,T
	Partial Derivatives, Tangent Plane and Linear Approximations	1	T, U
	Chain Rules, Directional Derivatives and Gradient	1	T, U
	Maximum and Minimum Values of Functions of two variables	1	T, U
Lagrange Multipliers and Applications	1	T, U	
Double Integrals in Rectangles, Iterated Integrals	1	I, T	
Double, Triple Integrals in General regions and Applications	2	T,U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	J. Stewart, <i>Calculus</i> , Thomson Learning, 7 th edition, 2012.		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3				
	4					3		
Attitudes (Level: 1-5)	5							
	.							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	3.0	0.0	0.0
L,M,H conversion*		M		M		M		

3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Sequences, Series, The Integral Test and Estimates Sums, The comparison Tests	2, 4	HW	Lectures and Quiz
2	Alternating Series, Absolute Convergence and the Ratio and Roots Tests, Strategy for Testing Series	2, 4	HW	Lectures and Quiz
3	Power Series, Representations of Functions as Power Series, Taylor & Maclaurin Series, Applications of Taylor Polynomials	4, 5	Quiz	Lectures and Quiz

4	3D Coordinate Systems, Vectors, The Dot Product, The Cross Product, Equations of Lines and Planes, Functions of Surface.	2, 4	HW	Lectures and Quiz
5	Vector Functions and Space Curves, Derivatives and Integrals of Vector Functions, Arc Length, Parametric Surfaces	4, 5	HW	Lectures and Quiz
6	Functions of Several Variables, Limit and Continuity,	2, 4, 5	Quiz	Lectures and Quiz
7	Partial Derivatives, Tangent Planes and Linear Approximations,	3, 5	HW	Lectures and Quiz
8	Chain Rule, Directional Derivatives and Gradient Vectors,	3, 5	HW	Lectures and Quiz
Midterm Exam				
9	Maximum and Minimum Values, Lagrange Multipliers	2, 4	HW	Lectures and Quiz
10	Double Integrals over Rectangles, Iterated Integrals, Double Integrals over General Regions	2, 4	HW	Lectures and Quiz
11	Double Integrals in Polar Coordinates, Application of Double Integrals.	4, 5	HW	Lectures and Quiz
12	Triple Integrals, Triple Integrals in Cylindrical and Spherical Coordinates. Change of Variables in Multiple Integrals	2, 4	Quiz	Lectures and Quiz
13	Vector Fields, Line Integrals, the Fundamental Theorem for Line Integrals	4, 5	HW	Lectures and Quiz

14	Green's Theorem, Curl and Divergence, Surface Integrals	2, 4, 5	HW	Lectures and Quiz
15	Stokes' Theorem, Divergence Theorem.	1, 2, 3, 4,	Exercises	
Final Exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/ quizzes (10%)	Qz1->Qz4 80% Pass	Qz5->Qz8 80%Pass	Qz1->Qz4 80% Pass	Qz5->Qz8 80% Pass	Qz2, 4, 6, 8 70% Pass
Homework exercises (10%)	HW1->H3 70% Pass	HW4, HW5 70%	HW1->HW3 70% Pass	HW4, HW5 70%	HW1->HW5 60% Pass
Midterm exam (30%)	Q1, Q2 80% Pass		Q3, Q4 70% Pass		Q5 50%
Final exam (50%)		Q1, Q2 80%Pass		Q3, Q4 70%Pass	Q5 50%

Note: %Pass: Target that % of students have scores greater than 50 out of 100.

5. Date revised: May 2025

Ho Chi Minh City, 03/06/2025
Department of Mathematics

Pham Huu Anh Ngoc



PHYSICS 1

Course Code: **PH013IU**

1. General information

Course designation	<i>This subject will provide an introduction to mechanics including concepts and principles of kinetics, dynamics, energetics of motion of a particle and a rigid body.</i>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Assos. Prof. Phan Bảo Ngọc; Dr. Đỗ Xuân Hội; Dr. Phan Hiền Vũ; Dr. Nguyễn Quang
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 85 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 25 Private study including examination preparation, specified in hours: 60
Credit points/ECTS	2 credits/ 3.09 ECTS (1 ECTS is equivalent to 27.5 hours)
Required and recommended prerequisites	None
Course objectives	This course will provide students with: • The basic knowledge of general Mechanics Physics • Skills to solve problems in engineering environment by applying both theoretical and experimental techniques • Understanding and skills needed to use physical laws governing real process and to solve them in the engineering environment • Confidence and fluency in discussing physics in English.



Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Understand basic knowledge of kinematics, dynamics, and laws of conservation of a mechanical system. CLO2. Apply knowledge of physics to solving problems in science and engineering	
	Skill	CLO3. Apply skills to analyzing and solving problems in science and engineering	
	Attitude	CLO4. Communicate effectively in writing manner	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Chapter 1: Bases of Kinematics	3	I, T,U
	Chapter 2: The Law of Motion	2	I, T,U
	Chapter 3: Work and Mechanical Energy	3	I, T,U
	Chapter 4: Linear Momentum and Collisions	2	I, T,U
	Chapter 5: Rotation of a Rigid Object About a Fixed Axis	3	I, T,U
	Chapter 6: Equilibrium and Elasticity	1	I
	Chapter 7: Universal Gravitation	1	I
Examination forms	Written Examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Lecture Notes [2] Halliday D., Resnick R. and Walker, J. (2011) <i>Principles of Physics</i> , 9 th edition, John Willey and Sons, Inc. [3] Alonso M. and Finn E.J. (1992) <i>Physics</i> , Addison-Wesley Publishing Company. [4] Faughn/Serway (2006) <i>Serway's College Physics</i> , Thomson Brooks/Cole.		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Intended Learning Outcomes (ILO) (1-10) is shown in the following table:

	ILO



CLO	1	2	3	4	5	6	7	8	9	10
1	x									
2	x									
3										
4										

ILO1. Apply knowledge of mathematics, physics, and informatics for solving space engineering problems.

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-3	Chapter 1: Basis of Kinematics Motion in One Dimension: - Position, Velocity, and Acceleration - One-Dimensional Motion with Constant Acceleration - Freely Falling Objects Motion in Two Dimensions: - Position, Velocity, and Acceleration Vectors - Two-Dimensional Motion with Constant Acceleration. Projectile Motion - Circular Motion. Tangential and Radial Acceleration - Relative Velocity and Relative Acceleration	1-4	Assignment/Quiz Midterm	Lecture, Discussion, Inclass-Quiz	[1] 1 [2] 1, 2, 3, 4
4-5	Chapter 2: Laws of Motion - Newton's First Law and Inertial Frames - Newton's Second Law - Newton's Third Law Some Applications of Newton's Laws: - Gravitational Force and Weight - Forces of Friction - Uniform Circular Motion and Non-uniform Circular Motion	1-4	Assignment//Quiz Midterm	Lecture, Discussion, Inclass-Quiz	[1] 2 [2] 5, 6



	- Motion in the Presence of Resistive Forces - Motion in Accelerated Frames				
6-8	Chapter 3: Work and Mechanical Energy - Work Done by Force. Power - Kinetic Energy and Work. Kinetic Energy Theorem - Potential Energy of a System - Conservation of Mechanical Energy - Conservative and Non-conservative Forces - Changes in Mechanical Energy for Non-conservative Forces - Relationship Between Conservative Forces and Potential Energy	1-4	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 3 [2] 7, 8
Midterm					
9-10	Chapter 4: Linear Momentum and Collisions - Linear Momentum and Its Conservation - Impulse and Momentum - Collisions in One Dimension and Two Dimensions	1-4	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 4 [2] 9
11-13	Chapter 5: Rotation of a Rigid Object About a Fixed Axis - Rotational Kinematics. Rotational Motion with Constant Angular Acceleration - Torque and Angular Acceleration - Moments of Inertia - Rotational Kinetic Energy - Rolling Motion of a Rigid Object - Angular Momentum of a Rotating Rigid Object - Conservation of Angular Momentum	1-4	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 5 [2] 10, 11
14	Chapter 6: Equilibrium and Elasticity The Conditions for Equilibrium The Center of Gravity	1-4	Assignment//Quiz	Lecture, Discussion, Inclass-Quiz	[1] 6 [2] 12



15	Chapter 7: Universal Gravitation Newton's Law of Gravitation Kepler's Laws and the Motion of Planets The Gravitational Field and Gravitational and Potential Energy	1-4	Assignment//Quiz	Lecture, Discussion, Inclass-Quiz	[1] 7 [2] 13
Final exam					

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz1 60%Pass	Qz2 60%Pass		Qz3 60%Pass
Homework exercises (20%)	HW2 50%Pass		HW1, HW3, HW4 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 50%Pass		Part II.1,2 50%Pass	Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

6. Date revised: December 26, 2024

Ho Chi Minh City, 26/12/2024

CHAIR OF DEPARTMENT OF PHYSICS



Phan Bảo Ngọc



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemistry for Engineers

Course Code: CH011IU

1. General information

Course name	- <i>(in English)</i> Chemistry for Engineers - <i>(in Vietnamese)</i> Hóa học cho Kỹ sư
Course designation	This one-semester course is designed for engineering students those who are pursuing a chemistry or non-chemistry engineering degree such as information technology, bio-technology, civil, biomedical, electronic and telecommunication engineering, environmental engineering, and chemical engineering. The course will introduce the basic principles of chemistry and connect those principles to issues in engineering professions.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Assoc. Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn Dr. Phung Thanh Khoa, ptkhoa@hcmiu.edu.vn Dr. Nguyễn Thị Hoàng Hải, nthhai@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar
	Others, please specify:

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	The course objectives for chemistry for engineers aim to equip students with a strong conceptual understanding of chemical principles, analytical and problem-solving skills, and the ability to apply their knowledge to various chemical systems and phenomena.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1: Apply the fundamental principles of chemistry, including atomic structure, chemical bonding, and the periodic table, to explain their relevance to engineering contexts <i>[3-apply]</i>					
		CLO2: Apply core chemical fundamentals in chemical reactions, chemical kinetics, equilibrium, and thermodynamics, to solve quantitative problems and predict chemical reaction outcomes in engineering systems <i>[3-Apply]</i>					
	Skill	CLO3: Follow instructions of chemical nomenclature to correctly reproduce the names and formulas of common chemical compounds, including organic and inorganic molecules, acids, bases, and salts. <i>[3-Guided Response]</i> CLO4: Follow the scientific method to apply chemistry principles in interdisciplinary fields and respond to challenges by acquiring and using new chemical knowledge. <i>[3-Guided Response]</i>					
	Attitude						
Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x

	Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
	Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content		<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
		<u>Weight</u> : lecture session (2.5 hours)						
		<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
		No.	Topic	Weight	Level			
		1	Chemistry and Measurement	1	I, T			
		2	Atoms, Molecules and Ions	2	T, U			
		3	Periodicity	1	T, U			
		4	Chemical Bonds	2	T			
		5	Intermolecular Forces	2	T, U			
		6	Gases and Their Properties	2	T			
		7	Solutions and Their Properties	1	T, U			
		8	Solids and Their Properties	1	T, U			
		9	Chemical Reactions	2	I, T			
		10	Chemical Kinetics	2	I, T			
		11	Chemical Equilibrium	1	T, U			
		12	Electrolytes, Acid- Base, pH and Buffer	1	I, T			
13	Thermochemistry	2	I, T					
14	Thermodynamics	2	I, T					
Examination forms		☒ Multiple-choice questions☐ Oral examination ☐ Report☒ Written examination ☐ Presentation☐ Others, please specify: ☐ Assignments						
Study and examination requirements		<u>Attendance</u> : A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.						
Reading list		I. Textbooks [1]Mary Jane Shultz (2010). Chemistry for Engineers – An Applied Approach. Houghton Mifflin. [2]Darrell Ebbing and Steven D. Gammon (2010). General Chemistry 9th Ed., Brooks/Cole, USA. [3]Nivaldo J. Tro (2008). Chemistry: A Molecular Approach, 2nd Ed., Pearson.						

	[4]Masterton and Hurley (2009). Chemistry, Principles and Reactions, 6th Ed., Cengage learning, USA. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		PLOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3				
	4						3	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	0.0	0.0	3.0	0.0
L,M,H conversion*		M	M	M			M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Chemistry and Measurement	1,4	HW/Qz	Lecture	[1-4]
2	2	Atoms, Molecules, and Ions	1,3	HW/Qz	Lecture	[1-4]
3	3	Periodicity	1,3	HW/Qz	Lecture	[1-4]
4	4&5	Chemical Bonds	1,3	HW/Qz	Lecture	[1-4]
5	6	Intermolecular Forces	1,3	HW/Qz	Lecture	[1-4]
6	7	Gases and Their Properties	1,3	HW/Qz	Lecture	[1-4]
7	8	Review, midterm	1,3	ME	Review activities, Q&A	
8	9	Liquid, Solids, and Their Properties	1,3	HW/Qz	Lecture	[1-4]
9	10	Chemical Reactions	2,4	HW/Qz	Lecture	[1-4]
10	11	Chemical Kinetics	2,4	HW/Qz	Lecture	[1-4]
11	12	Chemical Equilibrium	2,4	HW/Qz	Lecture	[1-4]
12	13	Electrolytes, Acid-Base, pH, and Buffer	2,4	HW/Qz	Lecture	[1-4]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
13	14	Thermochemistry	2,4	HW/Qz	Lecture	[1-4]
14	15	Thermodynamics	2,4	HW/Qz	Lecture	[1-4]
16	18	Final exam	2,4	FE		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework/Quiz (30%)	50% pass	50% pass	50% pass	50% pass	50% pass
Midterm exam (20%)	50% pass			50% pass	50% pass
Final exam (50%)	50% pass	50% pass	50% pass	50% pass	50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Revision Date: 20/08/2025

6. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/08/2025

Dean of School of Chemical and Environmental Engineering

Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemistry Laboratory

Course Code: CH012IU

1. General information

Course name	- <i>(in English)</i> Chemistry Laboratory - <i>(in Vietnamese)</i> Thực hành hóa đại cương				
Course designation	The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in the lecture. Prior to each lab, students must read the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.				
Course type	☒ <i>General knowledge</i> ☐ <i>Fundamental</i> ☐ <i>Specialized knowledge</i> ☐ <i>Internship/Project/Thesis</i> ☐ <i>Others:</i>				
Semester(s) in which the course is taught	☒ Year 1	☐ Year 2	☐ Year 3	☐ Year 4	☐ Year 5
	☐ Semester 1		☒ Semester 2	☐ Summer	
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
	☒ Lecture	☐ Lesson	☐ Project	☐ Seminar	

Teaching methods	Others, please specify: Practical experiment						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		Credit		1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1 credit (Theory:0 + Practice: 1) 2.00 ECTS						
Number of periods	Theory: 0 Practice: 30						
Required and recommended prerequisites for joining the course	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Course objectives	To introduce students to general chemistry laboratory and to provide students with a firm foundation in chemistry laboratory for careers in science and engineering.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1: Applying chemical concepts to draw logical conclusions about the applicability of data to real world problems [Applying].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO2. Communicate (in English) effectively with a range of audiences [Guided Response]. CLO3: Developing teamwork skills that include not only the efficient acquisition of experimental data [Guided Response]. CLO4: Being able to perform lab-work: perform experiments, analyze data, answer questions, make conclusions, research assignments, report writing [Guided Response].</td></tr></table>	Skill	CLO2. Communicate (in English) effectively with a range of audiences [Guided Response]. CLO3: Developing teamwork skills that include not only the efficient acquisition of experimental data [Guided Response]. CLO4: Being able to perform lab-work: perform experiments, analyze data, answer questions, make conclusions, research assignments, report writing [Guided Response].																										
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (4.2 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Orientations</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Chemical Reactions</td><td>1</td><td>I, T, U</td></tr><tr><td>3</td><td>pH and buffers</td><td>1</td><td>I, T, U</td></tr><tr><td>4</td><td>Redox titration</td><td>1</td><td>I, T, U</td></tr><tr><td>5</td><td>Chemical Equilibrium</td><td>1</td><td>I, T, U</td></tr><tr><td>6</td><td>Factors affecting reaction rate</td><td>1</td><td>I, T, U</td></tr></table>	No.	Topic	Weight	Level	1	Orientations	1	I, T, U	2	Chemical Reactions	1	I, T, U	3	pH and buffers	1	I, T, U	4	Redox titration	1	I, T, U	5	Chemical Equilibrium	1	I, T, U	6	Factors affecting reaction rate	1	I, T, U
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Examination forms	<table><tr><td>☒ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☒ Report</td><td>☐ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☒ Multiple-choice questions	☐ Oral examination	☒ Report	☐ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																					
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☐ Presentation	☐ Others, please specify:																												
☐ Assignments																													
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																												
Reading list	I. Textbooks [1] Lab manual for chemistry laboratory (internal use only) II. References 																												

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2			3				
	3				3			
	4					3		
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	3.0	3.0	0.0	0.0
L,M,H conversion*		M		M	M	M		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientations	1,4		- Lecture	[1].
2.	2	Chemical Reactions	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
3.	3	pH and buffers	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
4.	4	Redox titration	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
5.	5	Chemical Equilibrium	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	6	Factors affecting reaction rate	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
7.		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/Pre-Lab (10%)	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass
Lab report (60%)	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass
Final exam (30%)	Part I 50%Pass			Part II 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics: Rubric for lab work assessment

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
I. Lab activity							
1. Attendance	10	Participate on time					Be late ≥ 15 min
2. Prepare for contents and plans of lab works	10	Prepare well, answer correct all questions					Not prepare well, could not answer correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive
4. Experimental skills (measure, operate, manage)	20	Correct in procedures for measuring, operating and management)					Incorrect in procedures for measuring, operating and management)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
5. Time and resources management	5	Distribute appropriately time and resource to complete well experiments					Distribute inappropriately time and resource to incomplete more than 50% of experiments
II. Report							
6. Writing skill and format	5	Clear, no spellings and grammar mistakes					Not logical, too much spelling and grammar mistakes, not understandable
7. Introduction, method	10	Sufficient, concise, accurate					Incomplete contents $\geq 50\%$, not clear, inaccurate
8. Experimental Results	20	Achieve accurate results					Incomplete results $\geq 50\%$;
9. Data analysis	5	Logical, sufficient data analysis					No data analysis; Wrong in data analysis
10. Conclusion/ suggestion	5	concise, valuable					not valuable
11. Images and support information	5	Accurate, abundant, clear and beautiful					Too little or no images or supporting information; unclear, inaccurate
Total	100						

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	07/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Engineering Drawing

Course Code: ENEE1013IU

1. General information

Course name	- <i>(in English)</i> Engineering Drawing - <i>(in Vietnamese)</i> Vẽ kỹ thuật
Course designation	This course aims to provide Environmental Engineering students with the ability to understand technical ideas on the technical scheme and the skill to construct the engineering drawing compliance with TCVN and ISO by hand and by using AutoCAD software. The course also provides the knowledge for using geometrical construction with drawing instruments and AutoCAD software, drawing representation and the standard of presentation of engineering drawing.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective

Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar																																								
	Others, please specify: Assignments, practice, discussion																																								
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>2</td> <td>0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>60</td> <td>60</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>85</td> <td>85</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2	0				Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
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Total workload	85	85	0	0	0	0																																			
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																								
Number of periods	Theory: 30 Practice: 0																																								
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any))</i>																																								
Course objectives	The aim of this course is to - Use drawing instruments to sketch by hand and to construct geometry on engineering drawings; - Apply the standard of engineering drawings instruments to present the drawing compliance with TCVN and ISO; - Present basic geometrical features and solve some basic problems for these features and specify the properties and relationship of geometrical features and the position and the true size of geometrical features; - Interpret the type of presentations compliance with TCVN and ISO, and orthographic projections, auxiliary views, partial views, and local views - Construct the engineering drawing to present some types of models and design the AutoCAD software to draw the drawing in compliance with TCVN and ISO and the 2D drawings.																																								

Course learning outcomes	Upon the successful completion of this course, students will be able to:																																							
	Competency level	Course learning outcome (CLO)																																						
	Knowledge	CLO1. Analyze the geometrical construction and orthogonal projection method to sketch drawings by hand and by using AutoCAD drawing commands (Level 2 - Understanding).																																						
	Skills	CLO2. Apply orthogonal projections method to construct basic engineering drawings using standard instruments (Level 3 – Guided Response). CLO3. Apply AutoCAD commands to construct basic engineering drawings in accordance with TCVN and ISO (Level 3 – Guided Response).																																						
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><td>No.</td><td>Topic</td><td>Weight</td><td>Level</td></tr><tr><td>1</td><td>Introduction to Engineering Drawing</td><td>1</td><td>I,T</td></tr><tr><td>2</td><td>Orthographic Projections</td><td>1</td><td>T,U</td></tr><tr><td>3</td><td>Pictorial Drawings</td><td>1</td><td>T,U</td></tr><tr><td>4</td><td>Dimensioning</td><td>1</td><td>T,U</td></tr><tr><td>5</td><td>Sectioning</td><td>1</td><td>T,U</td></tr><tr><td>6</td><td>Introduction and Install AutoCAD software</td><td>1</td><td>I,T</td></tr><tr><td>7</td><td>Practice drawing commands</td><td>2</td><td>T,U</td></tr><tr><td>8</td><td>Practice modifying commands</td><td>2</td><td>T,U</td></tr></table>				No.	Topic	Weight	Level	1	Introduction to Engineering Drawing	1	I,T	2	Orthographic Projections	1	T,U	3	Pictorial Drawings	1	T,U	4	Dimensioning	1	T,U	5	Sectioning	1	T,U	6	Introduction and Install AutoCAD software	1	I,T	7	Practice drawing commands	2	T,U	8	Practice modifying commands	2	T,U
No.	Topic	Weight	Level																																					
1	Introduction to Engineering Drawing	1	I,T																																					
2	Orthographic Projections	1	T,U																																					
3	Pictorial Drawings	1	T,U																																					
4	Dimensioning	1	T,U																																					
5	Sectioning	1	T,U																																					
6	Introduction and Install AutoCAD software	1	I,T																																					
7	Practice drawing commands	2	T,U																																					
8	Practice modifying commands	2	T,U																																					
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☐ Written examination ☒ Others, please specify: Constructed-response test																																							

Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Kirstie Plantenberg (2010). Engineering Graphic Essentials, Fourth Edition, SDC Publications [2] Gary R Bertoline (2008). Introduction to Graphics Communication for Engineers, Fourth Edition, Mc Graw-Hill Higher Education. [3] Robert A. Corbitt (1999). Standard handbook of Environmental Engineering, Second Edition, The McGraw-Hill. II. References [4] Trần Hữu Quế (2009). Vẽ Kỹ Thuật Cơ Khí Tập 1, NXB Giáo Dục [5] Nguyễn Đình Điện (2005). Hình Học Hoạ Hình, NXB Giáo Dục

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge (Level 1-6)	1		2					
Skills (Level 1-7)	2					3		
	3			3				
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE		2	3		3		
L,M,H Conversion*			L	M		M		

* L (Low), M (Medium), H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Introduction to Engineering Drawing	1	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Discussion	[1] 1 [2] 1
2	2	Orthographic Projections	1	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] 2 [2] 2
3	3	Pictorial Drawings	1	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] 3 [2] 3
4	4	Dimensioning	2	Attendance Q&A Midterm	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] 4 [2] 4
5	5	Sectioning	2	Attendance Q&A Midterm	Reading materials before class; Doing the lecture Discussion; and doing Quiz in class	[1] 5 [2] 5
6	6	Introduction and Install AutoCAD software	3	Attendance Q&A Final	Reading materials before class; Doing the lecture; Discussion	[4] 1 [5] 1
7	7	Practice drawing commands	3	Attendance Q&A Final	Reading materials before class; Doing the lecture; Discussion	[4] 2 [5] 2
8	8	Practice drawing commands MIDTERM EXAMINATION	3	Attendance Q&A Final WRITING	Reading materials before class; Doing the lecture; Discussion EXAM	[4] 2 [5] 2
9	9-10	Practice modifying commands	3	Attendance Q&A Final	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[4] 3 [5] 3
10	16-17	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Class participation (10%)	80% Pass		
Assginment (20%)	80% Pass		
Midterm exam (20%)		60% Pass	
Final exam (50%)			60% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional):

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Pham Thanh Tung
- Email: pttung@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Engineering Drawing Lab

Course Code: ENEE1014IU

1. General information

Course name	- <i>(in English)</i> Engineering Drawing Lab - <i>(in Vietnamese)</i> Thực hành vẽ kỹ thuật						
Course designation	This course aims to provide students with knowledge of AutoCAD software and the use of AutoCAD software to construct basic engineering drawings in accordance to TCVN and ISO quickly and accurately.						
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer						
Person responsible for the course	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☒ Compulsory ☐ Elective						
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Assignments, practice, discussion						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	0	1			
Contact hours	25		0	25	0	0	0
Self-Study hours	30		0	30	0	0	0
Total workload	55		0	55	0	0	0
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS						

Number of periods	Theory: 0 Practice: 30																						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Corequisites: <i>ENEE1013IU Engineering Drawing</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																						
Course objectives	The aim of this course is to: - Provide the knowledge of geometrical construction on engineering drawings and the presentation of drawings in accordance with TCVN and ISO. - Provide the ability to use AutoCAD software to construct and manage basic engineering drawings.																						
Course learning outcomes	<table><tr><td colspan="2">Upon the successful completion of this course, students will be able to:</td></tr><tr><td>Competency level</td><td>Course learning outcome (CLO)</td></tr><tr><td>Knowledge</td><td>CLO1. Analyze the geometrical construction on engineering drawings and the presentation of drawings in accordance with TCVN and ISO. (Level 2 – Understanding).</td></tr><tr><td>Skill</td><td>CLO2. Apply AutoCAD commands to construct engineering drawings in accordance with TCVN and ISO (Level 3 – Guided Response). CLO3. Apply AutoCAD commands to manage engineering drawings (Level 3 – Guided Response).</td></tr></table>			Upon the successful completion of this course, students will be able to:		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Analyze the geometrical construction on engineering drawings and the presentation of drawings in accordance with TCVN and ISO. (Level 2 – Understanding).	Skill	CLO2. Apply AutoCAD commands to construct engineering drawings in accordance with TCVN and ISO (Level 3 – Guided Response). CLO3. Apply AutoCAD commands to manage engineering drawings (Level 3 – Guided Response).												
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u> : lecture session (4.2 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize) <table><tr><td>No.</td><td>Topic</td><td>Weight</td><td>Level</td></tr><tr><td>1</td><td>Practice dimensioning commands</td><td>1</td><td>T,U</td></tr><tr><td>2</td><td>Practice layer and printing management</td><td>1</td><td>T,U</td></tr><tr><td>3</td><td>Introduction to environmental drawings</td><td>2</td><td>I,T</td></tr><tr><td>4</td><td>Practice an environmental drawings</td><td>2</td><td>T, U</td></tr></table>			No.	Topic	Weight	Level	1	Practice dimensioning commands	1	T,U	2	Practice layer and printing management	1	T,U	3	Introduction to environmental drawings	2	I,T	4	Practice an environmental drawings	2	T, U
No.	Topic	Weight	Level																				
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Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☐ Written examination</td></tr><tr><td>☐ Presentation</td><td>☒ Others, please specify: Constructed-response test</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>			☐ Multiple-choice questions	☐ Oral examination	☐ Report	☐ Written examination	☐ Presentation	☒ Others, please specify: Constructed-response test	☐ Assignments													
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☐ Report	☐ Written examination																						
☐ Presentation	☒ Others, please specify: Constructed-response test																						
☐ Assignments																							
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.																						
Reading list	I. Textbooks [1] Kirstie Plantenberg (2010). Engineering Graphic Essentials, Fourth Edition, SDC Publications [2] Gary R Bertoline (2008). Introduction to Graphics Communication for Engineers, Fourth Edition, Mc Graw-Hill Higher Education. [3] Robert A. Corbitt (1999). Standard handbook of Environmental Engineering, Second Edition, The McGraw-Hill. II. References [4] Trần Hữu Quế (2009). Vẽ Kỹ Thuật Cơ Khí Tập 1, NXB Giáo Dục [5] Nguyễn Đình Điện (2005). Hình Học Hoa Hình, NXB Giáo Dục																						

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge (Level 1-6)	1		2					
Skills (Level 1-7)	2					3		
	3			3				
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE		2	3		3		
L,M,H Conversion*			L	M		M		

* *L (Low), M (Medium), H (High)*

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Practice dimensioning commands	2	Attendance Q&A Final	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] 4 [2] 4
2.	2	Practice layer and printing management	3	Attendance Q&A Final	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] 5 [2] 5
3.	3-4	Introduction to environmental drawings	1	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[3] 1, 2 [4] 4 [5] 4
4.	5-6	Practice environmental drawings	3	Attendance Q&A Final	Reading materials before class;	[3] 3 [4] 4 [5] 4

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
					Doing the lecture; Discussion; and doing Quiz in class	
	16-17	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Class participation (30%)	80% Pass		
Assignments (20%)	80% Pass		
Final exam (50%)		60% Pass	60% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional): No

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Pham Thanh Tung
- Email: pttung@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No •	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Statistics

Course Code: MA040IU

1. General information

Course name	- (in English) Applied Statistics - (in Vietnamese) Thống kê ứng dụng																																															
Course designation	This course is designed for students pursuing a degree in engineering and provides knowledge on statistical data, plotting data, descriptive statistics, probability and distribution, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.																																															
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others																																															
Semester(s) in which the course is taught	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5																																															
	☐ Semester 1 ☒ Semester 2 ☐ Summer																																															
Person responsible for the course	Dr. Tran Thanh Tu, ttu@hcmiu.edu.vn																																															
Language	English																																															
Relation to curriculum	☒ Compulsory ☐ Elective																																															
Teaching methods	Lecture, lesson																																															
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																										
<i>Credit</i>	2	2																																														
<i>ECTS</i>	3.09																																															
Contact hours	25	25	0	0	0	0																																										
Self-Study hours	60	60	0	0	0	0																																										
Total workload	85	85	0	0	0	0																																										
Credit points	2 credits (Theory: 2 + Practice:0) 3.09 ECTS																																															

Number of periods	Theory: 30 Practice:0														
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course														
Course objectives	Students will be provided with the knowledge about statistical data, plotting data, descriptive statistics, probability and distribution, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.														
Course learning outcomes	Upon the successful completion of this course students will be able to:														
	Competency level¹	Course learning outcome (CLO)													
	Knowledge	CLO1. Discovers the principles of data and statistics, plotting and smoothing data, descriptive statistics, discrete probability distributions, continuous probability distributions, sampling and sampling distributions in statistical analyses. <i>[3-Applying]</i> CLO2. Applies hypothesis testing and decision making, paired t-Test and independent t-Test, Analysis of Variance (ANOVA) as well as time series analysis and forecasting in statistical analyses. <i>[3-Applying]</i>													
	Skill	CLO3. Responds to exercises related to data plotting and smoothing, descriptive statistics, probability distributions in statistical analyses. <i>[3-Guided Response]</i> CLO4. Traces the difference of hypothesis tests, the importance of ANOVA, time series analysis and forecasting in statistical analyses. <i>[3-Guided Response]</i>													
	Attitude	CLO5. Follow the ethical guidelines in statistical practices. <i>[3-Valuing]</i>													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>														
	Weight: lecture session (2.5 hours)														
	Teaching levels: I (Introduce); T (Teach); U (Utilize)														
	<table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1.</td><td>Introduction to Data and Statistics</td><td>1</td><td>T,U</td></tr><tr><td>2.</td><td>Plotting and Smoothing data</td><td>1</td><td>T,U</td></tr></table>	No.	Topic	Weight	Level	1.	Introduction to Data and Statistics	1	T,U	2.	Plotting and Smoothing data	1	T,U		
No.	Topic	Weight	Level												
1.	Introduction to Data and Statistics	1	T,U												
2.	Plotting and Smoothing data	1	T,U												

¹Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	3.	Descriptive statistics	1	T,U
	4.	Probability and Distribution	1	I,T
	5.	Hypothesis tests	1	I,T
	6.	t-Tests	1	I,T
	7.	Analysis of Variance (ANOVA)	2	T,U
	8.	Time series analysis and forecasting	2	T,U
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☒ Assignments		☐ Oral examination ☒ Written examination ☐ Others, please specify	
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the theory session and 100 percent is compulsory for the labwork session. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Paul Mac Berthouex, Linfield C. Brown, <i>Statistics for Environmental Engineers, 2nd Edition</i> . Lewis Publishers, 2002. [2] Nathabandu T. Kottegoda and Renzo Rosso, <i>Applied Statistics for Civil and Environmental Engineers, 2nd Edition</i> . Blackwell publishing, 2008. [3] Yuri A.W.Shardt, <i>Statistics for Chemical and Process Engineers: A Modern Approach</i> , Springer, 2015. [4] David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, James J. Cochran, <i>Statistics for Business & Economics, 13th Edition</i> . Cengage Learning, USA, 2017.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude:
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skill (Level: 1-7)	3			3				
	4			3				
Attitude (Level: 1-5)	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	0.0	0.0	0.0	3.0
L,M,H conversion *		M	M	M				M

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Data and Statistics	1,5	Quiz1	Lecture, Discussion, Quiz	[1] Chapter 1,2 [4] Chapter 1
2.	2	Plotting and Smoothing data	1,3	HW1	Lecture, Discussion, Homework	[1] Chapter 3,4 [3] Chapter 1 [4] Chapter 2
3.	3	Descriptive statistics	1,3		Lecture, Discussion	[1] Chapter 5,6 [3] Chapter 1 [4] Chapter 3
4.	4	Probability and Distribution	1,3	HW2	Lecture, Discussion, Homework	[2] Chapter 2,3,4 [4] Chapter 4,5,6
5.	5	Hypothesis tests	2,4	Quiz2	Lecture, Discussion, Quiz	[1] Chapter 16 [2] Chapter 5 [3] Chapter 2 [4] Chapter 9
6.	6	t-Tests	2,4	HW3	Lecture, Discussion, Homework	[1] Chapter 17,18 [4] Chapter 9
7.	7	Analysis of Variance (ANOVA) (part 1)	2,4		Lecture, Discussion	[1] Chapter 24 [2] Chapter 6 [4] Chapter 13
8.	8	Analysis of Variance (ANOVA) (part 2) Midterm exam.	2,4	HW3 A1	Lecture, Discussion, Homework	[1] Chapter 25 [4] Chapter 13
9.	9	Time series analysis and forecasting (part 1)	2,4		Lecture, Discussion	[1] Chapter 53 [3] Chapter 5 [4] Chapter 17
10.	10	Time series analysis and forecasting (part 2)	2,4	HW4	Lecture, Discussion, Homework	[1] Chapter 53 [3] Chapter 5 [4] Chapter 17
		No class				
		Reserved week				
		Final exam.		A2		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class Quiz and homework (HW) (30%)	HW1 Quiz1 60%Pass (R5.1)	HW3 Quiz2 60%Pass (R5.1)	HW2 60%Pass (R5.1)	HW4 60%Pass (R5.1)	Quiz1 60%Pass (R5.1)
Midterm exam (A1) (20%)	A1. Part I 60%Pass (R5.2)		A1. Part II 60%Pass (R5.2)		
Final exam (A2) (50%)		A2. Part I 60%Pass (R5.2)		A2. Part II 60%Pass (R5.2)	

Note: %Pass: Target that 60% of students having scores greater than 50 out of 100.

5. Rubrics

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer:

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Tran Thanh Tu
- Email: ttu@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	General Information	Reduce the credit of course to 2 (theory only) due to the separating of Lab works to a new course	May 26th, 2023	Dr. Tran Thanh Tu
2	General Information	Add Parallel course: ENEE1020IU Applied Statistics Lab		
3	Assessment plan	Revise assessment plan according to the changes in CLOs.		
4	Rubrics	Add rubric for presentation assessment		
5	Course learning outcomes	Add detail of Bloom taxonomy	June 13th, 2023	Dr. Tran Thanh Tu
6	Learning Outcomes Matrix	Change Learning Outcomes Matrix		
7	Rubrics	Change rubrics		
8	All	Move midterm exam. from week 9 to week 8	June 05th, 2025	Dr. Tran Thanh Tu
9	Course learning outcomes	Change the PLO competency level in the matrix (to level 3 and 4) Delete CLO Attitude	August 13th, 2025	Dr. Tran Thanh Tu
10	Assessment plan	Change the weight (%) of assessment type	August 13th, 2025	Dr. Tran Thanh Tu
11	Course learning outcomes	Change the PLO competency level in the matrix (back to level 3 for all) Add CLO Attitude back	August 19th, 2025	Dr. Tran Thanh Tu



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Statistics Lab

Course Code: MA041IU

1. General information

Course name	- (in English) Applied Statistics Lab - (in Vietnamese) Thực hành thống kê ứng dụng																																															
Course designation	This course is designed for students pursuing a degree in engineering and provides knowledge and skills in using Python software for plotting data, descriptive statistics, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.																																															
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others																																															
Semester(s) in which the course is taught	☒ Year 1	☐ Year 2	☐ Year 3	☐ Year 4	☐ Year 5																																											
	☐ Semester 1		☒ Semester 2		☐ Summer																																											
Person responsible for the course	Dr. Tran Thanh Tu, ttu@hcmiu.edu.vn																																															
Language	English																																															
Relation to curriculum	☒ Compulsory ☐ Elective																																															
Teaching methods	Lecture, lesson, lab works																																															
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td>Credit</td><td>1</td><td>0</td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>ECTS</td><td>2.00</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis	Credit	1	0	1				ECTS	2.00						Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																										
Credit	1	0	1																																													
ECTS	2.00																																															
Contact hours	25	0	25	0	0	0																																										
Self-Study hours	30	0	30	0	0	0																																										
Total workload	55	0	55	0	0	0																																										
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS																																															

Number of periods	Theory: 0 Practice: 30			
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☒ Corequisites: MA040IU Applied Statistics ☐ Previous course:			
Course objectives	Students will be provided with the knowledge and skills about using Python software to analyze statistical data, plotting data, test hypothesis, conduct analysis of variance (ANOVA), time series analysis and forecasting.			
Course learning outcomes	Upon the successful completion of this course students will be able to:			
	Competency level¹	Course learning outcome (CLO)		
	Knowledge	CLO1. Applies the Python software in plotting, smoothing, analyzing statistical data. <i>[3-Applying]</i> CLO2. Uses the Python coding in hypothesis tests and time series data analysis. <i>[3-Applying]</i>		
	Skill	CLO3. Copies codes in Python to plot, smooth data and show descriptive statistics of data. <i>[3-Guided Response]</i> CLO4. Reproduces programming in Python for hypothesis tests and time series data analysis. <i>[3-Guided Response]</i>		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (4.17 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1.	Data with Python	1	I, T
	2.	Graphics with Python	1	I, T
	3.	Statistical analyses with Python (part 1)	1	I, T
	4.	Statistical analyses with Python (part 2)	1	T, U
	5.	Programming with Python in practice (Hypothesis tests)	1	T, U
	6.	Programming with Python in practice (Regression	1	T, U

¹Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		models)		
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☒ Assignments		☐ Oral examination ☐ Written examination ☒ Others, please specify: Lab work (coding)	
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the theory session and 100 percent is compulsory for the labwork session. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Yosef Cohen and Jeremiah Y. Cohen, <i>Statistics and data with R - An applied approach through examples</i>. John Wiley & Sons, 2008. [2] C. Reimann, P. Filzmoser, R. G. Garrett, R. Dutter, <i>Statistical Data Analysis Explained: Applied Environmental Statistics with R</i>. John Wiley & Sons, 2008. [3] Thomas Haslwanter, <i>An Introduction to Statistics with Python with Applications in the Life Sciences</i>, Springer, 2016. Software: [1] The R Foundation for Statistical Computing (2019), <i>R 3.5.3</i>. (https://cran.r-project.org/) [2] https://www.python.org/			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skill (Level: 1-7)	3			3				
	4				3	3		
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	0.0	0.0
L,M,H conversion *		M	M	M	M	M		

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	9	Data with Python	1,3		Discussion, Coding	[1] Chapter 1,2 [2] Chapter 2 [3] Chapter 3

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
2.	10	Graphics with Python	1,3	Quiz1	Discussion, Coding, Quiz	[1] Chapter 3 [2] Chapter 3 [3] Chapter 4
3.	11	Statistical analyses with Python (part 1)	1,3	CE1	Discussion, Coding, Quiz	[1] Chapter 4,5,6 [2] Chapter 4 [3] Chapter 6
4.	12	Statistical analyses with Python (part 2)	2,4	Quiz2	Discussion, Coding, Quiz	[1] Chapter 10 [2] Chapter 9 [3] Chapter 7
5.	13	Programming with Python in practice (Hypothesis tests)	2,4		Discussion, Coding	[1] Chapter 14,15 [2] Chapter 16 [3] Chapter 11
6.	14	Programming with Python in practice (Regression models)	2,4	CE2	Discussion, Coding	CE1,2
7.	15	Final exam		A		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class Quiz (20%)	Quiz1 (R5.1) 60%Pass	Quiz2 (R5.1) 60%Pass	Quiz1 (R5.1) 60%Pass	Quiz2 (R5.1) 60%Pass
Coding exercise (CE) (30%)	CE1 (R5.2) 60%Pass	CE2 (R5.2) 60%Pass	CE1 (R5.2) 60%Pass	CE2 (R5.2) 60%Pass
Final exam. (A) (50%)		A (R5.3) 60%Pass		

Note: %Pass: Target that 60% of students having scores greater than 50 out of 100.

5. Rubrics

5.1.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2.Rubric for lab work assessment

Criteria	% contribute	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
1. Attendance	10	Participate (100)					Be late ≥15 min
2. Preparation for the lab	5	Prepare well, answer all questions correctly					Not prepare well, could not answer

Criteria	% contribute	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
							correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive
4. Coding skills during the classes (arrange the data, correct commands, fix bugs, etc.)	70	Correct in procedures for data input, write command, fix bugs					Incorrect in procedures for data input, write command, fix bugs
5. Code submission (after the classes)	10	On time					No submission
Total	100						

5.3. Critical thinking value rubric for evaluating questions in exams

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer:

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Tran Thanh Tu
- Email: ttu@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Create new course (due to the separating of Lab works from course: ENEE1019IU Applied Statistics)	May 26th, 2023	Dr. Tran Thanh Tu
2	Course learning outcomes	Add detail of Bloom taxonomy	June 13th, 2023	Dr. Tran Thanh Tu
3	Learning Outcomes Matrix	Change Learning Outcomes Matrix		
4	Rubrics	Change rubrics		
5	All	Adjusted timeline accordingly	June 05th, 2025	Dr. Tran Thanh Tu
6	Course learning outcomes	Change the PLO competency level in the matrix (to level 3 and 4) Delete CLO Attitude	August 13th, 2025	Dr. Tran Thanh Tu
7	Assessment plan	Change the weight (%) of assessment type	August 13th, 2025	Dr. Tran Thanh Tu
8	Course learning outcomes	Change the PLO competency level in the matrix (back to level 3 for all)	August 19th, 2025	Dr. Tran Thanh Tu



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Mechanics

Course Code: CHE001IU

1. General information

Course name	- <i>(in English)</i> Applied Mechanics - <i>(in Vietnamese)</i> Cơ ứng dụng
Course designation	This subject presents the fundamental knowledge of equilibrium conditions of force system and the knowledge and skills of methods of calculation of strength of materials problems: Tension and Compression, Torsion, Plane Bending, Combined Bending and Torsion; and the knowledge of transmissions of belt, chain, gear, shaft and driveshaft (bearings) in engineering.
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Nguyen Ba Quang Vinh
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload							
			Lecture	Lab	Project	Internship	Thesis
		Credit	2				
	Contact hours	25	25				
	Self-study hours	60	60				
	Total workload	85	85				
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS						
Number of periods	Theory: 30 Practice:0						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: Calculus 1 (MA001IU), Physics 1 (PH013IU)						
Course objectives	Provide to student knowledge of basic mechanic principles of rigid solid mechanics and deformation solid mechanics is based on the understanding of a few basic concepts and on the use of simplified models. This approach makes it possible to develop all the necessary formulas in a rational and logical manner, and to clearly indicate the conditions under which they can be safely applied to the analysis and design of actual engineering structured and machine components.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Analyze statically loaded mechanical systems to break down force systems, resolve resultants/moments, and interpret overall stability under specified load cases. [Analyze, evaluate] CLO2. Analyze the fundamental theorems/principles of statics to identify equilibrium conditions and infer the reactions of supports. [Analyze, evaluate] CLO3. Analyze the equilibrium conditions of force system to determine the internal force and to draw the internal force diagram of bars. [Analyze, evaluate] CLO4. Analyze stress and strain of element and apply the strength theories to calculate the strength of an element. [Analyze]					

		CLO5. Analyze design loads to justify sizing and selection of belts, chains, gears, shafts, and bearings per specified criteria. [Analyze] CLO6. Examine the attributes of a work-ready engineer and deconstruct how rigorous design calculations support safety, quality, and efficiency. [Analyze]
	Skill	CLO7. Follow the strength theories to design reasonable cross section of bars (bars, truss and mechanical parts...) in different load types. [Guided Response]
	Attitude	

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Fundamental notions and principles in theoretical mechanics	1	I, T			
	2	Reduction of a system of force. Conditions of a system of balanced forces.	2	T, U			
	3	Fundamental notions of mechanics of elastic strain	1	T, U			
	4	Stress and strain	2	T			
	5	Strain on bar material	2	T, U			
	6	Belt actuators	2	T			
	7	Chain actuators	1	T, U			
	8	Gear actuators	1	T, U			

	9	Shafts – Bearings - Clutches	0.5	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks Đỗ Sanh, Cơ học kỹ thuật Tập 1, NXB Giáo dục Việt Nam, 2009. Ngô Kiều Nhi, Trương Tích Thiện, Cơ ứng dụng, NXB ĐHQG Tp. HCM. 2005. Ferdinand P. Beer, Mechanics of Materials, McGraw-Hill, 2012. II. References Nguyễn Hữu Lộc, Thiết kế chi tiết máy, NXB ĐHQG Tp. HCM, 2009. J. L. Meriam, L. G. Kraige, Engineering Mechanics – Statics & Dynamics, John Wiley & Sons, Inc., 2002. Ferdinand P. Beer, Mechanics of Materials, McGraw-Hill, 2012.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-7) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1–6)	1	4						
	2	4						
	3	4						
	4	4						
	5	4						
	6	4						
Skills (Level: 1–7)	7			3				
Attitudes (Level: 1–5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	3.0	0.0	0.0	0.0	0.0
L, M, H conversion*		H		M				

*L (Low); M (Medium); H (High)

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1&2	Fundamental notions and principles in theoretical mechanics	1,2,3	HW	Lecture	
2.	3&4	Reduction of a system of force. Conditions of a system of balanced forces.	1,2,3	HW	Lecture	
3.	5&6	Fundamental notions of mechanics of elastic strain	1,2,3	HW	Lecture	
4.	7&8	Stress and strain Midterm Exam	1,2,3	HW Midterm exam	Lecture Test	
5.	9&10	Strain on bar material	1,2,3	HW	Lecture	
6.	11&12	Belt actuators	1,2,3	HW	Lecture	
7.	13	Chain actuators	1,2,3	HW	Lecture	
8.	14	Gear actuators	1,2,3	HW	Lecture	
9.	15	Shafts – Bearings - Clutches	1,2,3	HW	Lecture	
10.	16-17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
In-class attendance (10%)							
Homework exercises (20%)	>50% pass				>50% pass		
Midterm exam (20%)			>50% pass				
Final exam (50%)	>50% pass				>50% pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Criteria	Excellent	Good	Average	Poor	CLOs Mapped
Attendance & Participation	Attends 100% sessions; actively participates and contributes in class discussions.	Attends > 90%, occasional participation and engagement.	Misses several classes (≤ 2); limited participation.	Misses many classes (> 2); rarely or never participates.	CLO6

Criteria	Excellent	Good	Average	Poor	CLOs Mapped
Homework Quality	Correct, complete, well explained using technical language; always on time.	Mostly correct; some minor errors; clear explanation; usually on time.	Partially correct (~50%); vague explanation; sometimes late.	Incorrect or irrelevant; poorly explained; often late or missing.	CLO1, CLO2, CLO3, CLO4
Midterm Exam	Logical approach; fully correct steps; uses theory precisely.	Mostly correct steps; small errors; results mostly unaffected.	General direction correct; many steps have mistakes; results affected.	Misapplied concepts; mostly incorrect or irrelevant results.	CLO1, CLO2, CLO3
Final Exam	Thorough understanding and application; correct calculations and design logic.	Adequate understanding; solves standard problems correctly.	Basic understanding; incomplete or unclear responses.	Poor understanding; major errors in application or reasoning.	CLO3, CLO4, CLO5, CLO7

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Nguyen Ba Quang Vinh
- Email: nbqvinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Planned learning activities and teaching methods	The two weeks initially allocated for the midterm examination will be removed. The midterm exam content will be integrated into Week 8	07/06/2025	Dr. Nguyen Ba Quang Vinh
2	Assessment plan	The weight of the midterm examination has been adjusted to 20%, while the weight of the final examination has been increased to 50%	07/06/2025	Dr. Nguyen Ba Quang Vinh
3	Rubrics	Add rubric	07/06/2025	Dr. Nguyen Ba Quang Vinh
4	Course learning outcomes Learning Outcomes Matrix	Revise the CLOs using verbs aligned with the PLOs matrix Adjust the learning outcome matrix to align with the table of course contributions to the PLOs	18/08/2025	Dr. Nguyen Ba Quang Vinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
 School of Civil Engineering and Management

COURSE SYLLABUS
Course Name: Fluid Mechanics
 Course Code: **CE205IU**

1. General information

Course name	- <i>(in English)</i> Fluid Mechanics - <i>(in Vietnamese)</i> Cơ lưu chất				
Course designation	Fluid mechanics is one of a principle subjects for civil (or chemical) engineers. Generally, fluid mechanics is the study of the mechanisms in which fluids, under all possible conditions (such as: gases and liquids), respond to forces, exert forces, and move from one place to another in physical view. This course will provide fundamental knowledge on physical properties of fluids and its characteristics as well. Moreover, students learn the laws and the governing equations representing different kinds of fluids at both static and motion state interacting to structures; and know how to solve these equations or compute physical parameters in practical meaning. In addition, the practices to measure fluid properties are introduced in this course. Therefore, fluid mechanics is involved in nearly all areas of civil (or chemical) Engineering either directly or indirectly. Some examples of direct involvement are those where we are concerned with manipulating the fluid, including: sea and river (flood) defences, water distribution/sewerage (sanitation) networks, dams, irrigation, pumps and turbines, water retaining structures, and so on; and some examples where the primary object is construction - yet analysis of the fluid mechanics is essential, such as: flow of air in / around buildings; bridge piers in rivers; Ground-water flow, and so forth.				
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☒ Year 2	☐ Year 3	☐ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	A/Prof. Phạm Ngọc				
Language	English				

Relation to curriculum	☒ Compulsory ☐ Elective																																									
Teaching methods	Lecture, lesson, homework, discussion For the twinning program, the teaching methods and learning activities can be project-based methods or/and in-class activities.																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td>Credit</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Self-study hours</td><td>60</td><td>60</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td></td><td></td><td></td><td></td></tr> </table>									Lecture	Lab	Project	Internship	Thesis		Credit	2					Contact hours	25	25					Self-study hours	60	60					Total workload	85	85				
		Lecture	Lab	Project	Internship	Thesis																																				
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Contact hours	25	25																																								
Self-study hours	60	60																																								
Total workload	85	85																																								
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																									
Number of periods	Theory: 30 Practice: 0																																									
Required and recommended prerequisites for joining the course	- Prerequisites: (Course code – Course name)..... - Corequisites: (Course code – Course name): CEIU206IU - Fluid Mechanic Laboratory - Previous course (Course code – Course name)																																									
Course objectives	- Introduce the concepts of fluid mechanics, which are more applicable for civil or chemical engineers; - Demonstrate how these concepts are used for solving some common problems in field of civil engineering																																									
Course learning outcomes	Upon the successful completion of this course students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td> CLO1. Analyze the hydrostatic pressure and force exerted on submerged surfaces or floating subjects...by applying the principles of fluid static and dynamic. CLO2. Analyze and solve some real fluid related problems in field of civil (or chemical engineering). </td></tr> <tr> <td>Skill</td><td> CLO3: Communicate technical English effectively; CLO4: Implement technical solutions following the both national and international regulations and standards. </td></tr> <tr> <td>Attitude</td><td></td></tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Analyze the hydrostatic pressure and force exerted on submerged surfaces or floating subjects...by applying the principles of fluid static and dynamic. CLO2. Analyze and solve some real fluid related problems in field of civil (or chemical engineering).	Skill	CLO3: Communicate technical English effectively; CLO4: Implement technical solutions following the both national and international regulations and standards.	Attitude																												
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Attitude																																										

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Introduction	1	I, T, U
	Fluid Static	4	I, T, U
	The flow of an ideal fluids	2	I, T, U
	The flow of a real fluids	1	I, T, U
	The flow in pipes	4	I, T, U
Fluid measurement	1	I, T	
Group assignment	1	I, U	
Examination forms	Written examination: Mid-term and Final examinations		
Study and examination requirements	Attendance: A minimum attendance of 60 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have GPA more than 50/100 points overall to pass this course.		
Reading list	<u>Textbooks:</u> [1] Bruce R. Munson, Donald F. Young, Theodore H.Okiishi, Fundamentals of fluid mechanics, John Wiley & Sons Inc. 2006. [2]. Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson. Engineering of Fluid Mechanics (10 Edition). Wiley. 2014 <u>Additional references:</u> [3] Bar Meir, Genick, Basic of fluid mechanics, www.potto.org [4] Nakayama, Y., Boucher, R.F.. Introduction to fluid mechanics, Butterworth-Heinemann. 2000. [5] John K. Vennard. Elementary fluid mechanics, John Wiley & Sons Inc. 1940		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) and Program/Student Learning Outcomes (PLO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge	1	3						

(Level 1-6)	2		3					
Skills	3			3				
(Level 1-7)	4					3		
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE	3	3	3		3		
L,M,H Conversion*		M	M	M		M		
CLOs	ILOs							

**Use Bloom's Taxonomy*

3. Planned learning activities and teaching methods

For the twinning program, the teaching methods and learning activities can be project-based methods or/and in-class activities.

Week	Topic	CLO	Learning activities	Assessments activities	Resources
1	Introduction: about the course; physical properties and important characteristics of fluids.	1,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 1	[1] [2]
2-3	Fluid Statics: Definition of pressure; Physical laws and basic equations for analyzing and determining pressure of a point in rest fluids; Methods to measure pressure.	2,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 1	[1] [2]
4-5	Fluid Statics: Hydrostatic force acting on the submerged surface; Buoyancy phenomena and buoyant force; Stability of floating body; Rigid-body rotation.	2,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 2	[1] [2]
6-8	The flow of ideal fluids: Introduction; Bernoulli's Equation; Continuity equation; Flow rate measurement; Energy line and the hydraulic grade line. Midterm exam	3,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class, Midterm exam	Attendance Q&A Homework 3 Test	[1] [2]
9	The flow of real fluids: Laminar and Turbulent flow; Fluid flow past solid boundaries; Fluid flow between parallel plates.	3,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 3	[1] [2]

10-13	Fluid flow in pipes: Energy relationships; General mechanics of fluid flow in pipes; Friction and head losses in the pipes	3,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 4	[1] [2]
14	Fluid measurements	3,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A Homework 5	[1] [2]
15	Group assignment and review for final examination	3,4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	Attendance Q&A	[1] [2]
	Final examination			Writing	

4. Assessment plan

- The type of assessment is grading based on exam questions. The range of score is from 0 to 100.
- The final GPA of students is integrated from 3 components, including: progress assessment, mid-term exam and final exam. The contribution of each component (in percentage) is shown in the table below.

No	Assessment Type (% contribute to GPA)	CLO1	CLO2	CLO3	CLO4
1	<i>Progress assessment (30%)</i>				
1.1	Class attendance				Attended 80%Pass
1.2	In class activity: Discussion and doing Quiz in class				Participated in class Q&A 60%Pass
1.3	Home works				HW1-4, Submitted 80%Pass
2	<i>Midterm exam (Mid, 30%)</i>	Q1-2, 60%Pass	Q3-4 60%Pass		
3	<i>Final exam (Fin, 40%)</i>		Q1 70%Pass	Q3-5 70%Pass	

Note: %Pass: Target that % of students having scores greater than 50% out of question score

5. Rubrics

5.1 Rubric for grading progress assessment

Criteria	CLO	Weight (%)	Scale of qualification			
			Excellent	Good	Medium	Fail
			(90-100)	(70-89)	(50-69)	0-49
Lecture Attendance, relatively estimated from scheduled hours	3	30	> 90%	80% ÷ 90%	70% ÷ 80%	<60% (Or forbidden for exams)
Participation in learning activities	3	30	- Enthusiastic discussion, - actively answer many questions - Fulfill Independently and correctly more than 90% quizzes	- Sometime participating for discussion and answering the question - Submit from 70% to 90% quizzes; but not correct all	- Sometime participating for discussion and answering the question - Submit from 50% to 70% quizzes; but few of the are correct or not solve by themselves	- No discussion or answer to the questions. - Submit less than 50%; or most quizzes are not correct or not solve by themselves
Individual and group homework	3	40	- Submit 90% HomeWorks on time with correct solution. - Main contributor or leader for group assignment assessed as good solution	- Submit 70% - 90% HomeWorks on time; and most of them with correct solution. - A member of the group having group assignment assessed as medium quality	- Submit 50% - 70% HomeWorks on time; and most of them with correct solution. - A member of the group having group assignment assessed as medium quality	- Submit less than 50% HomeWorks on time; few of them with correct solution. - A member of the group having group assignment assessed as poor quality
Total score:		100	90-100	70-89	50-69	0-49

5.2 Rubric for grading midterm exam

Criteria	CLO	Weight/ Score (%)	Scale of qualification			
			Excellent	Good	Medium	Fail
			(90%-100%)	(70%-89%)	(50%-69%)	(0-49%)
Ability for calculating physical	1,4	20	- Understand problem and apply	- Understand problem and	- Understand problem and apply	- Do not understand problem and

Criteria	CLO	Weight/ Score (%)	Scale of qualification			
			Excellent	Good	Medium	Fail
			(90%-100%)	(70%-89%)	(50%-69%)	(0-49%)
properties of gases			correct formula; and	apply correct formula; and	correct formula; and	so apply wrong formula; or
Ability for calculating physical properties of liquids	1,4	20	Have correct solution and results	Have correct solution but wrong results.	Have not correct solution and wrong results.	Have not correct solution results; or No solution; or Commit plagiarism.
Ability for applying Pascal law to solve some real problems	2,4	30	Apply correct Pascal law to solve problem with suitable ways and correct results.	Apply correct Pascal law to solve problem with suitable ways, but wrong results.	Apply correct Pascal law to solve problem with suitable ways, but wrong results.	
Ability for applying the principal laws of hydro-pressure in static water body to analyze and to estimate the hydrostatic force exerting on submerged plates	2,4	30	Figure out clear and correct pressure and force diagram. Apply principle of fluid static to solve problem with suitable ways and correct results.	Apply principle of fluid static to solve problem with suitable ways and correct results; but only pressure and force diagram not clear or some mistakes	Apply principle of fluid static to solve problem with suitable ways and results have some mistake; or having pressure and force diagram but not clear or some mistakes	Do not understand the problem; and wrong application of principle to solve problem; or - No solution; or - Commit plagiarism
Total score:		100	90-100	70-89	50-69	0-49

5.3 Rubric for grading final examination

Criteria	CLO	Weight/ Score (%)	Scale of qualification			
			Excellent	Good	Medium	Fail
			(90%-100%)	(70%-89%)	(50%-69%)	(0-49%)
Ability for applying the theory to solve the problem of hydro static force analysis for some common hydraulic structures	1,4	30	- Well understanding the given problem. - Figure out clear and correct pressure and force diagram. - Solve the problem correctly by applying hydrostatic principles	- Well understanding the given problem. - Figure out clear and correct pressure and force diagram. - Have the problem solution by applying hydrostatic principles with minor mistakes.	- Well understanding the given problem. - Have pressure and force diagram with some mistakes. - Have suitable ways for solving the problem; but many results are not correct	- Do not understand the given problem; and do not have pressure and force diagram; and wrong solution; or - No solution; or Commit plagiarism.
Ability for applying the principal laws of ideal fluid dynamic to solve some real problems	2,4	30	- Well understanding the given problem. - Solve the problem correctly by well applying important concepts for ideal fluid at steady state flowing condition (e.g: Reynold theory, Bernoulli's equation, continuity equation and so on)	- Well understanding the given problem. - Have problem solution by correctly applying principal equations of fluid dynamic with minor mistake or results	- Well understanding the given problem. - Write down correct form of principal hydro-dynamic equations for solving the problem solution; but many results are not correct	- Do not understand the given problem and have wrong solution; or - No solution. - or Commit plagiarism.
Ability for applying the principal laws of real fluid dynamic to solve some problems	2,4	40	- Well understanding the given problem. - Figure out a clear and correct diagram of hydraulic grade line and energy line. - Solve the problem	- Well understanding the given problem. - Figure out a clear and correct diagram of hydraulic grade line and energy line. - Correctly apply	- Well understanding the given problem. - Figure out diagram of hydraulic grade line and energy line with some mistake or not clear.	- Do not understand the given problem; and do not have hydraulic grade line and energy line; and wrong solution; or

Criteria	CLO	Weight/ Score (%)	Scale of qualification			
			Excellent	Good	Medium	Fail
			(90%-100%)	(70%-89%)	(50%-69%)	(0-49%)
in pipe systems			correctly by well applying theory of real fluid flowing pipes (e.g: Reynold theory, methos for estimating head loss Bernoulli's equation, continuity equation and so on)	equations for solution; but the results having some minor mistakes	- Correctly apply equations for solution; but the results have many mistakes	- No solution; or - Commit plagiarism.
Total Score:		100	90-100	70-89	50-69	0-49

6. Date revised: August 13, 2025

7. Course coordinator/Lecturer

- School of Civil Engineering and Management
- Email: pngoc@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Civil Engineering and Management

COURSE SYLLABUS
Course Name: Fluid Mechanics Laboratory
Course Code: **CE206IU**

1. General information

Course name	- (in English) <i>Fluid Mechanics Laboratory</i> - (in Vietnamese) <i>Thí nghiệm Cơ lưu chất</i>				
Course designation	This course is primarily used as an undergraduate teaching lab. The experimental exercises will be provided to students for demonstrating the theoretical class lectures. These experiments are designed to examine some properties of fluids and to conduct experiments involving principle phenomena of incompressible (water) flow, such as: flow over the weir, head losses of flow in pipe.....				
Course type	☐ General knowledge Fundamental knowledge ☒ Specialized knowledge Internship/Project/Thesis ☐ Others: ☐ ☐				
Semester(s) in which the course is taught	☐ Year 1	☒ Year 2	☐ Year 3	☐ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	A/Prof. Phạm Ngọc				
Language	English				
Relation to curriculum	☒ Compulsory Elective ☐				
Teaching methods	Lecture, practice, group homework, seminar; For the twinning program, the teaching methods and learning activities can be project-based methods or/and in-class activities.				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internshi	Thesis
	<i>Credit</i>	1	0	1			
	<i>ECTS</i>	2.00					
	Contact hours	25	0	25	0	0	0
	Self-Study hou	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1 Credits (Theory: 0 + Practice: 1) 2 ECTS						
Number of periods	Theory: 0 Practice: 30						
Required and recommended prerequisites for joining the course	- Prerequisites: (Course code – Course name)..... - Corequisites: (Course code – Course name): CEIU205IU - Fluid Mechanics - Previous course (Course code – Course name)						
Course objectives	- To provide practical skills to determine some properties of fluids and conduct some experiments in Lab.						
Course learning outcomes	Upon the successful completion of this course students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Explain the mechanism of some basic flow phenomena CLO2. Analyze the experiment data of five fundamental experiments, including: Discharge over a notch; Reynolds number and transitional flow; Flow measurement apparatus; Jet trajectory and flow through an orifice; Fluid friction apparatus.					
	Skill	CLO3: Use English effectively in communication, reporting and presentation skills; CLO4: Effectively work in a teamwork.					
	Attitude	:.....					
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (4 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	Topic					Weight	Level
	Introduction					1	I, T
	Discharge Over a Notch					1	T, U
	Reynolds Number and Transitional Flow					1	T, U
	Flow Measurement Apparatus					1	T, U
	Jet Trajectory and Flow Through an Orifice					1	T, U
	Fluid Friction Apparatus					1	T, U

Examination forms	Report
Study and examination requirements	Attendance: attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	<u>Textbooks:</u> [1] Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Fundamentals of fluid mechanics, John Wiley & Sons Inc. 2006. [2]. Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson. Engineering of Fluid Mechanics (10 Edition). Wiley. 2014

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) and Program/Student Learning Outcomes (PLO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge (Level 1-6)	1	3						
Skills (Level 1-7)	2			3				
	3				3			
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE	3		3	3			
L,M,H Conversion*		M		M	M			

*Use Bloom's Taxonomy

3. Planned learning activities and teaching methods

For the twinning program, the teaching methods and learning activities can be project-based methods or/and in-class activities.

Week	Topic	CLO	Learning activities	Assessments activities	Resources
1	Introduction to the course, rules working in Lab, and using of equipment.	1	Lecture, practice		[1] [2]
2	Discharge Over a Notch	2,3,4 ,5	Lecture, practice	Group report 1	[1] [2]
3	Reynolds Number and Transitional Flow	2,3,4 ,5	Lecture, practice	Group report 2	[1] [2]

4	Flow Measurement Apparatus	2,3,4,5	Lecture, practice	Group report 3	[1] [2]
5	Jet Trajectory and Flow Through an Orifice	2,3,4,5	Lecture, practice	Group report 4	[1] [2]
6	Fluid Friction Apparatus	2,3,4,5	Lecture, practice	Group report 5	[1] [2]
7	Make up class				
8	Group presentation and evaluation		Presentation and Discussion	Oral examination	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Class participation/In-class activities (10%)				Checklist and observe 80%Pass
Group reports (80%)	Group HW (1-5) 80%Pass	Group HW (1-5) 80%Pass	Group HW (1-5) 80%Pass	
Oral presentation (10%)	A&Q 80%pass	A&Q 80%pass	A&Q 80%pass	A&Q 80%pass

Note: %Pass: Target that % of students having scores greater than 50% out of question score

5. Rubrics

- No

6. Date revised: May 27, 2025

7. Course coordinator/Lecturer

- School of Civil Engineering and Management
- Email: pngoc@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

Course Name: Entrepreneurship

Course Code: IT120IU

1. General information

Course designation	An introduction to the creative and innovative managerial practices of successful entrepreneurship.
Semester(s) in which the course is taught	7
Person responsible for the course	MSc. Dao Tran Hoang Chau
Language	English
Relation to curriculum	Compulsory (CS, NE, CE) Elective (DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 127.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 37.5 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 (ECTS: 4.64) Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	None
Course objectives	This course reviews the significant economic and social contributions entrepreneurs provide to society, the intense lifestyle commitment, and the skills necessary for entrepreneurial success. It explores how to identify and develop solutions to the most common leadership and personal challenges faced by entrepreneurs when starting new ventures or launching new products. It also promotes a deeper understanding of what is required to be a successful entrepreneur, highlights the skills and tools necessary to start a new business and explores alternatives to common pitfalls. This course applies entrepreneurial marketing approaches used by successful entrepreneurs. These include

	utilizing industry sector trends, identifying emerging customer niches, developing new products/services, using guerilla marketing strategies, and Internet and social marketing strategies. It emphasizes the importance of managing cash flows, ratio analysis, pro forma development, and the basics of deal structure and harvesting a business venture. Students will identify and interpret sources of information from company financial reports, financial publications, industry benchmarks, the media, and web sites.An introduction to the process of researching, writing, and presenting a business plan. Students identify and screen ideas using a business feasibility study that describes the product features, market opportunity, customer profile, sales forecast, competitive advantage, and profit potential. Following a successful feasibility study, students may use business plan software as each develops their own complete business plan.																				
Course learning outcomes	CLO 1. Understand entrepreneurial processes; CLO 2. Apply new technology to boost business performance; CLO 3. Manage marketing strategy and financial statements in a enterprise; <table><tr><td>Competency level</td><td colspan="2">Course learning outcome (CLO)</td></tr><tr><td>Knowledge</td><td colspan="2">1, 2, 3</td></tr><tr><td>Skill</td><td colspan="2">1, 3</td></tr><tr><td>Attitude</td><td colspan="2">3</td></tr></table>			Competency level	Course learning outcome (CLO)		Knowledge	1, 2, 3		Skill	1, 3		Attitude	3							
Competency level	Course learning outcome (CLO)																				
Knowledge	1, 2, 3																				
Skill	1, 3																				
Attitude	3																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><td>Topic</td><td>Weight</td><td>Level</td></tr><tr><td>Entrepreneurship, Creativity and Innovation;</td><td>3</td><td>I, T</td></tr><tr><td>Creative Problem Solving Model;</td><td>3</td><td>T, U</td></tr><tr><td>Develop a Product. Generate Ideas and Protect Inventions;</td><td>2</td><td>T</td></tr><tr><td>Marketing Strategies;</td><td>3</td><td>T, U</td></tr><tr><td>Finance and Accounting</td><td>4</td><td>T, U</td></tr></table>			Topic	Weight	Level	Entrepreneurship, Creativity and Innovation;	3	I, T	Creative Problem Solving Model;	3	T, U	Develop a Product. Generate Ideas and Protect Inventions;	2	T	Marketing Strategies;	3	T, U	Finance and Accounting	4	T, U
Topic	Weight	Level																			
Entrepreneurship, Creativity and Innovation;	3	I, T																			
Creative Problem Solving Model;	3	T, U																			
Develop a Product. Generate Ideas and Protect Inventions;	2	T																			
Marketing Strategies;	3	T, U																			
Finance and Accounting	4	T, U																			
Examination forms	Multiple-choice questions, short-answer questions																				
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.																				

	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Duening & Hisrich & Lechter, Technology Entrepreneurship 2nd, 2014

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3	3	3	3	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	3.0	0.0
L,M,H conversion*		M	M	M	M	M	M	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Entrepreneurship, Creativity and Innovation;	1	Midterm exam	Lecture, In-class activities, Quiz	
2	Creative Problem Solving Model;	1	Midterm exam	Lecture, In-class activities, Quiz	
3	Develop a Product. Generate Ideas and Protect Inventions;	2	Midterm exam, Assignment	Lecture, In-class activities, Project	
4	Midterm				

5	Marketing Strategies;	3	Final exam, Assignment	Lecture, Project	
6	Finance and Accounting	3	Final exam, Assignment	Lecture, Project	
7	Final exam				

4. Assessment plan

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (25%)	50%	50%	
Projects/Presentations/ Report (25%)			60%
Final examination (40%)			40%
Exercises/ Quiz (10%)	50%	50%	

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student:		HW/Assignment:	
Date:			
		Evaluator:	
			
	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		

Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others'	Specific position (perspective, thesis/hypothesis) acknowledge s different	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.

	complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	points of view are acknowledged within position (perspective, thesis/hypothesis).	sides of an issue.	
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	Organizational pattern (specific introduction and conclusion, sequenced material within	Organizational pattern (specific introduction and conclusion, sequenced material within	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and

	clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	the body, and transitions) is clearly and consistently observable within the presentation.	the body, and transitions) is intermittently observable within the presentation.	transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant

	information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: June 10, 2025

Ho Chi Minh City, 10/06/2025
Dean of School of Computer Science and Engineering



Assoc.Prof. Nguyen Van Sinh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Engineering Project Management

Course Code: ENEE4011IU

1. General information

Course name	- <i>(in English)</i> Chemistry for Engineers - <i>(in Vietnamese)</i> Quản lý dự án kỹ thuật				
Course designation	This course is developed to provide the principal concept on project management which was characterized by the project management body of knowledge guide (PMBOK Guide). This guide emphasizes the five project process groups of initiating, planning, executing, controlling and closing, and the nine knowledge areas of project integration, scope, time, cost, quality, human resources, communication, risk, and procurement management.				
Course type	☒ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☐ Year 3	☒ Year 4	☐ Year 5
	☐ Semester 1	☒ Semester 2	☐ Summer		
Person In-Charge	Dr. Tran Van Ly				
Language	English				
Relation to curriculum	☐ Compulsory ☒ Elective				
Teaching methods	☒ Lecture	☐ Lesson	☐ Project	☐ Seminar	
	Others, please specify:				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Students will be provided with knowledge and skills of constructing the network (AON & AOA), GANNT Chart, solving the network; Resource allocation, resource loading & levelling; Project budgeting & cost estimation, risk management; Project quality management; Project human resource management; Project procurement management; Project executing, monitoring & control to closing the project						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Align the project to the organization's strategic plans and business justification throughout its lifecycle; to identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders. [Applying]					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders Able to Implement general business concepts, practices, and tools to facilitate project success. [Applying]																																																								
	Skill	CLO3. Work effectively in group project in a specific context; combining the techniques to conduct practical cases. Respond to the needs of community and industrial sectors. [Guided Response]																																																								
	Attitude	CLO4. Apply appropriate legal and ethical standards. Adapt project management practices to meet the needs of stakeholders from multiple sectors of the economy (i.e. consulting, government, arts, media, and charity organizations); Identify and follow strictly ethical disciplines in project management. [Organization]																																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Project Management</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Project management processes for a project</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Work breakdown structure</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Project scheduling</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Resource allocation</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Logical Framework</td><td>2</td><td>I, T</td></tr><tr><td>7</td><td>Project cost management</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Project risk management</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Project quality management</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Project human resource management</td><td>1</td><td>I, T</td></tr><tr><td>11</td><td>Project procurement management</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Project executing, monitoring & control.</td><td>1</td><td>I, T</td></tr><tr><td>13</td><td>Project closing</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Project Management	1	I, T	2	Project management processes for a project	1	I, T	3	Work breakdown structure	1	I, T	4	Project scheduling	1	I, T	5	Resource allocation	1	I, T	6	Logical Framework	2	I, T	7	Project cost management	1	I, T	8	Project risk management	1	I, T	9	Project quality management	1	I, T	10	Project human resource management	1	I, T	11	Project procurement management	1	I, T	12	Project executing, monitoring & control.	1	I, T	13	Project closing	1	I, T
No.	Topic	Weight	Level																																																							
1	Introduction to Project Management	1	I, T																																																							
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4	Project scheduling	1	I, T																																																							
5	Resource allocation	1	I, T																																																							
6	Logical Framework	2	I, T																																																							
7	Project cost management	1	I, T																																																							
8	Project risk management	1	I, T																																																							
9	Project quality management	1	I, T																																																							
10	Project human resource management	1	I, T																																																							
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12	Project executing, monitoring & control.	1	I, T																																																							
13	Project closing	1	I, T																																																							

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Book name: A Guide to the project management body of knowledge (PMBOK® Guide). 5th Edition, Newtown Square, Pa. : Project Management Institute, Inc. [2] Project management: A managerial approach / Jack R. Meredith, Samuel J. Mantel. 7th Edition, Hoboken, N.J. : Wiley ; Chichester : John Wiley [distributor], 2009. [3] The project management life cycle/ Jason West land. Kogan Page Limited, 2006 II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3	3	3	3	
Attitudes (Level: 1-5)	4							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	3.0	0.0
L,M,H conversion*		M	M	M	M	M	M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Lecture 1: Introduction to Project Management, project life cycle and organization	1		Lecture, Group work	[1].
2	2	Lecture 2: Project management processes for a project - Common project management process interactions. - Project management process groups. - Initiating process group Planning process group	1	HW 1	Lecture, Group work	[1].
3	3	Lecture 3: Work breakdown structure	1,3,4	HW 2	Lecture, Group work	[1].
4	4	Lecture 4: Project scheduling. - Constructing the network: AON & AOA - Gantt chart - Solving the network Using Microsoft Project software	1,3,4	HW 3	Lecture, Group work	[1].
5	5	Lecture 5: Resource allocation - Critical path method – Crashing a project - Resource allocation problem - Resource loading - Resource leveling Constrained resource scheduling	1,3,4	HW 4	Lecture, Group work	[1].
6	6-7	Lecture 6: Logical Framework Approach (LFA)	3		Lecture, Group work	[1].
		Review for Midterm				
7	8	Lecture 7: Project cost management Project budgeting & Cost estimation - Top-Down budgeting - Bottom-Up budgeting Improving the process of cost estimation	2, 3, 4	HW 5	Lecture, Group work	[1].
		Midterm				
8	9	Lecture 8: Risk management. - Risk management planning - Risk identification - Risk analysis - Risk monitoring and control Using Crystal Ball software		HW 6	Lecture, Group work	
9	10	Lecture 9: Project quality management - Plan quality - Perform quality assurance Perform quality control	2, 3, 4	HW 7	Lecture, Group work	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
10	11	Lecture 10: Project human resource management - Develop human resource plan - Acquire project team - Develop project team Manage project team	2, 3, 4	HW 8	Lecture, Group work	[1].
11	12	Lecture 11: Project procurement management - Plan procurements - Conduct procurements - Administer procurements Close procurements	2, 3, 4	HW 9	Lecture, Group work	[1].
12	13	Lecture 12: Project executing, monitoring & control.	2, 3, 4	HW 10	Lecture, Group work	[1].
13	14	Lecture 13: Project closing Project Presentation Review for Final Exam	2, 3, 4		Problems solving Group work	[1].
14	15	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/ quizzes (10%)	HW1-2 50%Pass	HW4, HW5, HW6 50%Pass	HW7-8 50%Pass	HW9-10 50%Pass
Homework exercises (20%)	Q1 50%Pass	Q2 50%Pass	Q3, Q4 50%Pass	
Midterm exam (20%)	Q1 50%Pass	Q2 50%Pass	Q3, Q4 50%Pass	
Final exam (50%)	HW1-2 50%Pass	HW4, HW5, HW6 50%Pass	HW7-8 50%Pass	HW9-10 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Revision Date: August 21, 2024

6. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Tran Van Ly
- Email: tvly@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2024

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Business

COURSE SYLLABUS

Course Name: Introduction to Business Administration

Course Code: BA115IU

1. General information

Course ID	BA115IU
Relation to curriculum	Compulsory
Teaching methods	Lectures, projects, homework, examinations.
Workload (incl. contact hours, selfstudy hours)	15 classes; 1 class = 3 periods; 1 period = 50 minutes
Workload (incl. contact hours, selfstudy hours)	(Estimated) Total workload: 127.5 Contact hours: 37.5 (15 classes, 1 class = 3 periods, 1 period = 50 minutes) Private study including examination preparation, specified in hours: 90
Credit points	03 Credits (Theory:3 + Practice:0) 4.64 ECTS
Required and recommended prerequisites for joining the course	None

3				X						
4					X	X				
5					X					

3. Planned learning activities and teaching methods

Sessio n	Content	CLO	Bloom's Taxonom y	Category	Teacher' s Material	Assessments
1	Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits	1,3	KN, CR	Lecture	Instructor Manual, Teacher's Resource	Student's book
2	Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth	1,3	KN, CR	Lecture HBR presentatio n	Instructor Manual, Teacher's Resource	Student's book
3	Chapter 5: Choosing a Form of Business Ownership	1, 3	KN, CR	Lecture, HBR presentatio n	Instructor Manual, Teacher's Resource	Student's book
4	Chapter 7: Management, Leadership, And Employee Empowerment	1	KN, CR	Lecture, HBR presentatio n	Instructor Manual, Teacher's Resource	Student's book Casestudy

5	Chapter 8 Adapting Organizations To Today's Markets	1	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book Casestudy
6	Chapter 9 Producing World-Class Goods and Services	1	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book
7	Chapter10 Motivating Employees And Building SelfManaged Teams	1, 3	KN, CR	Lecture, HBR presentation	Casestudy, Teacher's Resource	Case-study, Student's book
8	Chapter 11 HRM: Finding and Keeping the Best Employees	2, 3	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book
9	Chapter 13 Marketing: Building Customer Relationships	2, 3	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book
10	Chapter14 Developing and Pricing Products and Services	2, 3	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book
11	Chapter 15 Distributing Products Quickly and Efficiently	2	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book
12	Chapter 16 Using Effective Promotional Techniques	2	KN, CR	Lecture, HBR presentation	Instructor Manual, Teacher's Resource	Student's book

13	COURSE REVIEW	1, 2, 3	KN, CR		Instructor Manual, Teacher's Resource	Student's book
14	GROUP PRESENTATION AND REPORT SUBMISSION	3,4,5	AP, EV	Group Presentation and Report Submission		
15	GROUP PRESENTATION AND REPORT SUBMISSION	3,4,5	AP, EV	Group Presentation and Report Submission		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Chapter Mindmap (5%)	70%Pass	70%Pass			
Case Analysis (5%)					
Class participation and preparation (5%)					
Group assignment (10%)				70%Pass	70%Pass
Mid-term Exam (30%)	70%Pass		Q1 70%Pass		
Final exam (40%)		70%Pass	70%Pass		

Note: %Pass: Target that 70 % of students having scores greater than 70 out of 100.

5. Grading rubric for presentation			
	Capstone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/authority on the topic.

Central Message	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.

6. Grading rubric for group report

	Capstone 4	Milestones 3 2		Benchmark 1
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Sources and Evidence	Demonstrates skillful use of high- quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error- free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

GRADING RUBRIC FOR WRITTEN COURSEWORK

Criteria	COMPLETELY FAIL Below 30%	INADEQUATE 30% – 49%	ADEQUATE 50% - 69%	ABOVE AVERAGE 70% - 89%	EXEMPLARY ≥ 90%
Organisation and clarification	No evidence of organization and coherence	Does not organise ideas logically and with clarification. Limited evidence of coherence Ideas lack consistence	Generally organised logically, with evidence of progression Occasionally, there may be a lack of focus or ideas may be tangential	Clear organization and progression. Responds appropriately and relevantly, although some ideas are underdeveloped.	Response is focused, detailed and nontangential. Shows a high degree of attention to logic and reasoning of points. Clearly leads the reader to the conclusion and stirs thought regarding the topic
Originality and usefulness of the analysis	Shows no ability to identify issues or a clear inability to gather the facts	Demonstrates an incomplete grasp of the task. There is no overall sense of creative coherence. Arguments are addressed incompletely.	Shows ability to identify issues, gather the facts and develop claims. Argument are addressed well but no links with evidence	Shows strong ability to identify issues, gather the fact and develop claims as well as link claims with evidence. Overall, an acceptable solution is offered and explained	Shows strong ability to identify issues, gather the facts and develop claims as well as link claims with evidence. Satisfactory solutions are offered and supported

Use of data/information	Shows no effort to incorporate information from primary and secondary sources	Shows little information from sources. Poor handling of sources	Shows moderate amount of source information incorporated. Some key points supported by sources.	Draws upon sources to support most points. Some evidence may not support arguments or may appear where inappropriate.	Draws upon primary and secondary source information in useful and illuminating ways to support key points. Excellent integration of quoted material into
			Quotations may be poorly integrated into paragraphs. Some possible problems with source citations	Quotations integrated well into paragraphs. Sources cited correctly	paragraphs. Source cited correctly
Use of frameworks	Shows no effort to structure problems in correspondence to theoretical frameworks	Shows limited ability to structure problems in correspondence to theoretical frameworks	Shows effort to link problems with the theoretical frameworks. There are still some mistakes	Shows ability to structure problems in correspondence to theoretical frameworks correctly. Minor mistakes in resolving problems	Shows ability to structure problems in correspondence to theoretical frameworks correctly. The problems are well resolved

Date revised: April 10th, 2023

Ho Chi Minh City, 10/4/2023

Dean of School of Business





**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**

School of Business

COURSE SYLLABUS

**Course Name: Entrepreneurship and Small Business
Management**

Course Code: BA154IU

1. General information

Course designation	This course aims to provide a hands-on introduction to the scalable venture creation process for students with a strong interest in entrepreneurship. The course is designed for a variety of student interests. It directly addresses the concerns of students wanting to become entrepreneurs in the near or more distant future. It is also useful to anyone who expects to be interacting with entrepreneurs in their business careers. Finally, this course is useful for anybody with a curious mind and a willingness to combine serious analysis with creative thinking.
Semester(s) in which the course is taught	1, 2,3
Person responsible for the course	Nguyen Vo Hien Chau, MBA.
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, project, discussion, presentation.

Workload (incl. contact hours, selfstudy hours)	(Estimated) Total workload: 127.5 Contact hours (please specify whether lecture, class discussion, project preparation.): 27.5 Private study including examination preparation, specified in hours ¹ : 90		
Credit points	3 credits (Theory: 3 + Practice:0) - 4.64 ECTS		
Required and recommended prerequisites for joining the course	None		
Course objectives	After studying this course, the students would be able to build on personal as well as external resources with a view to successfully launching and subsequently managing their enterprises. They would have not only a definite idea as to which support/developmental agency to look up to and for what purpose, but also the necessary know-how and wherewithal for accessing their help. They would have basic skills in operations, finance, marketing, and human resource management.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Describe overall startup business knowledge.	
	Skill	CLO2: Analyze various new business options in order to choose appropriate startup idea. CLO3: Prepare a plan to call for funding with a complete written business plan and pitching presentation	

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

	Attitude	CLO4. Display entrepreneurship spirit from a curious mind and a willingness to combine serious analysis with creative thinking.

Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Foundation of Entrepreneurship	2.5	I, T
	Creative and Innovation: Key to Entrepreneurial success	2.5	I, T, U
	Conducting a Feasibility Analysis and Designing a business model	5	T, U
	Crafting a business plan and building a solid strategic plan	2.5	T, U
	Building a powerful bootstrap marketing plan	2.5	T, U
	Pricing Strategy	2.5	T, U
	Ecommerce and the entrepreneur	2.5	T, U
	Creating a successful financial plan and managing cash flow	2.5	T, U
	Source of financing: finance vs debt	2.5	I, T, U
	Choosing the right location and layout	2.5	T, U
	Buying an existing business	1	T
	Franchising and entrepreneur	1	T

Examination forms	Multiple-choice questions, Essay Questions, Business Plan.		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	<u>Textbook:</u> [1] Norman M. Scarborough. 2019. Essentials of Entrepreneurship and Small Business Management, 9th edition, Pearson. <u>Reference Books:</u> [2] Alexander Osterwalder & Yves Pigneur. 2010. Business Model Generation, Wiley. [3] Alexander Osterwalder & Yves Pigneur. 2010. Value Proposition Design, Wiley. [4] Robert A. Baron, Scott A. Shane, and A. Rebecca Reuber. 2008. Entrepreneurship, 1st edition, Thomson. [5] Richard Dorf, Thomas Byers. 2006. Technology Ventures, From Idea to Enterprise, 2nd edition, McGraw Hill.		

2. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	The Foundations of Entrepreneurship	1	<u>Discussion 1:</u> 1. Search through recent business publications (especially those focusing on small companies) and find an example of an entrepreneur, past or present, who exhibits the entrepreneurial spirit of striving for success in the face of failure. 2. Do you want to become an entrepreneur? Why? Prepare a brief report for your class (300 words).	Lecture, Discussion	[1]

2	Creative and Innovation: Keys to Entrepreneurial success	1,4	<u>Discussion 2:</u> Find an easily available product (for example, a pen). Think of all the creative ways the product can be used. You need to prepare at least 10 alternative uses including unconventional methods for that particular product.	Lecture, Discussion ,	[1]
3-45	Conducting a Feasibility analysis and designing a business model	1,2	<u>Discussion 3:</u> 1. Five Forces Model of Highlands Coffee. 2. Value Proposition Canvas of Grab Car/bike 3. Business Model Canvas of Grab Car/bike <u>Feasibility Analysis Presentation:</u>	Lecture, Discussion , Group presentation	[1] [2]

			Each group will choose 01 new start up business (already started up by someone else) and conduct a feasibility analysis. Please note that the business you choose should be established less than 5 years. It's up to you to choose which industry and which company to analyze, but to save time, you can choose the business in the same industry with your business idea. The presentation should have three main parts: 1.Introduction of the business (Its name, Founder, Product/Service, Established year, Business size, current situation) 2. A feasibility analysis includes: -Industry and Market feasibility -Product or Services feasibility -Financial Feasibility		

			3.Discussion: your group opinion about the success/failure, challenge, and opportunity of the business.		
6	Crafting a Business Plan and Building a solid strategic plan	1,3	<u>Class Discussion:</u> 1. Advantages and Disadvantages of SWOT analysis 2. Prepare a competitive profile matrix for Shopee. Choose 1 of your favorite company. Find at least 4 of its competitors. Put all of them in a Positioning map	Lecture, Discussion ,	[1][2][3]

7	Building a powerful bootstrap marketing plan	1,3	Discussion 5: Select 2 businesses (1 large and 1 small) and play the role of “Mystery shopper” 1.How would you rate their service, quality, and convenience of each of the businesses based on your mystery shopper experience? 2.Compare and contrast the staff at the two stores based on how helpful, friendly, professional, and courteous they were to you during your mystery shopper visits? 3. How would you describe each company’s competitive advantage based on your mystery	Lecture, Discussion ,	[1][2][3]

			shopper visits?		
8	Pricing strategy	1,3	Discussion 6: Apple Inc. dominates the market for tablets with its line of iPads, which currently includes the classic iPad, the iPad Mini, and the iPad Air. Because the company constantly introduces new models and features, it also adjusts prices on these popular devices. Use the Web to research the history of the iPad and write a brief summary of Apple’s pricing strategy on its tablet. Which products compete with the iPad?	Lecture, Discussion ,	[1]
9,10	Midterm				
11	E-commerce and the entrepreneur	1,2,3	Discussion 7: Select one online company with which you are familiar and visit their Web sites. What percentage of them have privacy policies posted on their sites? View the Web site and provide comments based on what you have studied in this chapter. Does the Web site follow the techniques of designing a killer Web site? You may provide some suggestions to the business owner for improvement.	Lecture, Discussion , HW	[1]

12	Creating a successful financial plan	1,3	Discussion 8: 1. Find a publicly held company of interest to you that provides its financial statements on the Web. You can conduct a Web search using the company's name, or you can find lists of companies at the Securities and Exchange Commission's EDGAR database or visit AnnualReports.com to download the annual report of a company that interests you. 2. Analyze the company's financial statements by calculating the first 3 ratios covered in this chapter and compare these ratios to industry averages found in RMA's Annual Statement Studies, Bizminer, or one of the other financial analysis resources found in your library. 3. Do you spot any problem areas in the company's financials?	Lecture, Discussion, HW	[1]

			4. What are the financial strengths of the company?		
12,13	Managing cash flow	1,2,3	Make a cash flow management for your monthly expense.	Lecture, Exercise	[1]

13	Sources of Financing: Equity vs Debt	1,3,4	Discussion 9: Interview or find an article on the internet several local business owners about how they financed their businesses. (you can easily find it in Shark Tank TV Show or other sources) - Where did the initial capital come from for the small business owners you interviewed/or found? - Ask the small business owners or find in the article how much money they needed to launch their businesses. - Ask the small business owners how they raised the additional capital they needed to start their businesses. - Ask the small business owners about any advice they might offer others seeking capital? (if applicable)	Lecture, Discussion, HW	[1]
14	Choosing the right location and layout	1,3	Discussion 10: What factors should a seafood processing plant, a beauty shop, and an exclusive jewelry store consider in choosing a location? List factors for each type of business	Lecture, Discussion	[1]
15	Buying an existing business	1,2,4		Lecture, Discussion	[1]
15	Franchising and the Entrepreneur	1,2,4		Lecture, Discussion	[1]
15	Business Plan Review	1,2,3,4	Written Plan: Length and Style: 6,000 words (+-10%), excluding footnotes, figures and references. The format for assignments is to be 1.5 spaced with 2.5 cm margins and font size of 12 cpi. Please show the word count, along with all other details on the cover sheet.	Review, Q&A	

			The business plan will be assessed for analytical content and presentation. The business plan must be submitted before presented. Peer reviews to evaluate each member's contribution to the group work and define your final grade. All work must be original and must not have been submitted for any other subject or course here or elsewhere. Copying or plagiarizing works of other authors, including your fellow students or cutting and pasting from the internet and other sources is an offence and will be seriously penalized. <u>Final Presentation:</u> Duration: 10 minutes presentation + 5 minutes Q&A Please present as if you were in a business idea competition or finding funds for your business. BE PROFESSIONAL!		
16,1 7	Business Plan Presentation	3,4			

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-Class presentation (10%)	Feasibility Analysis 70% Pass	Feasibility Analysis 70% Pass		
Homework (15%)	HW 70%Pass	HW 70%Pass		
Midterm exam (20%)	Q: 1-40 70% Pass			

Business Plan (55%)	Written Plan 70% Pass	Written Plan 70%Pass	Written Plan & presentation 70%Pass	Written Plan 70%Pass

Note: %Pass: Target that % of students having scores greater than 70 out of 100.

4. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Plan			
Student: HW/Assignment:			
Date: Evaluator:			
	Max.	Score	Comments
Technical content (90%)			
Executive Summary	5		
Product/Service Feasibility	15		
Business Strategy and Competitor Analysis	30		
Marketing Strategy	15		
Financial Plan	15		
Implementation Plan	10		
Presentation (10%)			
Clear, attractive, and persuasive presentation	5		
Professional attitude	5		
TOTAL SCORE	100		

5.2. Holistic rubric

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Source: Association of American Colleges and Universities

	Understanding steps, framework to make a business plan. (20%)	Applying realistic research to develop a complete business plan (30%)	Entrepreneurial Mindset (50%)
Excellent A (85+)	Excellent depth of understanding of key steps and theoretical framework to make a complete business plan.	Excellent applying key steps and theoretical framework demonstrated by in depth and realistic research to complete the business plan. Excellent use of citations to range of significant data sources.	Excellent describe and communicate the unique features and benefits of the product or service brought to the market and well define the product/service USP. Effectively describe the market in which the business intends to compete, Identifies the resources necessary from producing to delivering the product/service with realistic and competitive strategy, as well as highlighting the expertise of the individual(s) within the business and identifying any ‘gaps’ and appropriate measures to resolve these issues.
Good B (75-85)	Good understanding of key steps and theoretical framework to make a complete business plan.	Good applying key steps and theoretical framework demonstrated by in depth and realistic research to complete the business plan. Good use of citations to a wide range of significant data sources.	Good describe and communicate the unique features and benefits of the product or service brought to the market and well define the product/service USP. Good describe the market in which the business intends to compete, Identifies the resources necessary from producing to delivering the product/service with realistic and competitive strategy, good attempt to highlight the expertise of the individual(s) within the business and identifying any ‘gaps’ and appropriate measures to resolve these issues.

Above Average C (60-74)	Appropriate understanding of key steps and theoretical framework to make a complete business plan.	Appropriate applying key steps and theoretical framework demonstrated by in depth and realistic research to complete the business plan. High-level use of citations to significant data sources.	High-level of describe and communicate the features and benefits of the product or service brought to the market and define the product/service USP. Appropriate describe the market in which the business intends to compete, good measurement to identify the 'gaps' and appropriate measures to implement the plan.
Average D (50-59)	Some understanding of key steps and theoretical framework to make a complete business plan.	Reasonable applying key steps and theoretical framework with some Realistic research complete the business plan. Some use of citations to significant data sources.	Some effort to describe and communicate the features and benefits of the product or service brought to the market and define the product/service USP. Some understanding and measurement to identify the 'gaps' and appropriate measures to implement the plan.

Oral communication value rubric for evaluating presentation tasks:

Source: Association of American Colleges and Universities

	Capstone	Milestone		Benchmark
	4	3	2	1

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

5. Date revised: 16 February, 2023

Ho Chi Minh City, 16/2/2023

Dean of School of Business





**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Entrepreneurship and Sustainability in Engineering

Course Code: CHE0051IU

1. General information

Course name	- <i>(in English)</i> Entrepreneurship and Sustainability in Engineering - <i>(in Vietnamese)</i> Khởi nghiệp và Bền vững trong Kỹ thuật
Course designation	This course is designed for students to understand the basics knowledge and principles of entrepreneurship in engineering; sustainability and 17 sustainable development goals (SDGs); as well as relevant issues and frameworks in achieving sustainable entrepreneurship in engineering-related business plans.
Course type	☒ General knowledge ☐ Fundamental ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Doan Hoai Linh (dhlinh@hcmiu.edu.vn) Dr. Tran Thanh Tu (tttu@hcmiu.edu.vn)
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
	☒ Lecture ☐ Lesson ☒ Project ☐ Seminar

Teaching methods	Others, please specify: -												
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis						
		<i>Credit</i>	3	0									
	Contact hours	37.5	37.5	0	0	0	0						
	Self-Study hours	90	90	0	0	0	0						
	Total workload	127.5	127.5	0	0	0	0						
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS												
Number of periods	Theory: 45 Practice: 0												
Requirements for taking the course	☒ None ☐ Prerequisites ☐ Corequisites ☐ Previous course												
Course objectives	Students will be provided with the knowledge about: (1) Basic economic theory and key principles of entrepreneurship in engineering; (2) Basic theory of sustainability and 17 sustainable development goals (SDGs); (3) Relevant issues and frameworks in achieving sustainable entrepreneurship in engineering-related business plans.												
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Discover the basic economic theory and key principles of entrepreneurship in engineering. <i>[3-Applying]</i> CLO2. Demonstrate complex aspects of sustainable development (economic, environmental, social equity) in engineering. <i>[3-Applying]</i> </td></tr> <tr> <td>Skill</td><td> CLO3. Reproduce writing and argumentation based on critical evaluation of the readings and of personal ideas and assessments in developing a sustainable engineering-related business plans. <i>[3-Guided Response]</i> CLO4. Reacts to the importance of economics and sustainability in engineering. <i>[3-Guided Response]</i> </td></tr> </tbody> </table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Discover the basic economic theory and key principles of entrepreneurship in engineering. <i>[3-Applying]</i> CLO2. Demonstrate complex aspects of sustainable development (economic, environmental, social equity) in engineering. <i>[3-Applying]</i>	Skill	CLO3. Reproduce writing and argumentation based on critical evaluation of the readings and of personal ideas and assessments in developing a sustainable engineering-related business plans. <i>[3-Guided Response]</i> CLO4. Reacts to the importance of economics and sustainability in engineering. <i>[3-Guided Response]</i>
Competency level ¹	Course learning outcome (CLO)												
Knowledge	CLO1. Discover the basic economic theory and key principles of entrepreneurship in engineering. <i>[3-Applying]</i> CLO2. Demonstrate complex aspects of sustainable development (economic, environmental, social equity) in engineering. <i>[3-Applying]</i>												
Skill	CLO3. Reproduce writing and argumentation based on critical evaluation of the readings and of personal ideas and assessments in developing a sustainable engineering-related business plans. <i>[3-Guided Response]</i> CLO4. Reacts to the importance of economics and sustainability in engineering. <i>[3-Guided Response]</i>												
Level of competence according to Bloom's Taxonomy:													
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7						
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x						

Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight</u> : lecture session (2.5 hours)						
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Introduction to this course Introduction to economics Definition in economics	1	I			
	2	Microeconomics vs Macroeconomics, unemployment and inflation	1	I			
	3	Interests, Time value of Money, Taxes, and Fixed charges, Profitability, alternative investments, and replacements	1	I, T			
	4	Entrepreneurship in engineering (business model, business plan)	1	I, T			
	5	Introduction to Sustainable Development Challenges of sustainability The Economics of Sustainability	1	I			
	6	17 sustainable development goals (SDGs) – Part 1	1	I, T			
7	17 sustainable development goals (SDGs) – Part 2	1	T				
8-14	Groupwork and report submission (project-based activity in 7 weeks; no in-class attendance)	7	T, U				
15	Presentation (based on groupwork)	1	U				
Examination forms	☒ Multiple-choice questions ☒ Report ☒ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:						
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.						

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Thomas Sowell, <i>Basic Economics A Citizen's Guide to the Economy</i>, ISBN: 978-0465081455, Basic Books, 2004. [2] Tony Cleaver, <i>Understanding the world economy</i>, 2nd edition, ISBN: 0-415-24404-8, Routledge (Taylor & Francisc Group), 2002. [3] Max Peters, Klaus Timmerhaus, Ronald West, <i>Plant Design and Economics for Chemical Engineers</i>, 5th edition, ISBN: 978-0072392661, McGrawhill, 2002. [4] Norman M. Scarborough, Jeffrey R. Cornwall, <i>Essentials of entrepreneurship and small business management</i>, 8th edition, ISBN: 978-1-292-09486-1, Pearson, 2016. [5] Adisa A., Slobodan P., Roland C., <i>Sustainable Development Practice – Case Studies for Engineers and Scientists</i>, Wiley, 2004. II. References [6] Stephen A.R., <i>Sustainable Development Handbook</i>, Elsevier, CRC Press, 2007. [7] Allan R., Forstner U., Salomons W., <i>Mathematical Modelling for Sustainable Development</i>, Springer, 2006.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3	3	3		
	4						3	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	3.0	0.0
L,M,H conversion*		M	M	M	M	M	M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to this course Introduction to economics Definition in economics	1		Lecture, Discussion	[1] Chapter 1-5
2.	2	Microeconomics vs Macroeconomics, unemployment and inflation	1		Lecture, Discussion	[2] Chapter 3,4
3.	3	Interests, Time value of Money, Taxes, and Fixed charges, Profitability, alternative investments, and replacements	1		Lecture, Discussion	[3] Chapter 7,8
4.	4	Entrepreneurship in engineering (business model, business plan)	1		Lecture, Discussion	[4] Chapter 4-5
5.	5	Introduction to Sustainable Development Challenges of sustainability The Economics of Sustainability	2		Lecture, Discussion	[5] Part 1
6.	6	17 sustainable development goals (SDGs) – Part 1	2		Lecture, Discussion	[7] Chapter 2,3
7.	7	17 sustainable development goals (SDGs) – Part 2	2		Lecture, Discussion	[6] Chapter 11 [6] Chapter 4,5
8.	8-15	Project-based activity (no in-class attendance)	1-4	A1	Report submission	[5] Part 2
9.	16	Group presentation	1-4	A2	Presentation, Discussion	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Report submission (A1) (70%) (as Final exam. score)	A1 (5.1) 60%Pass	A1 (5.2) 60%Pass	A1 (5.1) 60%Pass	A1 (5.2) 60%Pass
Group presentation (A2) (30%) (as progress/inclass score)	A2 (5.1) 60%Pass	A2 (5.2) 60%Pass	A2 (5.1) 60%Pass	A2 (5.2) 60%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	Capstone	Milestone		Benchmark
	4	3	2	1
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

5.3 Critical thinking value rubric for evaluating questions in exams

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	Capstone	Milestone		Benchmark
	4	3	2	1
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Tran Thanh Tu/Dr. Doan Hoai Linh
- Email: ttu@hcmiu.edu.vn/dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Develop new syllabus	April 18th, 2024	Dr. Doan Hoai Linh Dr. Tran Thanh Tu
2	All	Move midterm exam. from week 9 to week 8 Revised content for week 7 accordingly Adjusted timeline accordingly	June 05th, 2025	Dr. Doan Hoai Linh Dr. Tran Thanh Tu
3	2	Update ILOs	June 24th, 2025	Dr. Tran Thanh Tu
4	Course learning outcomes	Change the PLO competency level in the matrix (to level 4) Delete CLO Attitude	August 13th, 2025	Dr. Tran Thanh Tu Dr. Doan Hoai Linh
5	Assessment plan	Change the weight (%) of assessment type	August 13th, 2025	Dr. Tran Thanh Tu Dr. Doan Hoai Linh
6	Course learning outcomes	Change the PLO competency level in the matrix (back to level 3 for all)	August 19th, 2025	Dr. Tran Thanh Tu Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: INTRODUCTION TO CHEMICAL ENGINEERING

Course Code: CHE101IU

1. General information

Course name	- <i>(in English)</i> Introduction to Chemical Engineering - <i>(in Vietnamese)</i> Nhập môn Kỹ thuật Hóa học
Course designation	This course will introduce students to the engineering profession and the field of chemical engineering, guide them through the principles of engineering design and problem-solving, and help them develop teamwork, time management, and communication skills.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Huynh Kim Lam, hklam@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify:																																																
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>									Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																											
<i>Credit</i>	2	2																																															
<i>ECTS</i>	3.09																																																
Contact hours	25	25	0	0	0	0																																											
Self-Study hours	60	60	0	0	0	0																																											
Total workload	85	85	0	0	0	0																																											
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																																
Number of periods	Theory: 30 Practice: 0																																																
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: NONE ☐ Corequisites: NONE ☐ Previous course: NONE																																																
Course objectives	Upon successful completion of this course, the students should: – Demonstrate a broad and general understanding of the Chemical Engineering profession, including: – Identify the types of technical and societal problems that chemical engineers work to address; – Explain clear and reasonable long-term plans for a variety of academic and professional career paths available to chemical engineers; and – Identify ethical concerns associated with the chemical engineering profession. – Solve introductory problems associated with multiple areas of the core chemical engineering curriculum, including: – Describing physical quantities – Material balances – Fluid flow – Mass transfer – Reaction Engineering – Heat transfer – Materials – Controlling the process																																																
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <td>Competency level</td><td>Course learning outcome (CLO)</td></tr> </table>							Competency level	Course learning outcome (CLO)																																								
Competency level	Course learning outcome (CLO)																																																

	Knowledge	CLO1. Demonstrate the roles of chemical engineers and their relation to other disciplines CLO2. Apply introductory chemical engineering concepts		
	Skill	CLO3. Conduct basic calculations used in chemical and engineering when designing or analyzing chemical processes CLO4. Effectively communicate her/his work in written and oral form		
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	What is chemical engineering?	0.5	I, T
	2	The role of chemical processing?	0.5	I, T
	3	Solving engineering problems	0.5	I, T, U
	4	Describing physical quantities	0.5	I, T, U
	5	Material balances	1	I, T, U
	6	Fluid flow	1	I, T, U
	7	Mass transfer	1	I, T, U
	8	Reaction Engineering	1	I, T, U
	9	Heat transfer	1	I, T, U
	10	Materials	1	I, T, U
	11	Controlling the process	1	I, T, U
	12	Economics	1	I, T, U
	Examination forms	☐ Multiple-choice questions		
☐ Report			☒ Written examination	
☐ Presentation			☐ Others, please specify:	
☐ Assignments				

Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	<u>Textbooks:</u> “Introduction to Chemical Engineering: Tools for Today and Tomorrow” Kenneth A. Solen, John N. Harb (5th Edition), 2011, John Wiley & Sons, Inc. <u>References:</u> “Morton Denn, Chemical Engineering - An Introduction” (Cambridge Series in Chemical Engineering), 2011, Cambridge University Press.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3				3			
	4			3				
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0			
L,M,H conversion*		M	M	M	M			

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	What is chemical engineering? The role of chemical processing?	1, 4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 1, 2
2.	2	Solving engineering problems Describing physical quantities	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 3, 4

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3	Material balances	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 5
4.	4	Fluid flow	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 7
5.	5	Mass transfer	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 8
6.	6	Reaction Engineering	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 9
7.	7	Heat transfer	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 10
8.	8	Materials	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 11
		Midterm exam		Exam		
9.	9	Controlling the process	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 12
10.	10	Economics	2-4	Assignment (Individual and/or Group)	- Lecture - Class discussion	[1]. 13
11.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class evaluation (20%)	70% pass	70% pass	70% pass	90% pass
Midterm examination (30%)	70% pass	70% pass	70% pass	90% pass
Final examination (50%)	70% pass	70% pass	70% pass	90% pass

Note: %Pass: Target that % of students have scores greater than 50 out of 100.

5. Rubrics:

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	CLO	Level	2025.08.19	HKLam



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Inorganic Chemistry

Course Code: CHE2103IU

1. General information

Course name	- <i>(in English)</i> Inorganic Chemistry - <i>(in Vietnamese)</i> Hóa vô cơ						
Course designation	This course is designed to provide students with a broad knowledge and understanding of atomic properties, molecular structure, and properties of inorganic complexes and compounds.						
Course type	☐ General knowledge ☒ Fundamental ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:						
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer						
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☒ Compulsory ☐ Elective						
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:						
Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
Contact hours	37.5	37.5	0	0	0	0	0
Self-Study hours	90	90	0	0	0	0	0
Total workload	127.5	127.5	0	0	0	0	0

Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS					
Number of periods	Theory: 45 Practice: 0					
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CH011IU Chemistry for Engineers					
Course objectives	Upon successful completion of this course, the students should be able to demonstrate knowledge of: • Electronic structure of the atom, • Main group chemistry. • Connection between electronic structure and molecular properties. • Symmetry elements in molecules and assign molecules to the appropriate point group. • Several theories of bonding, the advantages and disadvantages of each theory, and which theory is most useful for each type of inorganic molecule. • Solvent systems and acid-base behavior • Ionic bonding and solid-state behavior. Features of organometallic chemistry					
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Be able to apply knowledge in mathematics and science in solving problems related to inorganic chemistry [Applying]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].</td></tr></table>		Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Be able to apply knowledge in mathematics and science in solving problems related to inorganic chemistry [Applying]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].
Competency level ¹	Course learning outcome (CLO)					
Knowledge	CLO1. Be able to apply knowledge in mathematics and science in solving problems related to inorganic chemistry [Applying]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Skill	CLO3. An ability to communicate (in English) effectively with a range of audiences [Guided response].		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	<u>Weight</u> : lecture session (2.5 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to inorganic chemistry	1	I, T
	2	Atomic Structure and Properties	1	I, T
	3	Bonding Theories	1	I, T
	4	Symmetry and Group Theory	2	I, T, U
	5	Molecular Orbital Theory	2	I, T
	6	Acid-Base Chemistry Donor-Acceptor Chemistry	1	I, T, U
	7	Solid State-Structure and Bonding	1	I, T, U
	8	Chemistry of the Main Group Elements	1	I, T
	9	Coordination Chemistry: Structures and Isomers	1	I, T, U
	10	Coordination Chemistry: Reactions and Mechanisms	1	I, T, U
11	Organometallic Chemistry	1	I, T	
12	Organometallic Reactions and Catalysis	1	I, T	
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Gary L. Miessler, Paul J. Fisher, Donald A. Tarr, <i>Inorganic Chemistry</i> , 5 th Ed., 2014. II. References [2] Catherine E. Housecroft and Alan G. Sharpe, <i>Inorganic Chemistry</i> , 3 rd Ed., 2008.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3				
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion*		M	M	M				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to inorganic chemistry	1,3		- Lecture - Class discussion	[1].
2.	2	Atomic Structure and Properties	1,2,3	Homework	- Lecture - Class discussion	[1].
3.	3	Bonding Theories	1,3	Homework	- Lecture - Class discussion	[1].
4.	4, 5	Symmetry and Group Theory	1,2,3	Quiz	- Lecture - Class discussion	[1].
5.	6,7	Molecular Orbital Theory	1,3	Homework	- Lecture - Class discussion	[1].
6.	8	Acid-Base Chemistry Donor-Acceptor Chemistry	1,2,3	Homework	- Lecture - Class discussion	[1].
		Midterm				
7.	9	Solid State-Structure and Bonding	1,3	Homework	- Lecture - Class discussion	[1].
8.	10	Chemistry of the Main Group Elements	1,3	Homework	- Lecture	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
					- Class discussion	
9.	11	Coordination Chemistry: Structures and Isomers	1,3	Homework	- Lecture - Class discussion	[1].
10.	12	Coordination Chemistry: Reactions and Mechanisms	1,3	Quiz	- Lecture - Class discussion	[1].
11.	13	Organometallic Chemistry	1,3	Homework	- Lecture - Class discussion	[1].
12.	14	Organometallic Reactions and Catalysis	1,2,3	Homework	- Lecture - Class discussion	[1].
13.	15	Group projects	1,2,3		Oral presentation	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes/ Homework exercises (15%)	Qz, HW 60%Pass	Qz, HW 60%Pass	Qz, HW 60%Pass
group project (15%)	group project 50%Pass	group project 50%Pass	group project 50%Pass
Midterm exam (25%)	Q1 50%Pass	Q2 50%Pass	
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		observable and is skillful and makes the content of the presentation cohesive.	clearly and consistently observable within the presentation.	intermittently observable within the presentation.	not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		establishes the presenter's credibility/ authority on the topic.	the presentation or establishes the presenter's credibility/ authority on the topic.	analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention throughout	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Inorganic Chemistry Lab

Course Code: CHE2104IU

1. General information

Course name	- <i>(in English)</i> Inorganic Chemistry Lab - <i>(in Vietnamese)</i> Thực hành Hóa vô cơ
Course designation	This course is designed for chemical engineering students. The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in Inorganic Chemistry lectures. Prior to each lab, students must read the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.
Course type	☐ General knowledge ☒ Fundamental ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Practical experiment

Workload			Lecture	Lab	Project	Internship	Thesis				
		Credit		1							
	Contact hours	25	0	25	0	0	0				
	Self-Study hours	30	0	30	0	0	0				
	Total workload	55	0	55	0	0	0				
Credit points	1 credit (Theory: 0 + Practice: 1) 2.00 ECTS										
Number of periods	Theory: 0 Practice: 30										
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: CHE2103IU - Inorganic Chemistry - Previous course:										
Course objectives	The course provides knowledge and skills for students to: • Use basic apparatus and apply experimental methodologies in the chemistry laboratory setting • Demonstrate safe and proper handling of laboratory equipment and chemicals • provide students with a firm foundation in Inorganic Chemistry laboratory for careers in science and engineering. • Develop skills in collecting and managing data in order to express their results in a precise and reliable quantitative or qualitative form on lab reports. • Be able to apply chemical concepts to draw logical conclusions about the applicability of data to real-world problems. • Be able to calculate physical or chemical quantities germane using collected data to the experiment being performed. Develop teamwork skills that include not only the efficient acquisition of experimental data, but also the awareness of safety in the laboratory setting.										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td></td><td></td></tr></table>							Competency level ¹	Course learning outcome (CLO)		
Competency level ¹	Course learning outcome (CLO)										

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Knowledge	CLO1. An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics [Applying].																														
	Skill	CLO2. An ability to communicate (in English) effectively with a range of audiences [Guided Response] CLO3. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Guided Response] CLO4. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [Guided Response]																														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (4.2 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Orientations</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Close packing geometry in solid</td><td>1</td><td>I, T, U</td></tr><tr><td>3</td><td>Preparation of laboratory solutions</td><td>1</td><td>I, T, U</td></tr><tr><td>4</td><td>Limit test for chloride & sulfates</td><td>1</td><td>I, T, U</td></tr><tr><td>5</td><td>Preparation of coordination compound, [Ni(NH₃)₆]I₂</td><td>1</td><td>I, T, U</td></tr><tr><td>6</td><td>Purification of kitchen salt by re-crystallization method</td><td>1</td><td>I, T, U</td></tr></table>				No.	Topic	Weight	Level	1	Orientations	1	I, T, U	2	Close packing geometry in solid	1	I, T, U	3	Preparation of laboratory solutions	1	I, T, U	4	Limit test for chloride & sulfates	1	I, T, U	5	Preparation of coordination compound, [Ni(NH ₃) ₆]I ₂	1	I, T, U	6	Purification of kitchen salt by re-crystallization method	1	I, T, U
No.	Topic	Weight	Level																													
1	Orientations	1	I, T, U																													
2	Close packing geometry in solid	1	I, T, U																													
3	Preparation of laboratory solutions	1	I, T, U																													
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5	Preparation of coordination compound, [Ni(NH ₃) ₆]I ₂	1	I, T, U																													
6	Purification of kitchen salt by re-crystallization method	1	I, T, U																													
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments																															
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																															

Reading list	I. Textbooks [1] Phung Thanh Khoa & co-workers, <i>Lab Manual – Inorganic Chemistry</i> , 2021 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2			3				
	3				3			
	4					3		
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	3.0	3.0	0.0	0.0
L,M,H conversion*		M		M	M	M		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientations	1,4		- Lecture	[1].
2.	2	Close packing geometry in solid	1,2,3, 4	Group assignment, Lab report	- Lecture - Practice	[1].
3.	3	Preparation of laboratory solutions	1,2,3, 4	Group assignment, Lab report	- Lecture - Practice	[1].
4.	4	Limit test for chloride & sulfates	1,2,3, 4	Group assignment, Lab report	- Lecture - Practice	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
5.	5	Preparation of coordination compound, $[\text{Ni}(\text{NH}_3)_6]\text{I}_2$	1,2,3, 4	Group assignment, Lab report	- Lecture - Practice	[1].
6.	6	Purification of kitchen salt by re-crystallization method	1,2,3, 4	Group assignment, Lab report	- Lecture - Practice	[1].
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/Pre-Lab (10%)	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass
Lab report (60%)	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass
Final exam (30%)	Part I 50%Pass			Part II 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics: Rubric for lab work assessment

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
I. Lab activity							
1. Attendance	10	Participate on time					Be late ≥ 15 min
2. Prepare for contents and plans of lab works	10	Prepare well, answer correct all questions					Not prepare well, could not answer correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
4. Experimental skills (measure, operate, manage)	20	Correct in procedures for measuring, operating and management)					Incorrect in procedures for measuring, operating and management)
5. Time and resources management	5	Distribute appropriately time and resource to complete well experiments					Distribute inappropriately time and resource to incomplete more than 50% of experiments
II. Report							
6. Writing skill and format	5	Clear, no spellings and grammar mistakes					Not logical, too much spelling and grammar mistakes, not understandable
7. Introduction, method	10	Sufficient, concise, accurate					Incomplete contents $\geq 50\%$, not clear, inaccurate
8. Experimental Results	20	Achieve accurate results					Incomplete results $\geq 50\%$;
9. Data analysis	5	Logical, sufficient data analysis					No data analysis; Wrong in data analysis
10. Conclusion/ suggestion	5	concise, valuable					not valuable
11. Images and support information	5	Accurate, abundant, clear and beautiful					Too little or no images or supporting information; unclear, inaccurate
Total	100						

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic Chemistry 1

Course Code: CHE1081IU

1. General information

Course name	- (in English) <i>Organic Chemistry 1.</i> - (in Vietnamese) <i>Hóa hữu cơ 1</i>					
Course designation	<i>This course is specifically designed for students of Chemical Engineering. It is the first part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on aspects of stereochemistry and the basics of addition, substitution and elimination reactions, functional groups, saturated and aromatic heterocyclic compounds.</i>					
Course type	☐ General knowledge ☒ Fundamental ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:					
Semester(s) in which the course is taught	1 (year 2)					
Person responsible for the course	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn					
Language	English					
Relation to curriculum	Compulsory					
Teaching methods	Lecture, lesson, homework, quiz.					
Workload (incl. contact hours, self-study hours)			Lecture	Lab		
		Credit	3			
Contact hours	37.5	37.5	0			
Self-Study hours	90	90	0			
Total workload	127.5	127.5	0			

Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS		
Number of periods	Theory: 45 Practice: 0		
Required and recommended prerequisites for joining the course	- Previous course (Course code – Course name) CH011IU-Chemistry for Engineers.		
Course objectives	Students will be provided with skills of recognizing different types of functional groups and reactions. Students will be provided with the ability to analyze and draw reaction mechanisms.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Apply knowledge about organic compound structures and their properties in reactions. [1]	
	Skill	CLO2. Predict and explain simple reaction mechanism.[1]	
	Attitude	CLO3. Discuss and work in groups under instruction for solving organic chemistry problems. [3]	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Bonding and molecular structure	2	T, I
	Introduction to organic compounds	1	T, I
	Stereochemistry	1	T, U
	Types of organic reactions	1	T, I
	Alkanes and Cycloalkanes	1	T, U
	Alkenes	2	T, U
	Alkynes	1	T, U
	Alkyl halides	3	T, U
	Diels and Aromatic compounds	3	T, U
Examination forms	Multiple-choice questions, short-answer questions		

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] Organic Chemistry, 7th Edition, 2007, John McMurry [2] Organic Chemistry with a Biological Emphasis, LibreTexts Open Access, 2016, Timothy Soderberg [3] Organic Chemistry, 12th Edition, 2016, T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder [4] Organic Chemistry, 8th Edition, 2013, L.G. Wade Jr.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLOs) (1-4) and Intended Learning Outcomes (ILOs) (1-8) level of contribution of CLO to ILO (Low – Medium – High) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2	3						
Attitudes (Level: 1-5)	3			3				
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3,0	0,0	3,0	0,0	0,0	0,0	0,0
L,M,H conversion*		M		M				

*Use Bloom's Taxonomy

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-2	Lecture 1: Bonding and molecular structure: Lewis structure, Electronegativity and polarity; Resonances; Intermolecular forces (review) Hybridization, Writing organic structures and mechanisms. Curved arrows	1	Quiz1, HW1	Lecture, In Class-Quiz, HW	

3	<i>Lecture 2: Introduction to organic compounds: Hydrocarbons and functional groups. Infrared Spectroscopy: Introduction</i>	1, 5	Quiz2, HW2	Lecture, In Class-Quiz, HW	
4	<i>Lecture 3: Stereochemistry</i>	2	Quiz3, HW3	Lecture, In Class-Quiz, HW	
5	<i>Lecture 4: Types of organic reactions</i>	1,3	Quiz4, HW4	Lecture, In Class-Quiz, HW	
6	<i>Lecture 5: Alkanes and Cycloalkanes: Nomenclature and Conformations</i>	1,3,4	Quiz5, HW5	Lecture, In Class-Quiz, HW	
7	<i>Lecture 6: Alkenes: Properties and Synthesis; <u>Addition reactions</u> Review</i>	1,3,4	Quiz6, HW6	Lecture, In Class-Quiz, HW	
8	Midterm <i>Lecture 6: Alkenes: Properties and Synthesis; <u>Addition reactions</u> Review (Continued)</i>	1,3,4	Quiz6, HW6	Lecture, HW	
9	<i>Lecture 7: Alkynes: Properties and Synthesis; Addition reactions</i>	1,3,4	Quiz7, HW5	Lecture, In Class-Quiz, HW	
10-12	<i>Lecture 8: Alkyl halides: <u>Elimination reactions</u>; <u>Nucleophilic substitutions</u></i>	1,3,4	Quiz8, HW6	Lecture, In Class-Quiz, HW	
13-15	<i>Lecture 9: Diels and Aromatic compounds: Conjugated unsaturated systems; <u>Electrophilic aromatic substitutions</u></i>	1,3,4	Quiz9, HW7	Lecture, In Class-Quiz, HW	
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (20%)	70% Pass	70% Pass	
Homework exercises (10%)	70% Pass	70% Pass	90% Pass
Midterm exam (30%)	70% Pass		
Final exam (40%)	70% Pass	50% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Mechanism	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Date revised: 08/2025

7. Course coordinator/Lecturer

- School/Department: Dr. Lê Quang Phong- Department of Applied Chemistry
- Email: lqphong@hcmiu.edu.vn

Hochiminh city, 21/ 8/2025

**DEAN OF SCHOOL OF CHEMICAL AND
ENVIRONMENTAL ENGINEERING**



Assoc. Prof., Dr. Huynh Kim Lam



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS
Course Name: Organic Chemistry 2
Course Code: CHE1091IU

1. General information

Course name	- (in English) <i>Organic Chemistry 2.</i> - (in Vietnamese) <i>Hóa hữu cơ 2</i>					
Course designation	<i>This course is specifically designed for students of Chemical Engineering. It is the second part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on functional groups, mechanisms of their common reactions with a biological emphasis.</i>					
Course type	☐ General knowledge ☒ Fundamental ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:					
Semester(s) in which the course is taught	2 (year 2)					
Person responsible for the course	Dr. Le Quang Phong					
Language	English					
Relation to curriculum	Compulsory					
Teaching methods	Lecture, lesson, homework, quiz.					
Workload (incl. contact hours, self-study hours)			Lecture	Lab		
		Credit	3			
Contact hours	37.5		37.5	0		
Self-Study hours	90		90	0		
Total workload	127.5		127.5	0		

Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS		
Number of periods	Theory: 45 Practice: 0		
Required and recommended prerequisites for joining the course	- Previous course (Course code – Course name) CHE1081IU - Organic Chemistry 1.		
Course objectives	Students will be provided with skills of recognizing different types of functional groups and reactions. Students will be provided with the ability to analyze and draw reaction mechanisms.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Apply the knowledge about structures of alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines, enols and enolates and their properties in the reactions.[ILO1]	
	Skill	CLO2. Predict and explain the mechanism of the functional groups mentioned in the course.[ILO1]	
	Altitude	CLO3. Discuss and work in groups under instruction for solving complex organic chemistry problems. [ILO3]	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Alcohols, Phenols	2	T, U
	Ethers, Epoxides, Thiols	1	T, U
	Aldehydes, ketones	2	T, U
	Carboxylic acids, Carboxylic acids derivatives:	3	T, U
	Enols and enolates	2	T, U
	Aldol condensation and Claisen condensation reactions	2	T, U
	Amine	2	T, U
	Examination forms	Multiple-choice questions, short-answer questions	

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] Organic Chemistry, 7th Edition, 2007, John McMurry [2] Organic Chemistry with a Biological Emphasis, LibreTexts Open Access, 2016, Timothy Soderberg [3] Organic Chemistry, 12th Edition, 2016, T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder [4] Organic Chemistry, 8th Edition, 2013, L.G. Wade Jr.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLOs) (1-4) and Intended Learning Outcomes (ILOs) (1-8) level of contribution of CLO to ILO (Low – Medium – High) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2	3						
Attitudes (Level: 1-5)	3			3				
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3,0	0,0	3,0	0,0	0,0	0,0	0,0
L,M,H conversion*		M		M				

*Use Bloom's Taxonomy

3. Planned learning activities and teaching methods

Week	Topic	CL O	Assessments	Learning activities	Resources
1-2	Lecture 1 and 2: Alcohols, Phenols: Synthesis and reactions	1,2,3	Quiz1, HW1	Lecture, In Class-Quiz, HW	
3	Lecture 3: Ethers, Epoxides, Thiols: Synthesis and reactions	1,2,3	Quiz2, HW2	Lecture, In Class-Quiz, HW	

4-5	<i>Lecture 4: Aldehydes, ketones: <u>Nucleophilic carbonyl addition reactions</u> Sugars as intramolecular hemiacetals and hemiketals Glycosidic bonds</i>	1,2,3	Quiz3, HW3	Lecture, In Class-Quiz, HW	
6-7	<i>Lecture 5: Carboxylic acids, Carboxylic acids derivatives: <u>Nucleophilic acyl substitution</u> Nucleophilic acyl substitution in the context of metabolism</i>	1,2,3	Quiz4, HW4	Lecture, In Class-Quiz, HW	
8	Midterm <i>Lecture 5: Carboxylic acids, Carboxylic acids derivatives: <u>Nucleophilic acyl substitution</u> Nucleophilic acyl substitution in the context of metabolism (continued)</i>				
9-10	<i>Lecture 6: Enols and enolates: <u>Reaction at the α Carbon of carbonyl compounds</u></i>	2,3	Quiz5, HW5	Lecture, In Class-Quiz, HW	
11-12	<i>Lecture 7: Aldol condensation and Claisen condensation reactions. Biochemical aldol addition. Decarboxylation and fatty acid metabolism. Biochemical Claisen condensation reactions. Biotin-dependent carboxylation</i>	2,3	Quiz6, HW6	Lecture, In Class-Quiz, HW	
13-14	<i>Lecture 8: Amine: Synthesis and reactions</i>	1,2,3	Quiz7, HW7	Lecture, In Class-Quiz, HW	
15	<i>Final exam Review</i>	2,3	Quiz8	Review-Test	
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (20%)	70% Pass	60% Pass	
Homework exercises (10%)	70% Pass	70% Pass	90% Pass
Midterm exam (30%)	70% Pass	60% Pass	
Final exam (40%)	60% Pass	50% Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Mechanism	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Date revised: 08/2025

7. Course coordinator/Lecturer

- School/Department: Dr. Lê Quang Phong- Department of Applied Chemistry
- Email: lqphong@hcmiu.edu.vn

Hochiminh city, 21/ 8/2025

**DEAN OF SCHOOL OF CHEMICAL AND
ENVIRONMENTAL ENGINEERING**



Assoc. Prof., Dr. Huynh Kim Lam



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic Chemistry Laboratory

(Thực hành Hóa Hữu Cơ)

Course Code: CHE1092IU

1. General information

Course designation	The course will provide students with laboratory skills used in classical and instrumental chemical analysis techniques. Students will also learn how to analyze data, perform statistical analysis, and interpret results.																																								
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5																																								
	☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Self-Study hours</td><td style="text-align: center;">60</td><td style="text-align: center;">0</td><td style="text-align: center;">60</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr> <td>Total workload</td><td style="text-align: center;">110</td><td style="text-align: center;">0</td><td style="text-align: center;">110</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>						Self-Study hours	60	0	60	0	0	0	Total workload	110	0	110	0	0	0																					
Self-Study hours	60	0	60	0	0	0																																			
Total workload	110	0	110	0	0	0																																			

Credit points	2		
Requirements for taking the course	☐ None ☐ Prerequisite course: ☒ Parallel course: Organic Chemistry 2 CHE1091IU Previous course:		
Course objectives	The organic chemistry laboratory course introduces the student to fundamental techniques and procedures in extraction, purification, synthesis and characterization of organic compounds and simple reactions used in the organic chemistry laboratory. In addition, the student will be trained in the proper way to write a scientific laboratory report.		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Illustrate the organic chemistry experiments procedure through a basic understanding of starting materials, functional groups, mechanism, and typical reaction conditions.	
	Skill	CLO2. Develop laboratory skills in handling chemical, assembling glassware and performing the following techniques as a part of synthetic procedures: distillation, reflux, separation, isolation, and crystallization. CLO3. Work in groups to prepare the pre-lab, writing the report and complete the tasks for organic chemistry experiments.	
	Attitude	CLO4. Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately, using general guidelines and basic knowledge about the common hazards associated with them in an organic chemistry laboratory.	
Content	Laboratory safety	1	I, T, U

	Simple distillation of a single solution	1	I, T, U
	Distillation of a mixture of two liquids	1	I, T, U
	Recrystallization	1	I, T, U

	Extraction	1	I, T, U
	Melting point	1	I, T, U
	Synthesis of aspirin	1	I, T, U
	Nucleophilic substitution reaction of alkyl halides	1	I, T, U
	Oxidation of benzaldehyde-Green chemistry	2	I, T, U
	Qualitative organic analysis	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments		
Other requirements	<u>Attendance:</u> An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list	I. Textbooks [1] Daniel Harris, Quantitative chemical analysis (experiments). W. H. Freeman and Company, New York, 8th Edition. [2] Organic chemistry laboratory manual- Department of Applied Chemistry II. References		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2					3		
	3			3	3			
Attitudes (Level: 1-5)	4	3						
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3,0	0,0	3,0	3,0	3,0	0,0	0,0
L,M,H conversion*		M		M	M	M		

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation, Lab safety	2		- Lecture - Class discussion	
2.	2	Simple distillation of a single solution	1,2,4	Quiz, Report	- Lecture - Laboratory	
3.	3	Distillation of a mixture of two liquids	1,2,4	Quiz, Report	- Lecture - Laboratory	
4.	4	Recrystallization	1,2,4	Quiz, Report	- Lecture - Laboratory	
5.	5	Extraction	1,2,4	Quiz, Report	- Lecture - Laboratory	
6.	6	Melting point	1,2,4	Quiz, Report	- Lecture - Laboratory	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	7-8	Midterm Synthesis of aspirin	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
8.	9	Nucleophilic substitution reaction of alkyl halides	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
9.	10-11	Oxidation of benzaldehyde-Green chemistry	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
10.	12	Qualitative organic analysis	1,2,5	Quiz, Report	- Lecture - Laboratory	
11.		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (20%), Report (50%)	70%Pass	70%Pass	70% Pass	70% Pass
Final exam (30%)	80 % Pass	70 % Pass	80 % Pass	50% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Revision Date: August 12th, 2025

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Analytical Chemistry 1

Course Code: CHE1051IU

1. General information

Course name	- <i>(in English)</i> Analytical Chemistry 1 - <i>(in Vietnamese)</i> Hóa phân tích 1
Course designation	This course covers the basic principles of chemical analysis with the focus on traditional techniques.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Assoc. Prof. Nguyen Thao Trang, nttrang@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)		Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0
	Self-Study hours	90	90	0	0	0
	Total workload	127.5	127.5	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS					
Number of periods	Theory: 45 Practice: 0					
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: CH011IU Chemistry for Engineers					
Course objectives	The students will be provided with the ranges and uses of classical analytical methods in qualitative and quantitative analysis and also with statistical methods in assessment of analytical measurement data quality and interpretation of their significance, validation of analytical methods and results. Students will develop skills in analysis tasks, critical thinking and problem-solving skills.					
Course learning outcomes	Upon the successful completion of this course, students will be able to:					
	Competency level	Course learning outcome (CLO)				
	Knowledge	CLO1. Be able to demonstrate knowledge the ranges and uses of classical analytical techniques in between qualitative and quantitative analysis. CLO2. Be able to apply statistical methods in analysis of measurement data and evaluate their significance, validation of analytical methods and results.				
	Skill	CLO3. Be able to communicate effectively in Vietnamese and English.				
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)					
	No.	Topic			Weight	Level
	1	Introduction to analytical chemistry			1	I, T

	2	Statistics in analytical chemistry	3	I, T, U
	3	Acid-base equilibria, pH, buffer	2	I, T, U
	4	Gravimetric techniques of analysis	1	I, T, U
	5	Titrimetric techniques of analysis	4	I, T, U
	6	Introduction to electrochemistry	1	I, T
	7	Redox titration	1	I, T, U
	8	Potentiometry and Voltammetry	2	I, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Douglas A. Skoog, Donald M. West and F. James Holler, Fundamentals of analytical chemistry, Saunders College Publishing, 6th Edition. [2] Daniel Harris, Quantitative chemical analysis. W. H. Freeman and Company, New York, 8th Edition. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion*		M		M				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to analytical chemistry Basic tools of analytical chemistry	1, 2, 3	Homework	- Lecture - Class discussion	
2.	2,3,4	Statistics in analytical chemistry: Errors in chemical analysis, Statistical treatment of errors, Sampling	1, 2, 3	Homework 1	- Lecture - Class discussion	
3.	5,6	Acid-base equilibria, pH, buffer	1, 2, 3	Homework 2	- Lecture - Class discussion	
4.	7	Gravimetric techniques of analysis	1,2,3	Homework 2	- Lecture - Class discussion	
5.	8	Review Midterm exam		In-class assignment	- Class discussion	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	9-10	Acid-base titration Complex acid-base titration	1,2,3	Homework 3	- Lecture - Class discussion	
7.	11	Complexometric titration and precipitate titration	1,2,3	Homework 4	- Lecture - Class discussion	
8.	12	Introduction to Electrochemistry	1,2,3	Homework 4	- Lecture - Class discussion	
9.	13	Redox titration	1,2,3	Homework 4	- Lecture - Class discussion	
10.	14	Potentiometry and Voltammetry Review	1,2,3	In-class assignment	- Lecture - Class discussion	
11.	15	Final				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Homework, In-class Assignment (30%)	Homework 1,2,3, 4; In class assignment 50%Pass	Homework 1, 2, 3, 4; In-class assignment 50%Pass	Homework 1, 2, 3, 4; In-class assignment 50%Pass
Midterm exam (20%)	Q1, Q2 50%Pass	Q3, Q4 50%Pass	
Final exam (50%)	Q1, Q2 50 % Pass	Q3, Q4 50 % Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Rubric for assessment of calculation and theory/suggestion questions in assignments, and exam

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. **Revision Date:** August 19, 2025

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Analytical Chemistry 2

Course Code: CHE1061IU

1. General information

Course name	- <i>(in English)</i> Analytical Chemistry 2 - <i>(in Vietnamese)</i> Hóa phân tích 2
Course designation	This course covers the basic principles of chemical analysis with the focus on modern techniques.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Assoc.Prof. Nguyen Thao Trang, nttrang@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)		Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	3	3			
	<i>ECTS</i>	4.64				
	Contact hours	37.5	37.5	0	0	0
	Self-Study hours	90.0	90.0	0	0	0
	Total workload	127.5	127.5	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS					
Number of periods	Theory: 45 Practice: 0					
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Corequisites: Analytical Chemistry Laboratory CHE1062IU ☒ Previous course: Analytical Chemistry 1 CHE1051IU					
Course objectives	The students will be provided with the ranges and uses of modern analytical methods in qualitative and quantitative analysis. Techniques used in separation of sample will also be introduced. Students will develop skills in analysis tasks, critical thinking, and problem-solving skills. Student will understand the professional and safety responsibilities residing in working on chemical analysis.					
Course learning outcomes	Upon the successful completion of this course, students will be able to:					
	Competency level¹	Course learning outcome (CLO)				
	Knowledge	CLO1. Demonstrate knowledge in the ranges and uses of modern analytical techniques in qualitative and quantitative analysis.				

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		Be able to apply the principles of the modern analytical techniques in qualitative and quantitative analysis.																																				
	Skill	CLO3. Be able to communicate effectively in Vietnamese and English.																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Measurement principles and electronics</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Principles of spectroscopic analysis</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Molecular absorption spectroscopy</td><td>3</td><td>I, T, U</td></tr><tr><td>4</td><td>Raman scattering spectroscopy</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Molecular emission spectroscopy</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Atomic absorption spectroscopy</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Chromatography</td><td>4</td><td>I, T, U</td></tr><tr><td>8</td><td>Miscellaneous techniques of analysis</td><td>3</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Measurement principles and electronics	1	I, T	2	Principles of spectroscopic analysis	1	I, T	3	Molecular absorption spectroscopy	3	I, T, U	4	Raman scattering spectroscopy	1	I, T	5	Molecular emission spectroscopy	1	I, T	6	Atomic absorption spectroscopy	1	I, T	7	Chromatography	4	I, T, U	8	Miscellaneous techniques of analysis	3	I, T
No.	Topic	Weight	Level																																			
1	Measurement principles and electronics	1	I, T																																			
2	Principles of spectroscopic analysis	1	I, T																																			
3	Molecular absorption spectroscopy	3	I, T, U																																			
4	Raman scattering spectroscopy	1	I, T																																			
5	Molecular emission spectroscopy	1	I, T																																			
6	Atomic absorption spectroscopy	1	I, T																																			
7	Chromatography	4	I, T, U																																			
8	Miscellaneous techniques of analysis	3	I, T																																			
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments																																					
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																					
Reading list	I. Textbooks [1] Douglas A. Skoog, Donald M. West and F. James Holler, Principles of Instrumental Analysis, Saunders College Publishing, 6th Edition. [2] Daniel Harris, Quantitative chemical analysis. W. H. Freeman and Company, New York, 8th Edition.																																					

	II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2			3				
Attitudes (Level: 1-5)	3							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion*		M		M				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Principles of measurement and electronics	1, 2	Homework 1	- Lecture - Class discussion	
2.	2	Principles of spectroscopic techniques	1, 2	Homework 1 In-class assignment	- Lecture - Class discussion	
3.	3	Absorption of UV-Vis radiation	1, 2	Homework 1 In-class assignment	- Lecture - Class discussion	
4.	4	Absorption of Infrared radiation	1,2	Homework 1 In-class assignment	- Lecture - Class discussion	
5.	5	Fourier Transform Infrared spectroscopy	1,2	Homework 2	- Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
				In-class assignment	- Class discussion	
6.	6	Raman Scattering Spectroscopy	1,2	Homework 2 In-class assignment	- Lecture - Class discussion	
7.	7	Fluorescence Spectroscopy	1,2	Homework 2 In-class assignment	- Lecture - Class discussion	
8.	8	Review Midterm exam	1,2	In-class assignment	- Class discussion	
9.	9	Atomic Absorption Spectroscopy	1,2	Homework 3 In-class assignment	- Lecture - Class discussion	
10.	10	Introduction to chromatography	1,2	Homework 3 In-class assignment	- Lecture - Class discussion	
11.	11	Gas chromatography	1,2	Homework 3 In-class assignment	- Lecture - Class discussion	
12.	12	Liquid chromatography	1,2	Homework 4 In-class assignment	- Lecture - Class discussion	
13.	13	Mass spectrometry and other Miscellaneous techniques	1,2	Homework 4 In-class assignment	- Lecture - Class discussion	
14.	14	Review			- Class discussion	
15.	15	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2
Homework, In-class assignment (30%)	Homework 1,2,3, 4 50%Pass	Homework 1, 2, 3, 4 50%Pass
Midterm exam (20%)	Q1, Q2 50%Pass	Q3, Q4 50%Pass
Final exam (50%)	Q1, Q2 50 % Pass	Q3, Q4 50 % Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Rubric for assessment of calculation and theory/suggestion questions in assignments, and exam

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Revision Date: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Analytical Chemistry Laboratory

Course Code: CHE1062IU

1. General information

Course name	- <i>(in English)</i> Analytical Chemistry Laboratory - <i>(in Vietnamese)</i> Thực hành hóa phân tích
Course designation	The course will provide students with laboratory skills used in classical and instrumental chemical analysis techniques. Students will also learn how to analyze data, perform statistical analysis, and interpret results.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	Credit	2		2			
	ECTS	4.00					
	Contact hours	50	0	50	0	0	0
	Self-Study hours	60	0	60	0	0	0
	Total workload	110	0	110	0	0	0
Credit points	2 credits (Theory: 0 + Practice: 2) 4.00 ECTS						
Number of periods	Theory: 0 Practice: 60						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: (Please specify course ID & course title, if any) ☒ Corequisites: Analytical Chemistry 2 CHE1061IU ☐ Previous course:						
Course objectives	The students will be familiar with classical and instrumental techniques in chemical analysis. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Demonstrate knowledge in the principles of the classical and instrumental techniques in chemical analysis.					
	Skill	CLO2. Conduct appropriate experiments, analyze and interpret data, and use critical judgment to draw conclusions. CLO3. Be able to communicate effectively in Vietnamese and English. CLO4. Be able to work effectively on a team.					
	Attitude	CLO5. Identify and follow the professional and safety regulation residing in working on chemical analysis.					
Content	The description of the contents should clearly indicate the weighting of the content and the level.						
	Weight: Lab lecture session (4.2 hours)						
	Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Orientation				1	I, T, U
	2	Calibration of Volumetric Glassware. Statistics				1	I, T, U
	3	Acid-base titration: monoacid-base titration.				1	I, T, U
4	Buffer preparation. Buffer capacity				1	I, T, U	
5	EDTA titration				1	I, T, U	

	6	Redox titration	1	I, T, U
	7	Precipitation titration	1	I, T, U
	8	Complex acid-base titration	1	I, T, U
	9-10	Spectrophotometric analysis	2	I, T, U
	11	Chromatography	1	I, T, U
	11	Review	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Daniel Harris, Quantitative chemical analysis (experiments). W. H. Freeman and Company, New York, 8th Edition. II. References 			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2					3		
	3			3				
	4				3			
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	3.0	3.0	0.0	4.0

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation. Introduction with common apparatus and glassware.	1-5		- Lecture - Class discussion	
2.	2	Calibration of volumetric glassware. Practice with statistics.	1-5	Quiz, Report	- Lecture - Laboratory	
3.	3	Preparation of standard solution. Standardization of NaOH.	1-5	Quiz, Report	- Lecture - Laboratory	
4.	4	Titration of acetic acid with standardized NaOH.	1-5	Quiz, Report	- Lecture - Laboratory	
5.	5	Titration of phosphoric acid in soft drink. Buffer preparation. Buffer capacity evaluation.	1-5	Quiz, Report	- Lecture - Laboratory	
6.	6	EDTA titration of Ca^{2+} and Mg^{2+} in natural waters.	1-5	Quiz, Report	- Lecture - Laboratory	
7.	7	Iodometric titration of Vitamin C.	1-5	Quiz, Report	- Lecture - Laboratory	
8.	8	Precipitation titration of chloride ion by Morh's method.	1-5	Quiz, Report	- Lecture - Laboratory	
9.	9	Spectrophotometric quantification of iron.	1-5	Quiz, Report	- Lecture - Laboratory	
10.	10	Spectrophotometric analysis of a mixture with overlapping absorption spectra.	1-5	Quiz, Report	- Lecture - Laboratory	
11.	11	Separation of pigments with Thin Layer Chromatography.	1-5	Quiz, Report	- Lecture - Laboratory	
12.	12	Review				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Quiz (20%), Report (50%)	Quiz Report 50%Pass	Quiz Report 50%Pass	Quiz Report 50%Pass	Report 50%Pass	Report 50%Pass
Final exam (30%)	Quiz Q1, Q2 50 % Pass	Quiz Q1, Q2 50 % Pass	Quiz 50 % Pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Rubric for laboratory report

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
I. Lab activity							
1. Attendance	10	Participate on time					Be late ≥ 15 min
2. Prepare for contents and plans of lab works	10	Prepare well, answer correct all questions					Not prepare well, could not answer correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive
4. Experimental skills (measure, operate, manage)	20	Correct in procedures for measuring, operating and management					Incorrect in procedures for measuring, operating and management
5. Time and resources management	5	Distribute appropriately time and resource to complete well experiments					Distribute inappropriately time and resource to incomplete more than 50% of experiments
II. Report							
6. Writing skill and format	5	Clear, no spellings and grammar mistakes					Not logical, too much spelling and grammar mistakes, not understandable
7. Introduction, method	10	Sufficient, concise, accurate					Incomplete contents $\geq 50\%$, not clear, inaccurate
8. Experimental Results	20	Achieve accurate results					Incomplete results $\geq 50\%$;
9. Data analysis	5	Logical, sufficient data analysis					No data analysis; Wrong in data analysis
10. Conclusion/ suggestion	5	concise, valuable					not valuable
11. Images and support information	5	Accurate, abundant,					Too little or no images or

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
		clear and beautiful					supporting information; unclear, inaccurate
Total	100						

5.2 Rubric for prelab and exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. **Revision Date:** August 19, 2025

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Hochiminh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Physical Chemistry 1

Course Code: CHE1031IU

1. General information

Course name	<i>- (in English)</i> Physical Chemistry 1 <i>- (in Vietnamese)</i> Hóa lý 1				
Course designation	The course is designed for chemical engineering students and others. The course provides the students with the necessary background in chemical engineering thermodynamics which includes thermodynamics, chemical equilibrium, and phase equilibrium. The knowledge in this course will be further elaborated on in the other fundamental courses as well as specialized courses in the chemical engineering program. The course includes two sections: • Thermodynamics: (i) Concepts and properties of pure substances (ii) the first law of thermodynamics, (iii) the second law of thermodynamics (iv) Thermodynamic cycles and (v) Application of thermodynamic laws in chemical reaction systems. • Chemical and phase equilibrium: (vi) Chemical equilibrium, (vii) Theory of phase equilibrium and phase equilibrium of single component systems (viii) Liquid – vapor and liquid – liquid equilibrium (ix) Liquid – solid equilibrium				
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☒ Year 2	☐ Year 3	☐ Year 4	☐ Year 5
	☐ Semester 1	☒ Semester 2	☐ Summer		

Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn																																									
Language	English																																									
Relation to curriculum	☒ Compulsory ☐ Elective																																									
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
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Contact hours	37.5	37.5	0	0	0	0																																				
Self-Study hours	90	90	0	0	0	0																																				
Total workload	127.5	127.5	0	0	0	0																																				
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																									
Number of periods	Theory: 45 Practice: 0																																									
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: CH011IU Chemistry for Engineers; PH013IU Physics 1; MA003IU Calculus 2																																									
Course objectives	Students know how to apply: fundamental knowledge of mathematics to thermochemistry, thermodynamic laws to industrial processes. Students know how to demonstrate all basic thermodynamic processes. Students know how to calculate: all fundamental thermodynamic variables of cycles, the constant and composition of reaction at equilibrium, all variables related to the equilibrium of phase transfer. Students know how to obtain thermodynamic properties from experiments																																									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1. When given a complex thermodynamic problem, able to identify, formulate and solve problems by applying various</td></tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. When given a complex thermodynamic problem, able to identify, formulate and solve problems by applying various																															
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Knowledge	CLO1. When given a complex thermodynamic problem, able to identify, formulate and solve problems by applying various																																									

		fundamentals thermodynamic laws. Able to understand and/or demonstrate basic thermodynamic cycles on P-V and T-S diagrams, calculate thermodynamic parameters of said cycles and determine the equilibrium parameters of chemical reaction systems. [Apply] (PLO 1&2)																												
	Skill	CLO2. Able to determine individually and/or in groups thermodynamic parameters in non-ideal mixtures via experimental data and case studies [Guided Response] (PLO 3)																												
	Attitude																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Concepts and behavior of gases</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance</td><td>3</td><td>T,U</td></tr><tr><td>3</td><td>Second and third law of thermodynamics</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions</td><td>3</td><td>T,U</td></tr><tr><td>5</td><td>Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Applications of thermodynamic laws Excess properties Henry’s constant</td><td>3</td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Concepts and behavior of gases	1	I,T,U	2	First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance	3	T,U	3	Second and third law of thermodynamics	3	T,U	4	Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions	3	T,U	5	Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state	2	T,U	6	Applications of thermodynamic laws Excess properties Henry’s constant	3	T,U
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	Activity coefficient and fugacity Henry's constant Setchenow's coefficient Obtaining thermodynamics parameters experimentally			
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Cengel, Yunus A., Michael A. Boles, and Mehmet Kanoglu. Thermodynamics: an engineering approach, McGraw-Hill, 2011. [2] Ira N. Levine, Physical chemistry 6th Ed., McGraw - Hill			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3	3					
Skills (Level: 1-7)	2			3				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion*		M	M	M				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Concepts and behavior of gases Zeroth law of thermodynamics	1,2	Quiz	Lecture, Discussion, Inclass-Quiz	[1],[2]
2.	2-4	First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance	1,2	Quiz	Lecture, Inclass-Quiz	[1],[2]
3.	5-7	Second law of thermodynamics Third law of thermodynamics	1,2	Quiz	Lecture, Inclass-Quiz	[1],[2]
4.	8	Midterm				
5.	9-11	Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions	3,4	Presentation, Quiz	Lecture, Group work, Presentation	[1],[2]
6.	12-13	Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state	3,4	Presentation, Quiz	Lecture, Group work, Presentation	[1],[2]
7.	14-15	Applications of thermodynamic laws Excess properties	3,4	Presentation, Quiz	Lecture, Group work, Presentation	[1],[2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Henry's constant Activity coefficient and fugacity Henry's constant Setchenow's coefficient Obtaining thermodynamics parameters experimentally				
8.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2
Quiz (15%)	50% pass	
Presentation (15%)		50% pass
Midterm Exam (20%)	50% pass	
Final Exam (50%)	50% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.

0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	Capstone	Milestone		Benchmark
	4	3	2	1
	presenter's credibility/ authority on the topic.	credibility/ authority on the topic.	credibility/ authority on the topic.	
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

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For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Planned learning activities	Removed design problems as assessment	16/1/2024	Dr. Doan Hoai Linh
2	Assessment plan	Changed the percentage of quiz and presentation to 15% each Final exam does not cover CLO3 and CLO4	16/1/2024	Dr. Doan Hoai Linh
3	Examination forms	Remove presentation	16/2/2024	Dr. Doan Hoai Linh
4	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
5	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
6	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
7	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
8	Assessment Plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Physical Chemistry 2

Course Code: CHE1043IU

1. General information

Course name	- (in English) Physical Chemistry 2 - (in Vietnamese) Hóa lý 2				
Course designation	The course is designed for chemical engineering students, providing them with the necessary background in chemical kinetics, electrochemistry, surface phenomena, and catalysis. Also, after 10 weeks of lectures in class, the 5-week part of the experiment related to all the contents of physical chemistry will be organized at the remaining time				
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☒ Year 3	☐ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2	☐ Summer	
Person responsible for the course	Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
	☒ Lecture	☐ Lesson	☐ Project	☐ Seminar	

Teaching methods	Others, please specify:																																										
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>			Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
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Self-Study hours	60	60	0	0	0	0																																					
Total workload	85	85	0	0	0	0																																					
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																										
Number of periods	Theory: 30 Practice: 0																																										
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisite course: ☐ Parallel course: ☒ Previous course: Physical Chemistry 1 (CHE103IU)																																										
Course objectives	Students will develop the ability to apply thermodynamic and molecular principles to understand solutions, phase equilibria, and reaction equilibria in both ideal and non-ideal systems. Students will explore electrochemical, colloidal/surface phenomena, and chemical kinetics in complex reactions by working with experimental data. Students will also strengthen their skills in communicating scientific analysis through clear and effective written homework.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Apply thermodynamic and molecular principles to explain behavior of solutions, multicomponent phase equilibria, and reaction equilibria, both ideal and non-ideal, systems, through mathematical and computational methods [3_<i>Apply</i>] CLO2. Apply electrochemical systems and colloidal/surface phenomena by interpreting data, identifying key variables, and linking them to theoretical models to solve chemical engineering problems [3_<i>Apply</i>] </td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Apply thermodynamic and molecular principles to explain behavior of solutions, multicomponent phase equilibria, and reaction equilibria, both ideal and non-ideal, systems, through mathematical and computational methods [3_<i>Apply</i>] CLO2. Apply electrochemical systems and colloidal/surface phenomena by interpreting data, identifying key variables, and linking them to theoretical models to solve chemical engineering problems [3_<i>Apply</i>]																																						
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		CLO3. Apply experimental-based approaches to investigate chemical kinetics and integrate knowledge from multiple disciplines. [3_Apply]					
	Skill	CLO4. Respond to the technical findings, analytical results, and proposed solutions in written homework [3-Guided response]					
	Attitude						
Level of competence according to Bloom’s Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	The description of the contents should clearly indicate the weighting of the content and the level.						
	Weight: lecture session (2.5 hours)						
	Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Solution, ideal and nonideal solution				2	I, T
	2	Reaction equilibrium in a nonideal system				1	T, U
	3	Multicomponent phase equilibrium				2	T, U
	4	Electrochemical systems				2	T,U
	5	Chemical kinetics of complex reactions				1	T, U
6	Colloidal Chemistry and Surface Phenomena				2	T,U	
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:						
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.						

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Ira N. Levine, Physical chemistry, McGraw – Hill, 2008. [2] Prof. Dr. G. Ertl, Prof. Dr. H. Knözinger, Prof. Dr. J. Weitkamp, Handbook of Heterogeneous Catalysis, Wiley-VCH, 2008. [3] Christopher M. A. Brett, Ana Maria Oliveira Brett, Electrochemistry: Principles, Methods, And Applications, Oxford University Press, 1993. [4] Margaret Robson Wright, An Introduction to Chemical Kinetics, Wiley-VCH, 2004.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge	1	3						
	2	3						
	3	3						
Skill	4			3				
Attitudes								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion		M		M				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1,2	Solution, ideal and nonideal solution	1,4	IA1, HW01	Lecture	[1-4]
2.	3	Reaction equilibrium in a nonideal system	1,4	IA2		[1-4]
3.	4	Multicomponent phase equilibrium	1,4	IA3, HW2	Lecture	[1-4]
4.	5,6	Electrochemical systems	2,4	IA4,	Lecture	[1-4]
5.	7	Chemical kinetics	3,4	IA5, HW3	Lecture	[1-4]
6.	8	Review and midterm exam	1	ME		

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	9,10	Colloidal Chemistry and Surface Phenomena	2,4	IA6, HW4	Lecture	[1-4]
8.	18	Final exam	2,3	FE		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class activities (IA) +Homework (HW) (30%)	>50% pass	>50% pass	>50% pass	>50% pass
Midterm exam (20%)	>50% pass	>50% pass	>50% pass	>50% pass
Final exam (50%)	>50% pass	>50% pass	>50% pass	>50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

6. Revision Date: 20/08/2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Ngo Thi Thuan
- Email: ntthuan@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

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For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Physical Chemistry 2 Laboratory

Course Code: CHE1044IU

1. General information

Course name	- <i>(in English)</i> Physical Chemistry 2 Laboratory - <i>(in Vietnamese)</i> Thực hành hóa lý 2
Course designation	This laboratory course provides students with hands-on experience in experimental methods of physical chemistry, including chemical analysis and the use of modern chemical instrumentation. Students will investigate the behavior of real chemical systems, explore the theoretical principles, and apply systematic approaches to the design, calibration, and operation of measurement systems. Emphasis is placed on connecting theory with practice, analyzing experimental data, and developing the skills needed to accurately detect, quantify, and interpret chemical phenomena.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn
Language	English

Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis		☒ Compulsory ☐ Elective																																											
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: laboratory																																													
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <th></th> <th></th> <th>Lecture</th> <th>Lab</th> <th>Project</th> <th>Internship</th> <th>Thesis</th> </tr> <tr> <td><i>Credit</i></td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td><i>ECTS</i></td> <td>2.00</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>0</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>30</td> <td>0</td> <td>30</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>55</td> <td>0</td> <td>55</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>						Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	1		1				<i>ECTS</i>	2.00						Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																								
<i>Credit</i>	1		1																																											
<i>ECTS</i>	2.00																																													
Contact hours	25	0	25	0	0	0																																								
Self-Study hours	30	0	30	0	0	0																																								
Total workload	55	0	55	0	0	0																																								
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS																																													
Number of periods	Theory: 0 Practice: 30																																													
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☒ Corequisites: CHE1043IU Physical Chemistry 2 ☐ Previous course:																																													
Course objectives	The course is designed for chemical engineering students. The laboratory course of physical chemistry 2 introduces the student to fundamental techniques and procedures in performing, observing, collecting, and processing data obtained from experiments, including chemical kinetics, surface phenomena, colligative properties, and ideal and non-ideal solutions. In addition, the student will be trained in the proper way to write a scientific laboratory report.																																													
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td>Knowledge</td> <td> CLO1. Apply the theoretical concepts underlying physical chemistry experiments and relate them to observed experimental results [3-Apply] CLO2. Apply knowledge of chemical laboratory safety to use appropriate personal protective equipment and implement </td> </tr> </table>				Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Apply the theoretical concepts underlying physical chemistry experiments and relate them to observed experimental results [3-Apply] CLO2. Apply knowledge of chemical laboratory safety to use appropriate personal protective equipment and implement																																						
Competency level ¹	Course learning outcome (CLO)																																													
Knowledge	CLO1. Apply the theoretical concepts underlying physical chemistry experiments and relate them to observed experimental results [3-Apply] CLO2. Apply knowledge of chemical laboratory safety to use appropriate personal protective equipment and implement																																													

		proper waste disposal methods for different types of chemicals [3-Apply]
	Skill	CLO3. Reproduce the experimental objectives, procedures, results, and conclusions effectively in English through written reports, while collaborating responsibly within a laboratory team [3-Guided response] CLO4. Perform effectively in a laboratory team by contributing to planning, assigning tasks, performing experiments, and compiling results inclusively and responsibly [3-Guided response] CLO5. Follow computational tools and data analysis methods to process, analyze, and interpret experimental results, using engineering judgment to draw valid conclusions. [3-Guided response]
	Attitude	

Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lab session (4.2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

No.	Topic	Weight	Level
1	Lab orientation	1	T
2	Experiment 1: Rate law determination of crystal violet hydroxylation	1	T
3	Experiment 2: pH paradoxes	1	T
4	Experiment 3: Using freezing point depression to find molecular weight	1	T
5	Experiment 4: Solubility and miscibility	1	T

	6	Experiment 5: Determination of the adsorption isotherm of methylene blue on activated carbon	1	T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks Lab manual for physical chemistry 2 (internal use only) II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge	1	3						
	2		3					
Skill	3			3				
	4				3			
	5					3		
Attitudes								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	0.0	0.0
L,M,H conversion		M	M	M	M	M		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities
1.	1	Lab orientation	1,2,3,4	Quiz	Teaching and learning

No.	Week	Topic	CLO	Assessments	Learning activities
2.	2	Experiment 1: Rate law determination of crystal violet hydroxylation	1,2,3,4,5	Prelab, report	Experiment and observation
3.	3	Experiment 2: pH paradoxes	1,2,3,4,5	Prelab, report	Experiment and observation
4.	4	Experiment 3: Using freezing point depression to find molecular weight	1,2,3,4,5	Prelab, report	Experiment and observation
5.	5	Experiment 4: Solubility and miscibility	1,2,3,4,5	Prelab, report	Experiment and observation
6.	6	Experiment 5: Determination of the adsorption isotherm of methylene blue on activated carbon	1,2,3,4,5	Prelab, report	Experiment and observation

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Prelab and Quiz (20%)	>50% pass	>50% pass	>50% pass	>50% pass	>50% pass
Lab report (50%)	>50% pass	>50% pass	>50% pass	>50% pass	>50% pass
Final evaluation (30%)	>50% pass	>50% pass	>50% pass	>50% pass	>50% pass

Note: %Pass: Target that % of students have scores greater than 50 out of 100.

5. Rubrics:

6. **Revision Date:** 20/08/2025

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Ngo Thi Thuan
- Email: ntthuan@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Biochemistry

Course Code: CHE1104IU

1. General information

Course name	- <i>(in English)</i> Biochemistry - <i>(in Vietnamese)</i> Hóa sinh						
Course designation	The course will cover fundamental concepts in biochemistry and an introduction to metabolisms occurring in living organisms in order to understand the molecular basic of life. The course topics will include enzyme kinetics and mechanisms and metabolisms of important biological molecules such as carbohydrates, fatty acids, amino acids with an emphasis on their degradation pathways.						
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person responsible for the course	Assoc. Prof. Nguyen Thao Trang, nttrang@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☒ Compulsory ☐ Elective						
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
Contact hours	37.5	37.5	0	0	0	0	
Self-Study hours	90	90	0	0	0	0	
Total workload	127.5	127.5	0	0	0	0	
Credit points	3 credits (Theory: 3 + Practice: 0)						

	4.64 ECTS																																								
Number of periods	Theory: 45 Practice: 0																																								
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: Analytical Chemistry 2 CHE1061IU; Analytical Chemistry Laboratory CHE1062IU; Organic Chemistry 2 CHE91IU																																								
Course objectives	The students will be provided fundamental concepts in biochemistry and metabolic pathways occurring in living organisms in order to understand the molecular basics of life. Students will develop skills to communicate effectively scientific knowledge.																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Demonstrate knowledge in enzyme kinetics and strategies in enzyme catalyzed reactions; metabolic pathways of important biological molecules including carbohydrates, fatty acids and amino acids.</td></tr><tr><td>Skill</td><td>CLO2. Be able to communicate effectively in Vietnamese and English.</td></tr></table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate knowledge in enzyme kinetics and strategies in enzyme catalyzed reactions; metabolic pathways of important biological molecules including carbohydrates, fatty acids and amino acids.	Skill	CLO2. Be able to communicate effectively in Vietnamese and English.																																		
Competency level	Course learning outcome (CLO)																																								
Knowledge	CLO1. Demonstrate knowledge in enzyme kinetics and strategies in enzyme catalyzed reactions; metabolic pathways of important biological molecules including carbohydrates, fatty acids and amino acids.																																								
Skill	CLO2. Be able to communicate effectively in Vietnamese and English.																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Enzymes: Basic Concepts and Kinetics</td><td>2</td><td>I, T, U</td></tr><tr><td>3</td><td>Metabolism: Basic Concepts and Design</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Carbohydrate Metabolism</td><td>4</td><td>I, T, U</td></tr><tr><td>5</td><td>The Citric Acid Cycle (CAC)</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Electron Transport Chain & Oxidative Phosphorylation</td><td>2</td><td>I, T</td></tr><tr><td>7</td><td>Photosynthesis - The Light Reaction & The Calvin Cycle</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Fatty Acid Metabolism</td><td>2</td><td>I, T</td></tr><tr><td>9</td><td>Amino Acid Catabolism</td><td>1</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.	1	I, T	2	Enzymes: Basic Concepts and Kinetics	2	I, T, U	3	Metabolism: Basic Concepts and Design	1	I, T	4	Carbohydrate Metabolism	4	I, T, U	5	The Citric Acid Cycle (CAC)	1	I, T	6	Electron Transport Chain & Oxidative Phosphorylation	2	I, T	7	Photosynthesis - The Light Reaction & The Calvin Cycle	1	I, T	8	Fatty Acid Metabolism	2	I, T	9	Amino Acid Catabolism	1	I, T
No.	Topic	Weight	Level																																						
1	Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.	1	I, T																																						
2	Enzymes: Basic Concepts and Kinetics	2	I, T, U																																						
3	Metabolism: Basic Concepts and Design	1	I, T																																						
4	Carbohydrate Metabolism	4	I, T, U																																						
5	The Citric Acid Cycle (CAC)	1	I, T																																						
6	Electron Transport Chain & Oxidative Phosphorylation	2	I, T																																						
7	Photosynthesis - The Light Reaction & The Calvin Cycle	1	I, T																																						
8	Fatty Acid Metabolism	2	I, T																																						
9	Amino Acid Catabolism	1	I, T																																						
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☒ Presentation (optional depending on class size) ☐ Others, please specify: ☒ Assignments																																								
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																																								
Reading list	I. Textbooks																																								

	[1] Jeremy M. Berg, John L. Tymoczko and Lubert Strayer, <i>Biochemistry</i> , 2010, 7 th edition.
	II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-2) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2			3				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	0.0	0.0
L,M,H conversion*		M		M				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.	1, 2	Quiz	- Lecture - Class discussion	
2.	2, 3	Enzymes: Basic Concepts and Kinetics	1, 2	Homework 1; Project	- Lecture - Class discussion	
3.	4	Metabolism: Basic Concepts & Design	1, 2	Quiz	- Lecture - Class discussion	
4.	5, 6	Carbohydrate Metabolism: Glycolysis-Gluconeogenesis	1, 2	Quiz; Project	- Lecture - Class discussion	
5.	7	The Citric Acid Cycle (CAC)	1, 2	Quiz	- Lecture - Class discussion	
6.	8	Electron Transport Chain	1, 2			

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Midterm exam				
7.	9	Electron Transport Chain (cont.) & Oxidative Phosphorylation	1, 2	Quiz	- Lecture - Class discussion	
8.	10, 11	Carbohydrate Metabolism: Pentose phosphate pathway (PPP)-Glycogen metabolism	1, 2	Quiz; Project	- Lecture - Class discussion	
9.	12	Photosynthesis - The Light Reaction & The Calvin Cycle	1, 2	Quiz		
10.	13-14	Fatty Acid Metabolism	1, 2	Homework 2	- Lecture - Class discussion	
11.	15	Amino Acid Catabolism Review	1, 2		- Lecture - Class discussion	

4. Assessment plan

Assessment Type	CLO1	CLO2
Assignment, Quiz, Project (written or presentation) (30%)	Quiz Homework 1,2 50%Pass	Quiz Homework 1, 2 50%Pass
Midterm exam (30%)	Quiz, Q1, Q2 50%Pass	Quiz Q3, Q4 50%Pass
Final exam (40%)	Quiz Q1, Q2 50 % Pass	Quiz Q3, Q4 50 % Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Rubric for presentation:

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
1. Selecting papers	20	Appropriate with the topic					Inappropriate with the topic, less relevant
2. Expanding the reading with various	10	Expanding for more than 2					No expandin

		Level					
Criteria	%	Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
related references for unclear issues from papers		related other papers					g the reading other references
3. Present about the contents of papers and answer the questions from instructor and classmates	60	Deeply understand about the contents of papers; all answers are correct					Little understanding about the paper contents; less than 50% answers are correct
4. Presentation skill	20	Well organize the slides; well illustrate the contents with figures/cartoons/tables; clear accent					Poorly organize the slides; poorly illustrate the contents with figures/cartoons/tables; read from slide

5.2 Rubric for assignment, exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Biochemistry Laboratory

Course Code: CHE1105IU

1. General information

Course name	- <i>(in English)</i> Biochemistry Laboratory - <i>(in Vietnamese)</i> Thực hành hóa sinh
Course designation	The course provides students with laboratory skills in the quantitative analysis of important macromolecules including proteins, carbohydrates, and metal ions as well.
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify: Laboratory														
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>		1											
Contact hours		25		25	0	0	0								
Self-Study hours		30		30	0	0	0								
Total workload		55		55	0	0	0								
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS														
Number of periods	Theory: 0 Practice: 30														
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☒ Corequisites: Biochemistry CHE1104IU ☐ Previous course:														
Course objectives	The students will be familiar with quantitative analysis of macromolecules such as proteins, carbohydrates, essential metal ions and investigation the activity of a certain type of enzymes. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1 Demonstrate knowledge in the principles of biochemical techniques in analysis of biological molecules.</td></tr> <tr> <td>Skill</td><td>CLO2. Perform appropriate experiments, analyze and interpret data, and use critical judgment to draw conclusions. CLO3. Be able to communicate effectively in Vietnamese and English. CLO4. Be able to work effectively on a team.</td></tr> <tr> <td>Attitude</td><td>CLO5. Appreciate safety knowledge in working in biochemistry laboratory</td></tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1 Demonstrate knowledge in the principles of biochemical techniques in analysis of biological molecules.	Skill	CLO2. Perform appropriate experiments, analyze and interpret data, and use critical judgment to draw conclusions. CLO3. Be able to communicate effectively in Vietnamese and English. CLO4. Be able to work effectively on a team.	Attitude	CLO5. Appreciate safety knowledge in working in biochemistry laboratory
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1 Demonstrate knowledge in the principles of biochemical techniques in analysis of biological molecules.														
Skill	CLO2. Perform appropriate experiments, analyze and interpret data, and use critical judgment to draw conclusions. CLO3. Be able to communicate effectively in Vietnamese and English. CLO4. Be able to work effectively on a team.														
Attitude	CLO5. Appreciate safety knowledge in working in biochemistry laboratory														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>														

	<u>Weight</u> : lecture session (2.5 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Orientation	1	I, T
	2	Determination of protein solution by Lowry method	1	I, T, U
	3	Investigation of the enzymatic activity of bromelain	1	I, T, U
	4	Determination of amino acid components by paper chromatography and electrophoresis	1	I, T, U
	5	Quantitative determination of soluble carbohydrates by spectrophotometer	1	I, T, U
	6	Quantitative determination of calcium	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance</u> : An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Biochemistry Laboratory Manual [2] Jeremy M. Berg, John L. Tymoczko and Lubert Strayer, <i>Biochemistry</i> , 2010, 7 th edition.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2					3		
	3			3				
	4				3			
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	3.0	3.0	0.0	4.0

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation	3-5		- Lecture	
2.	2	Determination of protein solution by Lowry method	1-5	Quiz, Report	- Lecture - Laboratory	
3.	3	Investigation of the enzymatic activity of bromelain	1-5	Quiz, Report	- Lecture - Laboratory	
4.	4	Determination of amino acid components by paper chromatography and electrophoresis	1-5	Quiz, Report	- Lecture - Laboratory	
5.	5	Quantitative determination of soluble carbohydrates by spectrophotometer	1-5	Quiz, Report	- Lecture - Laboratory	
6.	6	Quantitative determination of calcium	1-5	Quiz, Report	- Lecture - Laboratory	
7.		Exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Quiz (20%), Report (50%)	Quiz Report	Quiz Report	Quiz Report	Report 50%Pass	Report 50%Pass

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
	50%Pass	50%Pass	50%Pass		
Final exam (30%)	Quiz Q1, Q2 50 % Pass	Quiz Q1, Q2 50 % Pass	Quiz 50 % Pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Rubric for laboratory report

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
I. Lab activity							
1. Attendance	10	Participate on time					Be late ≥ 15 min
2. Prepare for contents and plans of lab works	10	Prepare well, answer correct all questions					Not prepare well, could not answer correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive
4. Experimental skills (measure, operate, manage)	20	Correct in procedures for measuring, operating and management					Incorrect in procedures for measuring, operating and management
5. Time and resources management	5	Distribute appropriately time and resource to complete well experiments					Distribute inappropriately time and resource to incomplete more than 50% of experiments
II. Report							
6. Writing skill and format	5	Clear, no spellings and grammar mistakes					Not logical, too much spelling and grammar mistakes, not

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
							understandable
7. Introduction, method	10	Sufficient, concise, accurate					Incomplete contents $\geq 50\%$, not clear, inaccurate
8. Experimental Results	20	Achieve accurate results					Incomplete results $\geq 50\%$;
9. Data analysis	5	Logical, sufficient data analysis					No data analysis; Wrong in data analysis
10. Conclusion/suggestion	5	concise, valuable					not valuable
11. Images and support information	5	Accurate, abundant, clear and beautiful					Too little or no images or supporting information; unclear, inaccurate
Total	100						

5.2 Rubric for prelab and exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering

A handwritten signature in blue ink, appearing to read 'lam', with a horizontal line underneath.

Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Process Instrumentation and Control

Course Code: CHE1021IU

1. General information

Course name	- (in English) Process Instrumentation and Control - (in Vietnamese) Đo lường và điều khiển quá trình				
Course designation	Process control has a number of significant advantages. The use of process control in a system enables the maximum profitability to be achieved. Other advantages are that automatic control results in increased plant flexibility, reduced maintenance, and in stable and safe operation of the plant. In this course, fundamental concepts of control theory as well as practical aspects of process control loops are explained. Theoretical modelling of chemical processes, a necessary step for designing process controller, is introduced with practice exercises. Process instruments that constitute industrial control loops are described. Measurement principles for sensors measuring temperature, pressure, liquid level, flowrate and composition are briefly described with guidance on how to select the proper types of sensors. Practical knowledge for designing and tuning of PID controllers, the most important and most popular type of process controllers, is also provided with illustrated examples.				
Course type	☐ General knowledge ☒ Fundamental knowledge ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☒ Year 3	☐ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	Dr. Nguyen Thanh Duy Quang, ntdquang@hcmut.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				

Teaching methods	Lecture						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	2	2				
	<i>ECTS</i>	3.09					
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS						
Number of periods	Theory: 30 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CH011IU Chemistry for Engineers						
Course objectives	• This course equips students with: - Description of process instruments that constitute industrial control loops and the corresponding measurement principles, and how to select the proper types of measurement sensors. - The fundamentals of control theory and practical aspects of process control system design - Development of dynamic modelling of chemical processes for process controller design. - Designing and tuning of PID controllers						
Course learning outcomes	Upon the successful completion of this course students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1: Select the proper type of measurement sensor for a specific application based on understanding of measurement principles and characteristics of the various types of industrial measurement sensors. CLO2: Develop dynamic process model and determine process control strategy for a process / process equipment.					
	Skill	CLO3: Perform the task of designing and tuning of PID controllers for a process / process equipment.					
	Attitude	CLO4: Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.					

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	1. Introduction to process instrumentation and control	1	I, T
	2. Theoretical modelling of chemical processes	1	I, T
	3. Laplace transform and transfer function	1	I, T
	4. Analysis of dynamic behavior of chemical processes	1	I, T
	5. Control system development. Designing process control system	1	I, T
	6. Feedback controller & PID controller	1	I, T
	7. Design and tuning of PID controller	1	I, T
	8. Empirical Model Identification. Illustration examples of PID controller design and tuning	2	T,U
	9. Instrumentation for Process Control.	1	T,U
Examination forms	Written examination		
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 70 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.		
Reading list	I. Textbooks [1]. D. Seborg, T. Edgar, D. Mellichamp, F. Doyle III. <i>Process Dynamics and Control</i> , 4th Ed, Wiley, 2017 [2]. Franklyn W. Kirk, Thomas A. Weedon, Philip Kirk. <i>Instrumentation</i> , 5th Ed, American Technical Publishers, Inc, 2010. [3]. Iva’n Dario Gil Chaves et al., <i>Process Analysis and Simulation in Chemical Engineering</i> , Springer International Publishing, Switzerland, 2016 II. References		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) and Program/Student Learning Outcomes (ILO) is shown in the following table:

	ILO						
CLO	1	2	3	4	5	6	7
1	3						

	ILO						
CLO	1	2	3	4	5	6	7
2		3					
3						3	
4			3				

**Use Bloom's Taxonomy*

3. Planned learning activities and teaching methods

Week	Topic	CLO	Learning activities	Assessments	Resources
1	1. Introduction to process instrumentation and control	1, 2	Lecture, Discussion,	Final exam	[1] [2]
2	2. Theoretical modelling of chemical processes	2	Lecture, Discussion, Class exercises	Midterm exam	[1]
3	3. Laplace transform and transfer function	2	Lecture, Discussion, HW	Midterm exam HW1	[1]
4	4. Analysis of dynamic behavior of chemical processes	2	Lecture, Discussion, HW	Midterm exam HW1	[1]
5	5. Control system development. Designing process control system	2	Lecture, Discussion, HW	Midterm exam Final exam	[1]
6	6. Feedback controller & PID controller	2,3	Lecture, Discussion, HW	Final exam HW2	[1]
7	7. Design and tuning of PID controller	3	Lecture, Discussion, HW	Final exam HW2	[1]
8	8. Empirical Model Identification. Illustration examples of	2, 3		Final exam HW2	

Week	Topic	CLO	Learning activities	Assessments	Resources
	PID controller design and tuning ❖ <u>Midterm exam</u>				
9	8. Empirical Model Identification. Illustration examples of PID controller design and tuning (continued)	2, 3	Lecture, Discussion, HW	Final exam HW2	[1]
10	9. Instrumentation for Process Control.	1	Lecture, Discussion, HW	Final exam	[1] [3]
---	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework exercises (30%)		HW1 80%Pass	HW2 80%Pass	
Midterm exam (20%)		Q1 80%Pass	Q2 80%Pass	
Final exam (50%)	Part II.1 80%Pass		Part II.2 80%Pass	Part II.3 80%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ntdquang@hcmut.edu.vn

Ho Chi Minh City, 21/8/2025
**Dean of School of Chemical and
Environmental Engineering**



Huỳnh Kim Lâm



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Industrial Chemistry

Course Code: CHE111IU

1. General information

Course name	- <i>(in English)</i> Industrial Chemistry - <i>(in Vietnamese)</i> Hóa học Công nghiệp
Course designation	This course will provide students with essential skills and knowledge involved in industrial chemistry. The covered topics include homogeneous and heterogeneous catalysis processes, inorganic chemical production processes, surfactants, paints and coatings, Processes in the Oil Refinery, olefins and polymer production processes, introduction to battery.
Course type	☐ General knowledge ☒ Fundamental ☐ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Phung Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2				
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: <i>CHE2011IU - Reaction Kinetics and Catalysis</i>						
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • The historical events for industrial chemistry • Basics of oil refinery and key petrochemical unit operations • Homogeneous and heterogeneous catalysis and inorganic chemical production processes. • Polymer production processes. • Basics of surfactants, paints and coatings, and battery						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to understand common commercial industrial chemical processes [Applying]. CLO2. Be able to apply knowledge in industrial chemistry to design chemical processes [Applying].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Skill CLO3. Communicate (in English) effectively with a range of audiences [Guided Response]. CLO4. Acquire and apply new knowledge as needed, using appropriate learning strategies [Guided Response].																																												
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Industrial Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Heterogeneous Catalysis – Concepts and Examples</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Processes in the Oil Refinery</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>The Solvay and Haber-Bosche processes</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Paints and Coatings</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Edible oils, Fats, Waxes, Soaps and Detergents</td><td>0.5</td><td>I, T</td></tr><tr><td>9</td><td>Introductions to Polymers</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Introduction to Battery</td><td>1</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to Industrial Chemistry	1	I, T	2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1	I, T	3	Heterogeneous Catalysis – Concepts and Examples	1	I, T	4	Processes in the Oil Refinery	1	I, T	5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1	I, T	6	The Solvay and Haber-Bosche processes	1	I, T	7	Paints and Coatings	1	I, T	8	Edible oils, Fats, Waxes, Soaps and Detergents	0.5	I, T	9	Introductions to Polymers	1	I, T	10	Introduction to Battery	1	I, T
No.	Topic	Weight	Level																																										
1	Introduction to Industrial Chemistry	1	I, T																																										
2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1	I, T																																										
3	Heterogeneous Catalysis – Concepts and Examples	1	I, T																																										
4	Processes in the Oil Refinery	1	I, T																																										
5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1	I, T																																										
6	The Solvay and Haber-Bosche processes	1	I, T																																										
7	Paints and Coatings	1	I, T																																										
8	Edible oils, Fats, Waxes, Soaps and Detergents	0.5	I, T																																										
9	Introductions to Polymers	1	I, T																																										
10	Introduction to Battery	1	I, T																																										
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																												
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.																																												
Reading list	I. Textbooks																																												

	[1] J.A. Moulijn, M. Makkee, A.E. van Piepen, <i>Chemical Process Technology</i>, Wiley-Interscience, 2nd Edition, 2013 [2] M.F. Ali, B.M. El Ali, J.G. Speight, <i>Hanbook of Industrial Chemistry (organic chemicals)</i>, McGraw-Hill, 2005 [3] Harold A. Wittcoff, Bryan G. Reuben, Jeffrey S. Plotkin, <i>Industrial Organic Chemicals</i>, Wiley-Interscience, 2nd Edition, 2004 II. References [1] M.A. Benvenuto, <i>Industrial Inorganic Chemistry</i>, De Gruyter, 2015 [2] A. Jess, P. Wasserscheid, <i>Chemical Technology: An Intergral Textbook</i>, Wiley-Interscience, 2013 [3] F. Cavani, G. Ceti, S. Perathoner, F. Trifiro, <i>Sustainable Industrial Processes</i>, Wiley-Interscience, 2009

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3			3				
	4						3	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	0.0	0.0	3.0	0.0
L,M,H conversion*		M	M	M			M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Industrial Chemistry	1,2,3,4		- Lecture - Class discussion	[1]. [2].
2.	2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1,2,3,4	Homework	- Lecture - Class discussion	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3	Heterogeneous Catalysis – Concepts and Examples	1,2,3,4	Quiz	- Lecture - Class discussion	[1].
4.	4	Processes in the Oil Refinery	1,2,3,4	Homework	- Lecture - Class discussion	[1].
5.	5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1,2,3,4	Quiz, Group work	- Lecture - Class discussion	[1].
6.	6	The Solvay and Haber-Bosche processes	1,2,3,4	Group work	- Lecture - Class discussion - presentation	
7.	7	Paints and Coatings	1,2,3,4	Homework	- Lecture - Class discussion	
8.	8	Edible oils, Fats, Waxes, Soaps and Detergents	1,2,3,4	Homework	- Lecture - Class discussion	
Midterm						
9.	9	Introductions to Polymers	1,2,3,4	Group work	- Lecture - Class discussion - presentation	
10.	10	Introduction to Battery	1,2,3,4	Group work	- Lecture - Class discussion - presentation	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework exercises (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Group presentation (20%)	Presentation 50%Pass	Presentation 50%Pass	Presentation 50%Pass	Presentation 50%Pass
Midterm exam (25%)	Q1 50%Pass	Q2 50%Pass		
Final exam (45%)	Part I 50%Pass	Part II.1 50%Pass		Part II.2 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		observable and is skillful and makes the content of the presentation cohesive.	clearly and consistently observable within the presentation.	intermittently observable within the presentation.	not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
		establishes the presenter's credibility/ authority on the topic.	the presentation or establishes the presenter's credibility/ authority on the topic.	analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Reaction Kinetics and Catalysis

Course Code: CHE2011IU

1. General information

Course name	- <i>(in English)</i> Reaction Kinetics and Catalysis - <i>(in Vietnamese)</i> Động học phản ứng và xúc tác
Course designation	This course provides students with the principal knowledge of homogeneous and heterogeneous catalysis. The course covers the definition of catalysis, adsorption-desorption, surface area, and porosity; Langmuir-Hinshelwood kinetics, kinetic modeling; characterization of catalysis; and reaction rate theory.
Course type	☐ General knowledge ☐ Fundamental ☒ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload			Lecture	Lab	Project	Internship	Thesis				
		<i>Credit</i>	3								
	Contact hours	37.5	37.5	0	0	0	0				
	Self-Study hours	90	90	0	0	0	0				
	Total workload	127.5	127.5	0	0	0	0				
Credit points	3 credits (Theory: 3 + Practice:0) 4.64 ECTS										
Number of periods	Theory: 45 Practice: 0										
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CHE2103IU - Inorganic chemistry										
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: - Principles of homogeneous and heterogeneous catalysts. - Methods used for characterization of catalysts. - Methods for preparation catalysts - Understand reaction rate and reaction kinetics. Industrial catalysts in catalysis processes, and modern catalysts										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Analyzing]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified</td></tr></table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Analyzing]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified
Competency level ¹	Course learning outcome (CLO)										
Knowledge	CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Analyzing]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified										

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Analyzing].																																				
	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction of catalysis: homogeneous and heterogeneous catalysis</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics</td><td>3</td><td>I, T</td></tr><tr><td>3</td><td>Catalyst Characterization</td><td>2</td><td>I, T</td></tr><tr><td>4</td><td>Solid catalysts</td><td>2</td><td>I, T</td></tr><tr><td>5</td><td>Catalysis in Practice: Synthesis Gas and Hydrogen</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Oil Refining and Petrochemistry</td><td>2</td><td>I, T</td></tr><tr><td>7</td><td>Environmental Catalysis</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Modern catalysts</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Introduction of catalysis: homogeneous and heterogeneous catalysis	1	I, T	2	Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics	3	I, T	3	Catalyst Characterization	2	I, T	4	Solid catalysts	2	I, T	5	Catalysis in Practice: Synthesis Gas and Hydrogen	1	I, T	6	Oil Refining and Petrochemistry	2	I, T	7	Environmental Catalysis	1	I, T	8	Modern catalysts	1	I, T
No.	Topic	Weight	Level																																			
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7	Environmental Catalysis	1	I, T																																			
8	Modern catalysts	1	I, T																																			
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																					
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.																																					

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] I. Chorkendorff, J.W. Niemantsverdriet, <i>Concepts of Modern Catalysis and Kinetics</i> , 3rd Ed., 2017. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4						4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	0.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H			H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction of catalysis: homogeneous and heterogeneous catalysis	1,2,3		- Lecture - Class discussion	[1].
2.	2,3,4	Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics	1,3	Homework	- Lecture - Class discussion	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	5,6	Catalyst Characterization	2,3	Homework	- Lecture - Class discussion	[1].
4.	7	Solid catalysts	1,2,3	Homework	- Lecture - Class discussion	[1].
5.	8	Solid catalysts	1,2,3	Homework	- Lecture - Class discussion	[1].
Midterm						
6.	9	Catalysis in Practice: Synthesis Gas and Hydrogen	2,4	Homework	- Lecture - Class discussion	[1].
7.	10,11	Oil Refining and Petrochemistry	2,3,4	Homework	- Lecture - Class discussion	[1].
8.	12	Environmental Catalysis	2,3,4	Quiz	- Lecture - Class discussion	[1].
9.	13	Modern catalysts	2,3,4	Homework	- Lecture - Class discussion	[1].
10.	14,15	Project presentations	1,2,3,4		- oral presentation - Class discussion	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (15%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Project presentations (15%)	Presentation 50%Pass	Presentation 50%Pass	Presentation 50%Pass	Presentation 50%Pass
Midterm exam (25%)	Q1 50%Pass	Q2 50%Pass		
Final exam (45%)	Part I 50%Pass	Part II 50%Pass		Part III 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Computational Chemistry

Course Code: CHE2024IU

1. General information

Course name	- <i>(in English)</i> Computational Chemistry - <i>(in Vietnamese)</i> Hóa tính toán
Course designation	The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer

Person responsible for the course	Assoc. Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn																																									
Language	English																																									
Relation to curriculum	☒ Compulsory ☐ Elective																																									
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Lecture</th> <th>Lab</th> <th>Project</th> <th>Internship</th> <th>Thesis</th> </tr> </thead> <tbody> <tr> <td></td> <td><i>Credit</i></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>60</td> <td>60</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>85</td> <td>85</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
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Contact hours	25	25	0	0	0	0																																				
Self-Study hours	60	60	0	0	0	0																																				
Total workload	85	85	0	0	0	0																																				
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																									
Number of periods	Theory: 30 Practice: 0																																									
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: CH011IU Chemistry for Engineers, CHE1091IU Organic Chemistry 2, CHE1043IU Physical Chemistry 2																																									
Course objectives	• The students acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules • Able to calculate the thermodynamic properties for a species of interest and kinetic data for a chemical reaction in gas and condensed phases using computer. • Able to obtain molecular properties from computational tools as well as available databases. • Describe and identify the various methods' advantages and disadvantages for simulating/modelling various scientific problems. • Students know how to solve the models using computer-based software. • Student can interpret the solutions.																																									

	• Students can solve practical problems		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Apply the most important principles for quantum chemical and molecular mechanics methods/calculations to determine the geometry, energies, and electronic properties of molecules	
	Skill	CLO2. Plan and conduct computer-based calculations of chemical properties (for example, size, hydrophobicity, dipole moment, thermodynamic properties) in molecules and relate these to biological/environmental chemical effects via calculation models CLO3. Critically examine and discuss the results from computer-based computational chemistry CLO4. Present and discuss, verbally and in writing, with various different groups, academic work from a societal and scientific perspective.	
	Attitude		
Content	The description of the contents should clearly indicate the weighting of the content and the level.		
	Weight: lecture session (2.5 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Ab initio Methods	1	I, T, U
	Semi-empirical Methods	1	T, U
	Density Functional Theory	1	T, U
	Molecular Mechanics	1	T, U
	Molecular Dynamics and Monte Carlo Simulation	1	T, U
	Predicting Molecular Geometry	1	T, U
	Constructing a Z-matrix and using existing Basis Sets	1	T, U
	Molecular Vibration	1	U
	Population Analysis	1	T, U
	Other Chemical Properties	1	T, U
	Thermodynamic properties Calculations	1	T, U
Potential Energy Surface and Kinetic Calculations	3	U	
	1	U	

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2					4		
	3					4		
	4			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0		4.0		4.0		
L,M,H conversion*		M		M		M		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching and learning activities	Assessment
1	Introduction and Fundamental principles: energy, electrostatics, atomic units, thermodynamics, quantum mechanics, statistical mechanics	G1	- Lecture - Class discussion	
2	Ab initio Methods	G1	- Lecture - Class discussion	Homework + Labwork
3	Semi-empirical Methods	G1	- Lecture - Class discussion	Homework + Labwork
4	Density Functional Theory	G1	- Lecture - Class discussion	Homework + Labwork
5	Molecular Mechanics	G1	- Lecture - Class discussion	Homework + Labwork
6	Molecular Dynamics and Monte Carlo Simulation	G1	- Lecture - Class discussion	Homework + Labwork
7	Predicting Molecular Geometry	G1, G2	- Lecture - Class discussion	Homework + Labwork
8	Constructing a Z-matrix and using existing Basis Sets Molecular Vibration	G1, G2	- Lecture - Class discussion	Homework + Labwork
	Midterm exam			
9	Population Analysis Other Chemical Properties	G1, G2	- Lecture - Class discussion	Homework + Labwork
10	Thermodynamic properties Calculations Potential Energy Surface and Kinetic Calculations	G1, G2	- Lecture - Class discussion	Homework + Labwork
FINAL EXAMINATION				Written exam

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Assignments (30%)	60%Pass	60%Pass	60%Pass	80%Pass (Group presentation)
Midterm exam (20%)	60%Pass	60%Pass	60%Pass	-
Final exam (50%)	60%Pass	60%Pass	60%Pass	60%Pass (Group project)

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. **Date revised:** August 19, 2025

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	CLO	Course learning outcomes and CLO mapping	2025.08.20	HKLâm



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Computational Chemistry Lab

Course Code: CHE2025IU

1. General information

Course name	- <i>(in English)</i> Computational Chemistry Lab - <i>(in Vietnamese)</i> Thực hành Hóa tính toán				
Course designation	The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
	☐ Year 1	☐ Year 2	☒ Year 3	☐ Year 4	☐ Year 5

Semester(s) in which the course is taught	☒ Semester 1	☐ Semester 2	☐ Summer																																						
Person responsible for the course	Assoc. Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☒ Compulsory ☐ Elective																																								
Teaching methods	☒ Lecture	☐ Lesson	☐ Project	☐ Seminar																																					
	Others, please specify:																																								
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Lecture</th> <th>Lab</th> <th>Project</th> <th>Internship</th> <th>Thesis</th> </tr> </thead> <tbody> <tr> <td></td> <td><i>Credit</i></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>0</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>30</td> <td>0</td> <td>30</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>55</td> <td>0</td> <td>55</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>		1				Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>		1																																						
Contact hours	25	0	25	0	0	0																																			
Self-Study hours	30	0	30	0	0	0																																			
Total workload	55	0	55	0	0	0																																			
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS																																								
Number of periods	Theory: 0 Practice: 30																																								
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Corequisites: Computational Chemistry CHE2024IU ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																								
Course objectives	- The students acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules - Able to calculate the thermodynamic properties for a species of interest and kinetic data for a chemical reaction in gas and condensed phases using computer. - Able to obtain molecular properties from computational tools as well as available databases. - Describe and identify the various methods' advantages and disadvantages for simulating/modelling various scientific problems.																																								

	- Students know how to solve the models using computer-based software. - Student can interpret the solutions. - Students can solve practical problems		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Apply the most important principles for quantum chemical and molecular mechanics methods/calculations to determine the molecular properties (e.g., geometry, energies, and electronic properties of molecules)	
	Skill	CLO2. Conduct computer-based calculations of chemical properties (for example, size, hydrophobicity, dipole moment, thermodynamic properties) in molecules and relate these to biological/environmental chemical effects via calculation models CLO4. Critically examine and discuss the results from computer-based computational chemistry CLO5. Present and discuss, verbally and in writing, with various different groups, academic work from a societal and scientific perspective.	
	Attitude		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2.5 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Experiment 1: Atomic and Molecular Orbitals	1	I, T, U
	Experiment 2: Potential energy surface	1	I, T, U
	Experiment 3: PES and Optimization	1	I, T, U
	Experiment 4: Reaction PES	1	I, T, U
	Experiment 5: General Chemistry Applications	1	I, T, U
	Experiment 6: Group project (optional)	1	I, T, U
Examination forms	☐ Multiple-choice questions	☒ Oral examination	
	☒ Report	☒ Written examination	
	☐ Presentation	☐ Others, please specify:	
	☐ Assignments		

Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
Skills (Level: 1-7)	2					4		
	3					4		
	4			4	4			
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0		4.0	4.0	4.0		
L,M,H conversion*		M		M	M	M		

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching and learning activities	Assessment
1	Lab1	CLO1		
2	Lab2	CLO2		Homework + Labwork
3	Lab3	CLO3		Homework + Labwork
4	Lab4	CLO4		Homework + Labwork
5	Lab5	CLO5		Homework + Labwork
FINAL EVALUATION				Written exam

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Class participation and Assignments (70%)	60% Pass	60% Pass	60% Pass	60% Pass	60% Pass
Final evaluation (30%)	60% Pass	60% Pass	60% Pass	60% Pass	60% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubric for prelab and exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. **Date revised:** August 18, 2025

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Simulation and Optimization

Course Code: CHE2034IU

1. General information

Course name	- <i>(in English)</i> Simulation and Optimization - <i>(in Vietnamese)</i> Mô phỏng và Tối ưu hóa						
Course designation	This course aims at introducing students to use quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems.						
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person responsible for the course	Tran Van Ly, tvly@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective		
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2	0			
Contact hours	25	25	0	0	0	0	0
Self-Study hours	60	60	0	0	0	0	0
Total workload	85	85	0	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS						
Number of periods	Theory: 30 Practice: 0						
Required and recommended prerequisites for	☐ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course:						

joining the course																																	
Course objectives	This course is to introduce the fundamental methods used in deterministic operations research and to use of numerical analysis and linear algebra to solve industrial engineering problems. Topics to be covered include: problem formulations, simplex method in table form, big-M method, duality theory, an introduction to the geometry of the simplex method, sensitivity analysis, and integer program.																																
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Gather & identify to define a mathematical model, formulate a mathematical model with 2 variables. Solve a mathematical model with 2 variables by graphical method; Formulate a mathematical model with more than 2 variables, solve a mathematical model with more than 2 variables by Simplex method, big M technique, two phase and revised method. [Analyzing] CLO2. Outline to formulate and solve the Integer Programming by using Branch and Bound technique. Apply mathematical and statistical tools to solve a variety of operational and decision-making problems, including linear and nonlinear programming. [Analyzing]</td></tr><tr><td>Skill</td><td>CLO3. Use software tools to model, solve and analyze complex systems, including spreadsheets, optimization software, and simulation packages. [Mechanism]</td></tr><tr><td>Attitude</td><td>CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]</td></tr></table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Gather & identify to define a mathematical model, formulate a mathematical model with 2 variables. Solve a mathematical model with 2 variables by graphical method; Formulate a mathematical model with more than 2 variables, solve a mathematical model with more than 2 variables by Simplex method, big M technique, two phase and revised method. [Analyzing] CLO2. Outline to formulate and solve the Integer Programming by using Branch and Bound technique. Apply mathematical and statistical tools to solve a variety of operational and decision-making problems, including linear and nonlinear programming. [Analyzing]	Skill	CLO3. Use software tools to model, solve and analyze complex systems, including spreadsheets, optimization software, and simulation packages. [Mechanism]	Attitude	CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]																								
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¹ Level of competence according to Bloom’s Taxonomy:																																	
	<table><tr><th></th><th>Level 1</th><th>Level 2</th><th>Level 3</th><th>Level 4</th><th>Level 5</th><th>Level 6</th><th>Level 7</th></tr><tr><td>Knowledge</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td><td>x</td></tr><tr><td>Skills</td><td>Perception</td><td>Set</td><td>Guided Response</td><td>Mechanism</td><td>Complex Overt Response</td><td>Adaptation</td><td>Origination</td></tr><tr><td>Attitudes</td><td>Receiving Phenomena</td><td>Responding to Phenomena</td><td>Valuing</td><td>Organization</td><td>Internalizing values</td><td>x</td><td>x</td></tr></table>		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x	Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination	Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7																										
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x																										
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Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x																										
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to operations research</td><td>1</td><td>U</td></tr><tr><td>2</td><td>Formulate linear programming problems</td><td>2</td><td>U</td></tr><tr><td>3</td><td>Solution of an LP: graphical solution</td><td>1</td><td>U</td></tr><tr><td>4</td><td>Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP</td><td>2</td><td>U</td></tr><tr><td>5</td><td>Solution of an LP: finding an initial feasible solution, big-M method, two-phase method</td><td>2</td><td>U</td></tr><tr><td>6</td><td>Revised simplex method, simplex formulas, shadow price, reduce cost</td><td>2</td><td>U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to operations research	1	U	2	Formulate linear programming problems	2	U	3	Solution of an LP: graphical solution	1	U	4	Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP	2	U	5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	2	U	6	Revised simplex method, simplex formulas, shadow price, reduce cost	2	U				
No.	Topic	Weight	Level																														
1	Introduction to operations research	1	U																														
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5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	2	U																														
6	Revised simplex method, simplex formulas, shadow price, reduce cost	2	U																														

	7	Sensitivity analysis: changing the objective function coefficient of a basic variable, changing the objective function coefficient of a nonbasic variable, changing the constraint coefficient of a nonbasic variable, changing the RHS values of constraints, adding a new variable.	2	U
	8	Degeneracy and cycling in linear programming	1	U
	9	Integer programming problems. Solving integer programs using branch and bound method	2	U
	10	Application of simulation and optimization in chemical engineering.	2	U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Hillier and Lieberman, Introduction to Operations Research, McGraw Hill, 2010, 9 th Edition. [2] Wayne L. Winston and Munirpallam Venkataramanan, Introduction to Mathematical Programming. Operations Research: Volume one, DuxBury, 2003, 4th Edition. [3] Hamdy A. Taha, Operation Research: An Introduction, Prentice Hall, 2003, 7th Edition. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	4		4				
Skills (Level: 1-7)	3					4	4	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	4.0	4.0	3.0
L,M,H conversion*		H		H		H	H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to operations research	1		Lecture	
2.	2	Formulate linear programming problems	1	HW	Lecture	
3.	3	solution of an LP: graphical solution	1,2	HW	Lecture	
4.	4	Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP	1,2	HW	Lecture	
5.	5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	1,2	HW	Lecture	
6.	6	Revised simplex method, simplex formulas, shadow price, reduce cost	1,2	HW	Lecture	
7.	7	Sensitivity analysis: changing the objective function coefficient of a basic variable, changing the objective function coefficient of a nonbasic variable, changing the constraint coefficient of a nonbasic variable, changing the RHS values of constraints, adding a new variable.	2,3,5	HW	Lecture	
8.	8	Degeneracy and cycling in linear programming	2	HW	Lecture	
		Midterm exam				
9.	9	Integer programming problems. Solving integer programs using branch and bound method	1,2,4	HW	Lecture	
10.	10	Application of simulation and optimization in chemical engineering.	4	HW	Lecture	
11.	17-18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework (30%)	>50% pass	>50% pass			
Midterm exam (20%)		>50% pass			

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Final exam (50%)			>50% pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Date revised: August 20, 2025

6. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Simulation and Optimization Laboratory

Course Code: CHE2035IU

1. General information

Course name	- <i>(in English)</i> Simulation and Optimization Laboratory - <i>(in Vietnamese)</i> Thực hành mô phỏng và tối ưu hóa						
Course designation	The lab aims to provide students with hands-on experience in applying various OR techniques and methods to solve real-world problems. Students will learn how to model and formulate optimization problems, analyze data, and implement OR algorithms.						
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person In-Charge	Tran Van Ly, tvly@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective		
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: laboratory						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	1		1			
	<i>ECTS</i>	2.00					
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1 credit (Theory: 0 + Practice: 1) 2.00 ECTS						
Number of periods	Theory: 0 Practice: 30						
Required and recommended	☐ None						

prerequisites for the joining course	☐ Prerequisites: ☒ Corequisites: Simulation and Optimization (CHE2034IU) ☐ Previous course:							
Course objectives	The lab focuses on developing students' problem-solving skills within the context of operations research. This includes understanding problem structures, identifying appropriate mathematical techniques, and applying optimization algorithms to find optimal solutions. Students will gain proficiency in translating real-world problems into mathematical models. They will learn how to represent decision variables, objective functions, and constraints in mathematical notation, and formulate optimization models for different types of OR problems. The lab involves implementing OR algorithms using computational tools and software packages. Students will learn how to use OR software, coding languages, or optimization libraries to solve complex optimization problems efficiently.							
Course learning outcomes	Upon the successful completion of this course, students will be able to:							
	Competency level ¹	Course learning outcome (CLO)						
	Knowledge	CLO1. Relates & selects various software tools commonly used in operations research. [Analyze] CLO2. Outline the process of formulating optimization problems and translating them into mathematical models. [Analyze]						
	Skill	CLO3. Use optimization software and programming languages to implement and solve operations research models; Construct sensitivity analysis techniques to assess the robustness and sensitivity of optimization solutions. [Mechanism]						
	Attitude	CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]						
¹ Level of competence according to Bloom's Taxonomy:								
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x	
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination	
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x	
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lab session (4.2 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)							
	No.	Topic				Weight	Level	
	1	Orientation				1	T	
	2	Lab. 1: Introduction to Excel Solver for Solving Linear Programs				1	I, U	
	3	Lab. 2: Sensitivity Analysis by MS Excel				1	I, U	
	4	Lab. 3: LINDO vs EXCEL for Solving Linear Programming. Consult the LINDO/EXCEL output for Analysis				1	I, U	
	5	Lab. 4: Integer Program Problems				1	I, U	
	6	Lab. 5: Applications in Chemical Engineering				1	I, U	

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Hillier and Lieberman, Introduction to Operations Research, McGraw Hill, 2010, 9 th Edition. [2] Wayne L. Winston and Munirpallam Venkataramanan, Introduction to Mathematical Programming. Operations Research: Volume one, DuxBury, 2003, 4th edition. [3] Hamdy A. Taha, Operation Research: An Introduction, Prentice Hall, 2003, 7th Edition. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4		4				
	2	4				4		
Skills (Level: 1-7)	3						4	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	4.0	4.0	3.0
L,M,H conversion*		H		H		H	H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation	1,2,3,4		Lecture	
2.	2	Lab. 1: Introduction to Excel Solver for Solving Linear Programs	1,3	Report	Lecture, practice	
3.	3	Lab. 2: Sensitivity Analysis by MS Excel	1,3	Report	Lecture, practice	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	4	Lab. 3: LINDO vs EXCEL for Solving Linear Programming. Consult the LINDO/EXCEL output for Analysis	2,3	Report	Lecture, practice	
5.	5	Lab. 4: Integer Program Problems	2,3	Report	Lecture, practice	
6.	6	Lab. 5: Applications in Chemical Engineering	2,3	Report	Lecture, practice	
7.		Final evaluation	2,3,4	Report	Practice	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class attendance (10%)				
Homework exercises (20%)	>50% pass		>50% pass	
In-class Assignment (40%)	>50% pass	>50% pass		
Final exam (30%)			>50% pass	>50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Date revised: August 20, 2025

6. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: MASS TRANSFER OPERATIONS

Course Code: CHE2041IU

1. General information

Course name	- <i>(in English)</i> Mass Transfer Operations - <i>(in Vietnamese)</i> Quá trình và thiết bị truyền khối
Course designation	Mass transfer processes are vital in chemical engineering because it is the method to separate or purify components from their mixtures. Through this course, students learn the principles of mass transfer and their application. The course integrates fluid dynamics and thermodynamics in order to develop rate expressions for mass transfer in multiphase and multicomponent systems. Based on Fick's law and phase equilibrium rules, the course provides knowledge of designing large scale separation processes such as distillation, extraction, drying, stripping and absorption to selectively obtain or remove specific components from mixtures.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn
Language	English

Relation to curriculum	☒ Compulsory ☐ Elective																																									
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
	<i>Credit</i>	3																																								
Contact hours	37.5	37.5	0	0	0	0																																				
Self-Study hours	90	90	0	0	0	0																																				
Total workload	127.5	127.5	0	0	0	0																																				
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																									
Number of periods	Theory: 45 Practice: 0																																									
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: <i>CHE2051IU Heat Transfer Operations</i>																																									
Course objectives	- Understanding the underlying thermodynamics and mass transfer process principles consisted of molecular diffusion, diffusion coefficient, mass transfer coefficient, and phase equilibrium. - Understanding the principles of mass transfer equipment which applies for distillation, adsorption, extraction, drying and other mass transfer processes... - Analyzing and evaluating the structure and the operation of mass transfer equipment. - Solve practical mass transfer problems																																									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. [Analyze] Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles, when given a complex mass transfer problem, able to identify, formulate and solve problems (PLO 1)</td></tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. [Analyze] Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles, when given a complex mass transfer problem, able to identify, formulate and solve problems (PLO 1)																															
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Knowledge	CLO1. [Analyze] Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles, when given a complex mass transfer problem, able to identify, formulate and solve problems (PLO 1)																																									

	Skill	CLO2. [Mechanism] individually and in groups the knowledge of distillation, extraction, stripping tower, drier a by analyzing given data and formulating the practical mass transfer problems (PLO 3)																										
	Attitude																											
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Diffusion (Fick’s 1st and 2nd law)</td><td>5</td><td>T,U</td></tr><tr><td>3</td><td>Adsorption and its applications</td><td>1</td><td>T,U</td></tr><tr><td>4</td><td>Absorption and its applications</td><td>4</td><td>T,U</td></tr><tr><td>5</td><td>Distillation, extraction process, phase diagram</td><td>4</td><td>T,U</td></tr></table>				No.	Topic	Weight	Level	1	Introduction	1	I,T,U	2	Diffusion (Fick’s 1 st and 2 nd law)	5	T,U	3	Adsorption and its applications	1	T,U	4	Absorption and its applications	4	T,U	5	Distillation, extraction process, phase diagram	4	T,U
No.	Topic	Weight	Level																									
1	Introduction	1	I,T,U																									
2	Diffusion (Fick’s 1 st and 2 nd law)	5	T,U																									
3	Adsorption and its applications	1	T,U																									
4	Absorption and its applications	4	T,U																									
5	Distillation, extraction process, phase diagram	4	T,U																									
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																											
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																											
Reading list	I. Textbooks [1] Robert, E. Treybal, “Mass Tranper Operations, Mac. Graw Hill, Book Company, 1968 [2] J. R. Welty, C. E. Wicks, R. E. Wilson, Fundamentales of Momentum, Heat and Mass Transfer, Joln Wiley, 1973. [3] Fundamentals of Heat & Mass Transfer by Incropera, DeWitt, Bergman, and Lavine – 6th Edition																											

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	2			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy L,M,H conversion*	AVE	4.0	0.0	4.0	0.0	0.0	0.0	0.0
		H		H				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Operations Research: definition, classification. Basic concepts of phase equilibrium, phase contents, types of concentration and conversion equations.	1	Quiz	Lecture, Discussion, Inclass-Quiz	[1],[2],[3]
2.	2-5	Molecular diffusion and Fick's law (1st and 2nd law). Equation of continuity Steady-state molecular diffusion in laminar flow Molecular diffusion in gases Steady state diffusion of A through non-diffusing B Steady-state equimolar counter diffusion Steady-state diffusion in multicomponent mixtures	1	Quiz	Lecture, Inclass-Quiz	[1],[2],[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Diffusivity of gases Molecular diffusion in liquids Stokes-Einstein Equation Dilute solutions of nonelectrolytes Solutes in aqueous solutions Steady-state binary molecular diffusion in porous liquids Steady-state molecular diffusion through variable area Mass transfer coefficient Steady and quasi-steady mass transfer Mass-transfer controlled by external diffusion resistance Diffusion controlled by external convection Repiration of a spherical cell Relationship between reaction kinetics and mass transfer Diffusion through a film within which there is a homogeneous reaction Convective mass transfer Mass transfer in falling film Laminar falling film in an inclined surface				
3.	6-7	Fundamentals of adsorption process Adsorption isotherm model: Langmuir, Freundlich, BET, Dubinin-Radushkevich, Temppkin and Pyzhev,	2	Quiz	Lecture, Inclass-Quiz	[1],[2],[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Harkins-Jura, Halsey, Henderson. Adsorption rate Intraparticle diffusion Boyd's adsorption mass transfer rate controlling step Percent cumulative drug release The relationship between adsorption capacity, entrapment efficiency and thermodynamics properties (Gibbs free energy, entropy, enthalpy)				
4.	8	Midterm				
5.	9-12	Gas-liquid absorption and stripping processes. Calculation of the minimum amount of solvent to absorb a component from a gas stream into a liquid. Designing an absorption tower. Kremser equations Packed tower, tray absorber (counter-current multi-stage absorption), absorption with chemical reaction (irreversible first-order reaction, irreversible nth order reaction) The relationship between mass transfer and thermodynamics, and solubilities Determining mass transfer properties from solubilities experimentally	3,4	Presentation, Quiz	Lecture, Group work, Presentation, assignment	[1],[2],[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	13-15	Binary mixture: classification and phase equilibrium graphs (T_{xy}, P_{xy}, xy) Distillation process: definition, basic principles in operation of a distillation tower. McCabe Thiele method to build operation lines and number of theoretical mass transfer stages of a distillation process for a binary mixture. Distillation tower design. Phase diagram (triangle diagram) for a three-component mixture: how to construct and how to use. Extraction processes: basic principles in operation and calculation. Phase diagram (triangle diagram) for a three-component mixture: how to construct and how to use. Extraction processes: basic principles in operation and calculation.	3,4	Presentation, Quiz	Lecture, Group work, Presentation, assignment	[1],[2],[3]
7.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2
Quiz (15%)	50% pass	
Presentation (15%)		50% pass

Assessment Type	CLO1	CLO2
Midterm Exam (20%)	50% pass	
Final Exam (50%)	50% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the

	Capstone	Milestone		Benchmark
	4	3	2	1
	compelling, and speaker appears polished and confident.	interesting, and speaker appears comfortable.	understandable, and speaker appears tentative.	understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Assessment plan	Removed CLO3 and CLO4 from Final Exam	16/1/2024	Dr. Doan Hoai Linh
2	Course learning outcomes	Change CLO1,2,3,4	2/4/2024	Dr. Doan Hoai Linh
3	Examination forms	Remove Presentations	2/4/2024	Dr. Doan Hoai Linh
4	Learning Outcomes Matrix	Change ILO for CLO 1,2,3,4	2/4/2024	Dr. Doan Hoai Linh
5	Assessment Plan	Remove Group Design Problems Increase percentage of Quiz and Presentation from 10% to 15% each	2/4/2024	Dr. Doan Hoai Linh
6	Course learning outcomes	Change CLO 2, 3, 4	7/4/2024	Dr. Doan Hoai Linh
7	Learning Outcomes Matrix	Change ILO for CLO 1,2,3	7/4/2024	Dr. Doan Hoai Linh
8	Assessment Plan	Change CLOs	1/7/2025	Dr. Doan Hoai Linh
9	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
10	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
11	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
12	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh

13	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Heat Transfer Operations

Course Code: CHE2051IU

1. General information

Course name	- (in English) Heat Transfer Operations - (in Vietnamese) Quá trình và thiết bị truyền nhiệt				
Course designation	The course will introduce the fundamental concepts of various modes of heat transfer: conduction, convection, and radiation. It will further elaborate these concepts with theories and applications to the solutions of practically relevant chemical engineering problems. Some aspects of process design principles of various heat transfer equipment will be taken up in the later part of this course. Finally, to present a physical picture of the convection process, heat transfer in boundary layer flows will be addressed. Even though the course is primarily designed to meet the requirements of an undergraduate chemical engineering course on heat transfer, it will be useful for the practicing engineers to refresh with fundamental and technical information.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☒ Year 3	☐ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2	☐ Summer	
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn				
Language	English				

Relation to curriculum	☒ Compulsory ☐ Elective																																									
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
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Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																									
Number of periods	Theory: 45 Practice: 0																																									
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: <i>CHE1031IU Physical Chemistry I</i>																																									
Course objectives	• Know three modes of heat transfer: conduction, convection, and radiation • Know how to calculate the heat transfer coefficients. • Understand the steady and unsteady heat conduction. • Understand boiling, condensation, and evaporation. • Know types of heat exchangers and evaporators and their design. • Understand the economical aspects in heat transfer. • Solve practical heat transfer problems.																																									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. [Analyze] three modes of heat transfer: conduction, convection, and radiation, when given a complex heat transfer problem, able to identify, formulate, analyze, and solve problems (PLO 1)</td></tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. [Analyze] three modes of heat transfer: conduction, convection, and radiation, when given a complex heat transfer problem, able to identify, formulate, analyze, and solve problems (PLO 1)																															
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	<table><tr><td>Skill</td><td>CLO2. [Mechanism] the knowledge of heat exchangers, evaporators, boiling and condensation systems to analyze given data and evaluating the practical heat transfer problems individually or in groups (PLO 3)</td></tr><tr><td>Attitude</td><td></td></tr></table>	Skill	CLO2. [Mechanism] the knowledge of heat exchangers, evaporators, boiling and condensation systems to analyze given data and evaluating the practical heat transfer problems individually or in groups (PLO 3)	Attitude																													
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Attitude																																	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Conduction</td><td>1</td><td>T,U</td></tr><tr><td>3</td><td>Convection</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Radiation</td><td>2</td><td>T,U</td></tr><tr><td>5</td><td>Boiling and Condensation</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Heat Exchangers</td><td>3</td><td>T,U</td></tr><tr><td>7</td><td>Evaporators</td><td>3</td><td>T,U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction	1	I,T,U	2	Conduction	1	T,U	3	Convection	3	T,U	4	Radiation	2	T,U	5	Boiling and Condensation	2	T,U	6	Heat Exchangers	3	T,U	7	Evaporators	3	T,U
No.	Topic	Weight	Level																														
1	Introduction	1	I,T,U																														
2	Conduction	1	T,U																														
3	Convection	3	T,U																														
4	Radiation	2	T,U																														
5	Boiling and Condensation	2	T,U																														
6	Heat Exchangers	3	T,U																														
7	Evaporators	3	T,U																														
Examination forms	<table><tr><td>☒ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☒ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																									
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☐ Assignments																																	
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																
Reading list	I. Textbooks [1] Fundamentals of Heat & Mass Transfer by Incropera, DeWitt, Bergman, and Lavine – 6th Edition [2] Heat Transfer by Gregory Nellis, Sanford Klein. ISBN: 978-0-521-88107-4 [3] A Heat Transfer Textbook – 4th edition, John H. Lienhard IV and John H. Lienhard V.																																

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	2			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*		H		H				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction 1.1 Modes of heat transfer 1.1.1 Conduction 1.1.2 Convection 1.1.3 Radiation 1.2 Material properties of importance in heat transfer 1.2.1 Thermal conductivity 1.2.2 Specific heat capacity	1,2	Quiz	Lecture, Discussion, Inclass-Quiz	[1] [2] [3]
2.	2	Conduction: One Dimensional 2.1 Steady state conduction through constant area 2.2 Thermal contact resistance	1,2	Quiz	Lecture, Inclass-Quiz, HW	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		2.3 Steady state heat conduction through a variable area 2.3.1 Cylinder 2.3.2 Sphere 2.4 Heat conduction in bodies with heat sources				
3.	3	Convective Heat Transfer: One dimensional 3.1 Principle of heat flow in fluids and concept of heat transfer coefficient 3.2 Individual and overall heat transfer coefficient 3.2.1 Heat transfer between fluids separated by a flat solid wall 3.2.2 Heat transfer between fluids separated by a cylindrical wall 3.3 Enhanced heat transfer: concept of fins 3.3.1 Analytical solution of different cases 3.3.2 Fin efficiency 3.4 Thermal insulation	1,2	Quiz	Lecture, Inclass-Quiz, HW	[1] [2] [3]
4.	4	Forced Convective Heat Transfer 4.1 Principle of convection 4.2 Forced convection mechanism: Flow over a flat horizontal plate 4.3 Flow through a pipe or tube 4.3.1 Turbulent flow 4.3.2 Laminar flow 4.3.3 Flow through a non-circular duct	1,2	Quiz	Lecture, Inclass-Quiz, HW	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		4.3.4 Flow over a flat plate 4.3.5 Flow over cylinders and spheres 4.3.5.1 Flow across a cylinder 4.3.5.2 Flow across a sphere 4.3.5.3 Flow across a bank of tubes 4.4 Momentum and heat transfer analogies 4.4.1 Reynolds analogy 4.4.2 The Chilton-Colburn analogy 4.4.3 The Prandtl analogy 4.4.4 The Van Karman analogy				
5.	5	Heat Transfer by Natural Convection 5.1 Introduction 5.2 Empirical correlations for natural convective heat transfer 5.2.1 Natural convection around a flat vertical plate 5.2.2 Natural convection around a horizontal cylinder 5.2.3 Natural convection around a horizontal flat surface 5.2.4 Natural convection around sphere 5.2.5 Natural convection in enclosure 5.3 Combined natural and forced convection	1,2	Quiz	Lecture, Inclass-Quiz, HW	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	6-7	Radiation Heat Transfer 6.1 Basic definition pertaining to radiation 6.1.1 Emissive power 6.1.2 Radiosity 6.1.3 Irradiation 6.1.4 Absorptivity, reflectivity, and transmissivity 6.2 Blackbody radiation 6.2.1 Planck's law 6.2.2 Wien's law 6.2.3 The Stefan-Boltzmann law for blackbody 6.2.4 Special characteristic of blackbody radiation 6.2.5 Kirchhoff's law 6.3 Grey body 6.4 Radiative heat exchanger between surfaces 6.4.1 View factor 6.4.2 Relation between view factors 6.5 Heat exchange between non blackbodies 6.6 Radiation shield 6.7 Electrical network for radiation through absorbing and transmitting medium 6.8 Radiation combined with conduction and convection	1,2	Quiz	Lecture, Inclass-Quiz, HW	[1] [2] [3]
7.	8	Midterm				
8.	9-10	Heat Transfer in Boiling and Condensation	3,4	Presentation	Lecture, Group work, Presentation, assignment	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		7.1 Heat transfer during boiling 7.2 Boiling of saturated liquid 7.2.1 Nucleation boiling 7.2.2 Maximum heat flux 7.2.3 Film boiling 7.3 Heat transfer during condensation 7.4 Film condensation 7.5 Condensation for horizontal tube 7.5.1 Condensation outside horizontal tube or bank of tube 7.5.1.1 Condensation on a single horizontal tube 7.5.1.2 Condensation on a vertical tube of N horizontal tubes 7.5.1.3 Condensation inside a horizontal tube 7.6 Condensation for packed and fluidized bed 7.6.1 Packed bed 7.6.2 Fluidized bed				
9.	11-12	Heat Exchangers 8.1 Elements of shell and tube heat exchanger 8.2 Thermal design of heat exchangers 8.2.1 Overall heat transfer coefficient 8.2.2 Fouling factor or dirt factor 8.2.2 Temperature profiles in heat exchangers 8.2.4 Why multi-pass exchangers	3,4	Presentation	Lecture, Group work, Presentation, assignment	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		8.2.5 LMTD correction factor 8.2.6 Individual heat transfer coefficient 8.2.7 Pressure drop in the heat exchanger 8.2.7.1 Correlation for tube side pressure drop 8.2.7.2 Correlation for shell side pressure drop				
10.	13-15	Evaporators 9.1 Solution properties 9.1.1 Concentration 9.1.2 Foaming 9.1.3 Degradation due to high temperature 9.1.4 Scaling 9.1.1 Equipment material 9.2 Evaporator 9.2.1 Natural circulation evaporator 9.2.2 Forced circulation evaporator 9.2.3 Falling film evaporator 9.3 Performance of steam heated tubular evaporators 9.3.1 Capacity and economy 9.3.2 Single and multiple effect evaporators 9.3.3 Boiling point elevation 9.4 Temperature profile in an evaporators 9.5 Heat Transfer coefficient	3,4	Presentation	Lecture, Group work, Presentation, assignment	[1] [2] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		9.6 Method of feeding: Multiple effect evaporators 9.7 Enthalpy balance 9.7.1 Single effect evaporator 9.7.2 Effect of heat of dilution 9.7.3 Multiple effect evaporator				
11.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2
Quiz (15%)	50% pass	
Presentation (15%)		50% pass
Midterm Exam (20%)	50% pass	
Final Exam (50%)	50% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional):

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	Capstone	Milestone		Benchmark
	4	3	2	1
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Assessment plan	Removed CLO3 and CLO4 from Final Exam	16/1/2024	Dr. Doan Hoai Linh
2	Textbooks Planned learning activities and teaching methods	Add more books	28/3/2024	Dr. Doan Hoai Linh
3	Course learning outcomes	Change CLO1,2,3 and CLO4	2/4/2024	Dr. Doan Hoai Linh
4	Learning Outcomes Matrix	Change ILO of CLO1,2,3,4	2/4/2024	Dr. Doan Hoai Linh
5	Assessment plan	Remove Design problems Increase percentage of Quiz and Presentation from 10% to 15% each	2/4/2024	Dr. Doan Hoai Linh
6	Examination form	Remove presentation	2/4/2024	Dr. Doan Hoai Linh
7	Course learning outcomes	Change CLO 2, 3, 4	7/4/2024	Dr. Doan Hoai Linh
8	Learning Outcomes Matrix	Change ILO for CLO 1,2,3	7/4/2024	Dr. Doan Hoai Linh
9	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
10	Assessment plan	Removed CLO4	05/06/2025	Dr. Doan Hoai Linh
11	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
12	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh

13	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
14	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemical Reaction Engineering

Course Code: CHE2061IU

1. General information

Course name	- <i>(in English)</i> Chemical Reaction Engineering - <i>(in Vietnamese)</i> Kỹ thuật phản ứng				
Course designation	The fundamentals of chemical kinetics, as well as reactor analysis and design, are covered in detail and in depth in this course. Chemical kinetics covers a variety of topics, including rate constants, reaction order, rate equations for both simple and complex processes, kinetic data analysis, and product distribution. The primary areas of research in reactor analysis and design concern the ideal reactor systems and configurations, such as batch reactors, plug flow reactors, and continuous stirred tank reactors. The design component covers how to size such reactors, calculate conversion levels at various temperatures and pressures, and determine reaction kinetics from experimental data. It also covers how to choose the best reactor type and operating parameters to maximize the production of a desired product.				
Course type	☐ <i>General knowledge</i> ☐ <i>Fundamental</i> ☐ <i>Specialized knowledge</i> ☒ <i>Internship/Project/Thesis</i> ☐ <i>Others:</i> ☐				
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5				
	☒ Semester 1 ☐ Semester 2 ☐ Summer				
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:				

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice:0) 4.64 ECTS						
Number of periods	Theory: 45 Practice:						
Required and recommended prerequisites for the course	- Prerequisites: - Corequisites: - Previous course: CHE2011IU - Reaction Kinetics and Catalysis; CHE1043IU - Physical Chemistry 2.						
Course objectives	The course will begin with an introduction to the fundamental ideas of chemical kinetics and chemical reactor design as they relate to straightforward reaction systems. The general mole balance, reactor types, conversion, reactor sizing, rate laws, stoichiometry, and isothermal reactor design will all be covered. The concepts learned in the first half of the course will be expanded upon in the second half of the course as we describe real systems that deal with complex reactions and multiple reactions.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Analyze the effects of fluid flow, and reaction conditions on the performance of chemical reactors; Analyze the efficiency of industrial chemical reactors through the calculation of reaction yields, selectivity, and conversion; Design reactors for various types of chemical reactions and assess their performance [Analyzing].					
	Skill	CLO2. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO3. Utilize computer-aided tools and software for reactor design, simulation, and analysis [Mechanism].					
¹ Level of competence according to Bloom’s Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level

	1	Mole Balance	1	I, T
	2	Conversion and Reactor Sizing	1	I, T
	3	Rate Laws	1	T, U
	4	Stoichiometry	2	T, U
	5	Isothermal Reactors Design - Batch reactors - Continuous-Stirred Tank Reactors - Tubular Reactors - Pressure Drop in Reactors	3	T, U
	6	Isothermal Reactor Design: Moles and Molar Flow Rates - Membrane reactor - Semibatch Reactor	2	T, U
	7	Collection and Analysis of Rate Data	2	T, U
	8	Multiple Reactions	2	T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] H. Scott Fogler, Elements of Chemical Reaction Engineering, 5th edition, Prentice Hall 2016. [II. References] [2] Warren L. McCabe, Julian Smith, Peter Harriott, Unit Operations of Chemical Engineering, McGraw-Hill Education 2005. [3] Don W. Green, Robert H. Perry, Perry's Chemical Engineers' Handbook, 8th Ed., McGraw-Hill 2007.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	2			4				
	3					4		
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	4.0	0.0	0.0
L,M,H conversion*		H		H		H		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
	1	Mole Balance	1	HW	Lecture	[1]
	2	Conversion and Reactor Sizing		HW	Lecture Solve chemical engineering problem	[1]
	3	Rate Laws	1	HW	Lecture Solve chemical engineering problem	[1]
	4&5	Stoichiometry	1	HW, Quiz	Lecture Solve chemical engineering problem	[1]
	6,7,8	Isothermal Reactors Design - Batch reactors - Continuous-Stirred Tank Reactors - Tubular Reactors - Pressure Drop in Reactors	1,2,3	HW	Lecture Solve chemical engineering problem	[1]
		Midterm				
	9,10	Isothermal Reactor Design: Moles and Molar Flow Rates - Membrane reactor - Semibatch Reactor	1,2,3	HW, Quiz	Lecture Solve chemical engineering problem	[1]
	11,12	Collection and Analysis of Rate Data	1,2,3	HW	Lecture Solve chemical engineering problem	[1]
	13,14	Multiple Reactions	1,2,3	HW, Quiz	Lecture Solve chemical engineering problem	[1]
	15	Solving homework	1,2,3			
		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Homework, quiz, inclass-score (30%)	50%pass	50%pass	50% pass

Assessment Type	CLO1	CLO2	CLO3
Midterm exam (25%)	Q1, Q2 50%pass		Q3 50% pass
Final exam (45%)	Part I 50% pass		Part II 50%pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	Capstone	Milestone		Benchmark
	4	3	2	1
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Add ECTS	20/05/2023	VBKhanh
2		Change format and adjust content	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Mechanical Unit Operations

Course Code: CHE2071IU

1. General information

Course name	- <i>(in English)</i> Mechanical Unit Operations - <i>(in Vietnamese)</i> Các quá trình và thiết bị cơ học				
Course designation	In chemical engineering processes, it is quite common that one must deal with fluids and solid particles in mixtures. In this course, students are provided with the basic knowledge of chemical engineering in fluid mechanics and mechanical process operations for heterogeneous systems. This subject is a vital part of background for a chemical engineer.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☒ Year 3	☐ Year 4	☐ Year 5
	☐ Semester 1	☒ Semester 2		☐ Summer	
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
	☒ Lecture	☐ Lesson	☐ Project	☐ Seminar	

Teaching methods	Others, please specify:																																			
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																														
	<i>Credit</i>	3																																		
Contact hours	37.5	37.5	0	0	0	0																														
Self-Study hours	90	90	0	0	0	0																														
Total workload	127.5	127.5	0	0	0	0																														
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																			
Number of periods	Theory: 45 Practice: 0																																			
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☒ Corequisites: <i>CHE2041IU Mass Transfer Operations</i> ☐ Previous course:																																			
Course objectives	- Students know understand the fundamentals of solid particles to apply in chemical engineering, including particles properties and its important role in mechanical unit operations - Students know how to select suitable equipment to transport fluids. The design of the system is mainly the calculation of the basic specifications of pumps (for liquids) or blowers (for gases) in given pipeline from a given place to another. - Students know how to calculate basic specifications of agitation systems. They know the classification of impeller types and their geometrical factors. - Student can calculate the terminal velocity of a fluid flow in which a given particle can be floated. Hereby, students understand the principles of designing settling or sedimentation equipment to separate dispersed phases from continuous phases. - Students know how to calculate critical velocity of a fluid flow to bring a bulk of solid particles into fluidized bed, and they can figure out the working conditions of a given fluidized bed. - Students can classify different types of filtration and how to build the filtration equation from theoretical data or experimental data. - Students can differentiate and apply specific membranes in extraction processes																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to:																																			

	<table><tr><td>Competency level</td><td>Course learning outcome (CLO)</td></tr><tr><td>Knowledge</td><td>CLO1. When given a complex particulate solids and fluids separation problem using mechanical unit operations only, able to understand, identify, formulate and solve problems by applying various separation methods. Able to calculated solid particle size and calculate the terminal velocity of a floating solid particle inside a fluid flow, sedimentation, floatation, and transportation and metering of fluids such as pipe, fitting, valves, pumps, blowers, compressors, full-bore meters, insertion meters, agitation and mixing process, and membrane separation,... [Analyze] (PLO 1)</td></tr><tr><td>Skill</td><td>CLO2. Understand various mechanical separation methods [Mechanism] (PLO 3)</td></tr><tr><td>Attitude</td><td></td></tr></table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. When given a complex particulate solids and fluids separation problem using mechanical unit operations only, able to understand, identify, formulate and solve problems by applying various separation methods. Able to calculated solid particle size and calculate the terminal velocity of a floating solid particle inside a fluid flow, sedimentation, floatation, and transportation and metering of fluids such as pipe, fitting, valves, pumps, blowers, compressors, full-bore meters, insertion meters, agitation and mixing process, and membrane separation,... [Analyze] (PLO 1)	Skill	CLO2. Understand various mechanical separation methods [Mechanism] (PLO 3)	Attitude																									
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><td>No.</td><td>Topic</td><td>Weight</td><td>Level</td></tr><tr><td>1</td><td>Introduction, fundamentals of fluids and solid particles</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Screening</td><td>2</td><td>T,U</td></tr><tr><td>3</td><td>Storage and conveying of bulk solids</td><td>1</td><td>T,U</td></tr><tr><td>4</td><td>Flow past immersed solid objects, fluids, packed and fluidized beds</td><td>3</td><td>T,U</td></tr><tr><td>5</td><td>Filtration</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Sedimentation</td><td>2</td><td>T,U</td></tr><tr><td>7</td><td>Transportation and metering of fluids</td><td>4</td><td>T,U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction, fundamentals of fluids and solid particles	1	I,T,U	2	Screening	2	T,U	3	Storage and conveying of bulk solids	1	T,U	4	Flow past immersed solid objects, fluids, packed and fluidized beds	3	T,U	5	Filtration	2	T,U	6	Sedimentation	2	T,U	7	Transportation and metering of fluids	4	T,U
No.	Topic	Weight	Level																														
1	Introduction, fundamentals of fluids and solid particles	1	I,T,U																														
2	Screening	2	T,U																														
3	Storage and conveying of bulk solids	1	T,U																														
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5	Filtration	2	T,U																														
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7	Transportation and metering of fluids	4	T,U																														
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																									
☐ Multiple-choice questions	☐ Oral examination																																
☐ Report	☒ Written examination																																
☐ Presentation	☐ Others, please specify:																																
☐ Assignments																																	

Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Warren McCabe, Julian Smith, Peter Harriott, Unit Operations of Chemical Engineering, 8th edition, McGraw Hill, 2012. [2] Swain, Mechanical Operations, 1st Ed., Tata McGraw-Hill Education, 2013.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	2			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy L,M,H conversion*	AVE	4.0	0.0	4.0	0.0	0.0	0.0	0.0
		H		H				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to mechanical unit operations Particulate solids: particle size, shape, and density	1	Quiz 1	Lecture, Discussion, Inclass-Quiz	[1],[2]
2.	2-4	Screening, size analysis by screening, screening equipments, effectiveness and capacity Size reduction: methods, crushers, grinders	2	Quiz 2-6	Lecture, Inclass-Quiz	[1],[2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Size enlargement: methods, equipments, granulators Storage and conveying of bulk solids				
3.	5-7	Flow past immersed solid objects and fluids Flow through packed and fluidized beds	2	Quiz 7-8	Lecture, Inclass-Quiz	[1],[2]
4.	8	Midterm				
5.	9-10	Filtration: cake filtration, equipment, cross flow	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation	[1],[2]
6.	11-12	Sedimentation: classifiers, design of thickeners, centrifugal separations Floatation	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation	[1],[2]
7.	13-15	Transportation and metering of fluids: pipe, fittings, valves, pumps, fans, blowers, compressors, full-bore meters, insertion meters Agitation and mixing of liquids: circulation, velocities, power consumption in agitated vessels, blending, mixing, suspension of solid particles, dispersion operations Membrane separation processes: separation of gases, liquids, dialysis, liquid-liquid extraction, pervaporation, reverse osmosis	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation	[1],[2]
8.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2
Quiz (15%)	Quiz 1-8 50% pass	
Presentation (15%)		Presentation 50% pass
Midterm Exam (20%)	Midterm 50% pass	

Assessment Type	CLO1	CLO2
Final Exam (50%)	Final 50% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional):

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	Capstone	Milestone		Benchmark
	4	3	2	1
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlhinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Assessment Plan	Remove design problems. Increase percentage of quiz and presentation from 10% to 15% each Final exam does not cover CLO3 and CLO4	16/1/2024	Dr. Doan Hoai Linh
2	Examination forms	Remove presentation	16/2/2024	Dr. Doan Hoai Linh
3	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
4	Learning Outcomes Matrix	Changed the contribution	05/06/2025	Dr. Doan Hoai Linh
5	Assessment plan	Presentation is now covering CLO2	05/06/2025	Dr. Doan Hoai Linh
6	Course learning outcomes	Changed CLO2, removed CLO3	05/06/2025	Dr. Doan Hoai Linh
7	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
8	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
9	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
10	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Occupational Health Safety and Environment (HSE)

Course Code: CHE2081IU

1. General information

Course name	- <i>(in English)</i> Occupational Health Safety and Environment (HSE) - <i>(in Vietnamese)</i> An toàn sức khỏe nghề nghiệp và môi trường
Course designation	The course is to introduce students to the application of health safety and environment (HSE) concepts in engineering. It emphasizes mainly the management of risk associated with any hazardous products and processes throughout its life cycle. Generally, implementing an HSE program is to minimize and control the risks that come from any hazards of products and processes. This makes HSE an integral part of any engineering discipline.
Course type	☐ General knowledge ☐ Fundamental ☒ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar
	Others, please specify:

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2				
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice:0) 3.09 ECTS						
Number of periods	Theory: 30 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CHE2011IU - Reaction Kinetics and Catalysis						
Course objectives	Upon successful completion of this course, the students should: • Demonstrate an understanding of product handling and management; principles of process system engineering and environment management. • Demonstrate knowledge of dangerous and risky components in a given system or work environment. • Demonstrate knowledge of HSE system.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to identify the potentially dangerous and risky components in a given system or work environment [Analyzing].					

^{1 1} Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Be able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and environmental [Analyzing].		
	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].		
	Attitude	CLO5. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Organization].		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u> : lecture session (2.5 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to Health Safety and Environment	1	I, T
	2	Introduction to Vietnam Law on Occupational Safety and Hygiene	2	I, T
	3	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1	I, T, U
	4	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1.5	I, T, U
	5	Chemical reactivity	0.5	I, T, U
	6	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1	I, T, U
	7	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety	1	I, T, U

		(ventilation, radiation and noise hazard), and ergonomics.		
	8	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1	I, T, U
	9	Discussion on common chemical accidents	0.5	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] T.S.S. Dikshith, <i>Handbook of Chemicals and Safety</i> , 2017, CRC Press, 2017. [2] Daniel Crowl and Joseph F. Louvar, <i>Chemical Process Safety</i> , Prentice Hall, 3 rd edition, 2011. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4						4	
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	0.0	0.0	4.0	4.0
L,M,H conversion*		H	H	H			H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Health Safety and Environment	1, 4,5		Lecture, Discussion	[1]. [2].
2.	2,3	Introduction to Vietnam Law on Occupational Safety and Hygiene	1,2,3, 4,5	Group work	Lecture, Discussion Group work	Vietnam Law
3.	4	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1,2,3, 4,5	HW1	Lecture, HW	[1]. [2].
4.	5	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and	1,2,3, 4,5	Quiz 1	Lecture, In-class score Quiz	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		explosion, prevention of fires and explosions				
5.	6	Chemical reactivity	1,2,3, 4,5	HW2, Group work	Lecture, Group work, HW	[1]. [2].
6.	7	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1,2,3, 4,5	Quiz 2	Lecture, In-class score Quiz	[1]. [2].
7.	8	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.	1,2,3, 4,5	Quiz 3	Lecture, In-class score Quiz	[1]. [2].
		Midterm				
8.	9	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1,2,3, 4,5	HW3, Group work	Lecture, Group work, HW	[1]. [2].
9.	10	Discussion on common chemical accidents	1,2,3, 4,5		Discussion	
		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes/ Homework exercises (10%)	HW, Qz 60%Pass	HW, Qz 60%Pass	HW, Qz 60%Pass	HW, Qz 60%Pass	HW, Qz 60%Pass
Group work (20%)	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass
Midterm exam (25%)	Q1 50%Pass	Q2 50%Pass		Q3 50%Pass	
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass			Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/	Issue/ problem to be considered critically is stated without clarification or description.

	Capstone	Milestone		Benchmark
	4	3	2	1
			or backgrounds unknown.	
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a	Most content is clear and accurate. It is presented in a logical order and	Some content is not clear and/or accurate. It is presented in a	Content is not clear and/or accurate, and/or presented in a somewhat logical	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		thorough understanding of the topic	shows a good understanding of the topic	somewhat logical order and shows some understanding of the topic.	order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention throughout	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. **Revision Date: August 18, 2025**

7. **Course coordinator/Lecturer**

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemical Engineering Lab

Course Code: CHE1012IU

1. General information

Course name	- <i>(in English)</i> Chemical Engineering Lab - <i>(in Vietnamese)</i> Thực hành Kỹ thuật Hóa học
Course designation	This course is designed for students pursuing a degree in chemical engineering and provides professional skills in applying fundamentals of chemical engineering via experimentation.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Experiment, report

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	0	1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1 credits (Theory: 0 + Practice: 1) 2.00 ECTS						
Number of periods	Theory: 0 Practice: 30						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: <i>CHE2041IU Mass Transfer Operations</i>						
Course objectives	Students will be provided professional skills and techniques to understand fully and apply fundamentals of chemical engineering in various instruments/ machinery in different aspects such as reactions, heat transfer, mass transfer, etc.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Understand and apply chemical engineering principles in various instruments. Conduct experiments of fixed and fluidized bed, gas absorption, dryer, heat exchanger and jacketed reactor [Analyze] (PLO 1 & 2)					
	Skill	CLO2. Perform analytical results and write scientific report of experiments and explain the results using chemical engineering principles [Mechanism] (PLO 3, 4, 5 & 6)					
	Attitude						
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight:</u> lecture session (5 hours/eight)						
	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
1	Fixed and Fluidized bed				1	T	

	2	Gas absorptbion	1	T
	3	Computer controlled tray dryer	1	T
	4	Tube-in-tube heat exchanger	1	T
	5	Jacketed reactor	1	T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☒ Others, please specify: Lab work ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4					
Skills (Level: 1-7)	2			4	4	4	4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	4.0	4.0	0.0
L,M,H conversion*		H	H	H	H	H	H	

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Fixed and fluidized bed apparatus	1-4	Report 1	Discussion, Experiment, Write report	
2.	2	Gas absorption column	1-4	Report 2	Discussion, Experiment, Write report	
3.	3	Computer controlled tray dryer	1-4	Report 3	Discussion, Experiment, Write report	
4.	4	Tube-in-tube heat exchanger L-L	1-4	Report 4	Discussion, Experiment, Write report	
5.	5	Jacketed reactor	1-4	Report 5	Discussion, Experiment, Write report	
6.	6	Final examination	1-4			

4. Assessment plan

Assessment Type	CLO1	CLO2
Lab Report (70%) (as Progress scores)	Report 1-4 70% pass	Report 1-4 70% pass
Presentation (30%) (as Progress scores)		Quiz 50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional):

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.

1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Assessment plan	Changed Final Exam to Quiz (30%) as Progress scores. Lab reports will be used as Final scores (70%)	05/06/2025	Dr. Doan Hoai Linh
2	Examination Forms	Removed “Written examination”	05/06/2025	Dr. Doan Hoai Linh
3	Person-in-charge	Changed to Dr. Doan Hoai Linh	05/06/2025	Dr. Doan Hoai Linh
4	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
5	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
6	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
7	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemical Process Design and Simulation

Course Code: CHE2092IU

1. General information

Course name	- <i>(in English)</i> Chemical Process Design and Simulation - <i>(in Vietnamese)</i> Thiết kế và mô phỏng quá trình hóa học
Course designation	To study the modeling & simulation techniques of chemical processes and to gain skills in using process simulators.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Dr. Doan Hoai Linh dhlinh@hcmiu.edu.vn
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify: LAB														
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis								
	<i>Credit</i>	0	3												
Contact hours	75	0	75	0	0	0	0								
Self-Study hours	90	0	90	0	0	0	0								
Total workload	165	0	165	0	0	0	0								
Credit points	3 credits (Theory: 0 + Practice: 3) 6.00 ECTS														
Number of periods	Theory: 0 Practice: 90														
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: Chemical Reaction Engineering (CHE2061IU); Mechanical Unit Operations (CHE2071IU), Fluid mechanics (CE206IU)														
Course objectives	The goal of this course is to design and replicate an actual industrial procedure by utilizing open-source process simulation software. The process entails selecting appropriate units such as reactions and separation methods, fine-tuning operational parameters for optimization, and assessing the performance of these units based on criteria specified in the set requirements, such as production, selectivity, efficiency, and more. After determining these parameters, students will need to assess the economic viability of the studied process and relevant bibliographic data.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1. Understand the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, reaction engineering, economics. [Analyze] (PLO 1&2)</td></tr> <tr> <td>Skill</td><td>CLO2. Design, optimize, communicate chemical processes, unit operations, and systems by applying the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, and reaction engineering, combining with economic and environmental evaluation. [Mechanism] PLO 3, 4, 6)</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Understand the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, reaction engineering, economics. [Analyze] (PLO 1&2)	Skill	CLO2. Design, optimize, communicate chemical processes, unit operations, and systems by applying the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, and reaction engineering, combining with economic and environmental evaluation. [Mechanism] PLO 3, 4, 6)	Attitude	
Competency level ¹	Course learning outcome (CLO)														
Knowledge	CLO1. Understand the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, reaction engineering, economics. [Analyze] (PLO 1&2)														
Skill	CLO2. Design, optimize, communicate chemical processes, unit operations, and systems by applying the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, and reaction engineering, combining with economic and environmental evaluation. [Mechanism] PLO 3, 4, 6)														
Attitude															
Level of competence according to Bloom's Taxonomy:															

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7												
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x												
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination												
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Linking the followings Material Balances in Nonreacting Systems Species Balances in Reacting Systems Energy Balance for Nonreacting Systems Energy Balance for Reacting Systems Material and Energy Balances in Process Flowsheets Into softwares Economics for chemical engineers</td><td>1</td><td>T, U</td></tr><tr><td>2</td><td>Special projects</td><td>14</td><td>U</td></tr></table>							No.	Topic	Weight	Level	1	Linking the followings Material Balances in Nonreacting Systems Species Balances in Reacting Systems Energy Balance for Nonreacting Systems Energy Balance for Reacting Systems Material and Energy Balances in Process Flowsheets Into softwares Economics for chemical engineers	1	T, U	2	Special projects	14	U
No.	Topic	Weight	Level																
1	Linking the followings Material Balances in Nonreacting Systems Species Balances in Reacting Systems Energy Balance for Nonreacting Systems Energy Balance for Reacting Systems Material and Energy Balances in Process Flowsheets Into softwares Economics for chemical engineers	1	T, U																
2	Special projects	14	U																
Examination forms	☐ Multiple-choice questions☐ Oral examination ☐ Report☐ Written examination ☒ Presentation☐ Others, please specify: ☐ Assignments																		
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																		
Reading list	I. Textbooks [1] Max Peters, Klaus Timmerhaus, Ronald West, Plant Design and Economics for Chemical Engineers, 5th edition, ISBN: 978-0072392661 II. References [2] DWSIM User Guide: https://dwsim.org/ Coco Simulation: https://www.cocosimulator.org/ Tutorials: https://www.youtube.com/c/DWSIMSimulator Learn Aspen Plus in 24 Hours, Second Edition Using Aspen Plus in Thermodynamics Instruction: A Step-by-Step Guide 1st Edition																		

	• Yu, Frank, Process Design for Chemical Engineers, CreateSpace Independent Publishing, 2012 • Coulson and Richardson's Chemical Engineering, Vol. 6: Chemical Engineering Design. By R.K. Sinnott, Butterworth-Heinemann, Oxford, 3rd, Ed., 1999, 1994 • Mecklenburgh, J.C., Plant layout, Leonard Hill Books (IChemE), 1973 • Brannan, C., Rules of Thumb for Chemical Engineers, 4th Ed., Gulf Professional Publishing, Burlington, MA, 2005 • Kletz, T.A. & Institution of Chemical Engineers, 1986, Hazop & Hazan: notes on the identification and assessment of hazards, Institution of Chemical Engineers, Rugby, Warwickshire • American Institute of Chemical Engineers. Center for Chemical Process Safety 2000, Guidelines for chemical process quantitative risk analysis, The Center, New York III. Softwares DWSIM https://dwsim.org/

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4					
Skills (Level: 1-7)	2			4	4		4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Tutorials and economics evaluations	1		Lecture	[1] [2]
2.	2-15	Special project	1,2,3	Report	Lab	[1] [2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	16	Final evaluation (Presentation)				

4. Assessment plan

Assessment Type	CLO1	CLO2
Report (70%) (As Progress scores)	>50% pass	
Presentation (30%) (As Final scores)		>50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Report

100%	80%	60%	50%	40%
Calculated energy, capital, investment, operational costs	Calculated energy capital, investment, operational costs	Calculated energy, capital, investment, operational costs	Calculated energy, capital, investment, operational costs	Calculated energy, capital, investment, operational costs
Take account carbon footprint, laws, and regulations	Take account carbon footprint, laws, and regulations	Take account carbon footprint, laws, and regulations	Take account carbon footprint, laws, and regulations	Take account carbon footprint, laws, and regulations
Among other groups has the highest net profit and ROI	Among other groups has the second highest net profit and ROI	Among other groups has the third highest net profit and ROI	Among other groups has the fourth highest net profit and ROI	Among other groups has the fifth highest net profit and ROI
If profit is negative, subtract 5%	If profit is negative, subtract 5%	If profit is negative, subtract 5%	If profit is negative, subtract 5%	If profit is negative, subtract 5%
If ROI < 5%, subtract 5%	If ROI < 5%, subtract 5%	If ROI < 5%, subtract 5%	If ROI < 5%, subtract 5%	If ROI < 5%, subtract 5%
If missing each calculations and forget taking account, subtract 15%	If missing each calculations and forget taking account, subtract 15%	If missing each calculations and forget taking account, subtract 15%	If missing each calculations and forget taking account, subtract 15%	If missing each calculations and forget taking account, subtract 15%
Lowest initial capital investment	Second lowest initial capital investment	Third lowest initial capital investment	Fourth initial capital investment	Fifth initial capital investment

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	Capstone	Milestone		Benchmark
	4	3	2	1
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Content	Shorten lectures hours Extend special projects time	February 1, 2024	Dr. Doan Hoai Linh
2	Reading list	Add book section and software section. Add more references	February 1, 2024	Dr. Doan Hoai Linh
3	Planned learning activities and teaching methods	Shorten lectures hours Extend special projects time	February 1, 2024	Dr. Doan Hoai Linh
4	Assessment plan	Remove midterm evaluation Increase percentage of Lab report and decrease percentage of final evaluation	February 1, 2024	Dr. Doan Hoai Linh
5	Rubric	Add lab report rubric	February 1, 2024	Dr. Doan Hoai Linh
6	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
7	Examination forms	Remove Report	16/2/2024	Dr. Doan Hoai Linh
8	Learning Outcomes Matrix	Changed the contribution	05/06/2025	Dr. Doan Hoai Linh
9	Course learning outcomes	Changed CLO1,2,3. Removed CLO4,5,6	05/06/2025	Dr. Doan Hoai Linh
10	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
11	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
12	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
13	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Green Chemical Engineering

Course Code: CHE311IU

1. General information

Course name	- <i>(in English)</i> Green Chemical Engineering - <i>(in Vietnamese)</i> Kỹ thuật hóa học xanh
Course designation	This course will introduce students with green chemical engineering in order to devise new technologies and methods of chemical processing that generate little or no pollution and also promote the practice of more sustainable engineering options. In particular, designing a chemical reactor to achieve maximum performance is the key for waste minimization. The course will focus on the principles of chemical reaction engineering with some key factors which influence reactor performance will be introduced.
Course type	☐ General knowledge ☐ Fundamental ☒ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective

Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>37.5</td> <td>37.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>90</td> <td>90</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>127.5</td> <td>127.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
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Contact hours	37.5	37.5	0	0	0	0																																				
Self-Study hours	90	90	0	0	0	0																																				
Total workload	127.5	127.5	0	0	0	0																																				
Credit points	3 credits (Theory: 3 + Practice:0) 4.64 ECTS																																									
Number of periods	Theory: 45 Practice:																																									
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CHE2011IU - Reaction Kinetics and Catalysis																																									
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • The principles of green chemistry • Understand the different green resources • Understand green catalysis processes and green organic solvents • Design a green process Potential and commercial industrial green processes.																																									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th style="width: 15%;">Competency level¹</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>							Competency level ¹	Course learning outcome (CLO)																																	
Competency level ¹	Course learning outcome (CLO)																																									

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Knowledge</td><td>CLO1. Be able to develop a working knowledge of the twelve fundamental principles of green chemistry [Analyzing]. CLO2. Be able to analyze the novel green reactors concepts [Analyzing].</td></tr><tr><td>Skill</td><td>CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. An ability to function effectively in a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Mechanism]. CLO5. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].</td></tr></table>	Knowledge	CLO1. Be able to develop a working knowledge of the twelve fundamental principles of green chemistry [Analyzing]. CLO2. Be able to analyze the novel green reactors concepts [Analyzing].	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. An ability to function effectively in a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Mechanism]. CLO5. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].																																																
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Principles and Concepts of Green Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Waste: Production, Problems and Prevention</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Measuring and Controlling Environmental Performance</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Catalysis and Green Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Organic Solvents: Environmentally Benign Solutions</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Renewable Resources</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Emerging Greener Technologies and Alternative Energy Sources</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Designing Greener Processes</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Industrial Case Studies</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Application of Green Catalysis and Processes</td><td>1</td><td>I, T</td></tr><tr><td>11</td><td>CO₂ conversion</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Lignin conversion</td><td>1</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Principles and Concepts of Green Chemistry	1	I, T	2	Waste: Production, Problems and Prevention	1	I, T	3	Measuring and Controlling Environmental Performance	1	I, T	4	Catalysis and Green Chemistry	1	I, T	5	Organic Solvents: Environmentally Benign Solutions	1	I, T	6	Renewable Resources	1	I, T	7	Emerging Greener Technologies and Alternative Energy Sources	1	I, T	8	Designing Greener Processes	1	I, T	9	Industrial Case Studies	1	I, T	10	Application of Green Catalysis and Processes	1	I, T	11	CO ₂ conversion	1	I, T	12	Lignin conversion	1	I, T
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	13	The Future's Green: An Integrated Approach to a Greener Chemical Industry	1	I, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Mike Lancaster, <i>Green Chemistry – An Introduction text</i> , RSC, 2002. [2] Mukesh Doble, Anil Kumar Kruthiventi, <i>Green Chemistry & Engineering</i> , Elsevier, 2007. [3] S. Suresh and S. Sundaramoorthy, <i>Green Chemical Engineering – An introduction to Catalysis, Kinetics, and Chemical Processes</i> , CRC Press, 2015 [4] Buxing Han, Tianbin (Eds.), <i>Green Chemistry and Chemical Engineering</i> , in “Encyclopedia of Sustainability Science and Technology Series”, 2 nd Edition, Springer, 2013 II. References 			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4				4			
	5						4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Principles and Concepts of Green Chemistry	1,2		- Lecture - Class discussion	[1]. [2].
2.	2	Waste: Production, Problems and Prevention	1,2,5	Homework	- Lecture - Class discussion	[1].
3.	3	Measuring and Controlling Environmental Performance	1,2,5	Homework	- Lecture - Class discussion	[1].
4.	4	Catalysis and Green Chemistry	1,2	Homework	- Lecture - Class discussion	[1].
5.	5	Organic Solvents: Environmentally Benign Solutions	1,2	Homework	- Lecture - Class discussion	[1].
6.	6	Renewable Resources	1,2,4	Quiz	- Lecture - Class discussion	[1].
7.	7	Emerging Greener Technologies and Alternative Energy Sources	1,2	Homework	- Lecture - Class discussion	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
8.	8	Designing Greener Processes	1,2	Homework	- Lecture - Class discussion	[1]. [2].
Midterm						
9.	9	Industrial Case Studies	1,2,4	Group work	- Lecture - Class discussion	[1]. [2].
10.	10	Application of Green Catalysis and Processes	1,2	Homework	- Lecture - Class discussion	[3].
11.	11	CO ₂ conversion	1,2	Group work	- Lecture - Class discussion	[4].
12.	12	Lignin conversion	1,2	Group work	- Lecture - Class discussion	[4].
13.	13	The Future's Green: An Integrated Approach to a Greener Chemical Industry	1,2,4	Group work	- Lecture - Class discussion	[1]. [2].
14.	14,15	Group presentation	1,2, 3,4,5		Oral presentation	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes/ Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass
Midterm exam	Q3 50%Pass	Q1, Q2 50%Pass			

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
(25%)					
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass			Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone 4	Milestone 3 2		Benchmark 1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	Capstone	Milestone		Benchmark
	4	3	2	1
			mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention throughout	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ptkhoa@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



Course Name: Nanomaterials
Course Code: CHE3211IU

Course name	- (in English) Nanomaterials - (in Vietnamese) Vật liệu Nano						
Course designation	This course will discuss the synthesis, properties characterization and applications of materials structured on the nanometer scale.						
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer						
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☐ Compulsory ☒ Elective						
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	3	3				
	<i>ECTS</i>	4.64					
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90.0	90.0	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: Analytical chemistry 2 (CHE1061IU); Inorganic Chemistry (CHE2103IU); Physical Chemistry 2 (CHE1043IU)						

Course objectives	The course will discuss fabrication methods for nanomaterials, including physical and chemical methods. The optical, electronic, and catalytic properties of nanomaterials will be presented. The section dealing with the applications of nanomaterials is interactive: each group of students will be assigned a specific type or application of nanomaterials, which will be studied and presented to the class in a short lecture.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Identify and apply analytical and characterization tools to study the structure and properties of nanomaterials (PLO 1&2). [Analyze]					
	Skill	CLO2. Participate in a group research project and present the results of this project in a professional manner (PLO 3, 4&6). [Mechanism]					
	Attitude						
¹ Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<u>Weight</u> : lecture session (2.5 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Introduction to Nanomaterials				1	I, T
	2	Crystal Structure of Nanomaterials				0.5	T, U
	3	Length Scales of Nanomaterials				0.5	T, U
	4	Types of Nanostructures (0D, 1D, 2D)				0.5	T
	5	Synthesis of Nanomaterials				0.5	T, U
	6	Characterization of Nanomaterials				1.5	T
	7	Porous Nanomaterials: Structure and Synthesis				0.5	I, T
	8	Recent developments in nanomaterials				4	I, T
9	Special Topics presented by Students				6	T, U	
Examination forms	☐ Multiple-choice questions						

	[2] Guozhong Cao, Nanostructures & nanomaterials, Imperial College Press, London, 2004 [3] Gregory Timp Ed., Nanotechnology, AIP Press, Springer, 1998 [4] J. H. Fendler Ed., Nanoparticles and Nanostructured Films, Wiley-VCH, 1998 [5] C. P. Poole, Jr. and F .J. Owens, Introduction of Nanotechnology, Wiley, 2003 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4					
Skills (Level: 1-7)	2			4	4		4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy L,M,H conversion*	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Nanomaterials	1		Lecture	
2.	2-6	Crystal Structure of Nanomaterials Length Scales of Nanomaterials Types of Nanostructures (0D, 1D, 2D) Synthesis of Nanomaterials Characterization of Nanomaterials Porous Nanomaterials: Structure and Synthesis	1,2,3		Lecture	
3.	7	Recent developments in nanomaterials	2		Lecture	
4.	8	Midterm				
5.	9-10	Recent developments in nanomaterials	2		Lecture	
6.	11-15	Special Topics Presented by Students	5	Presentation	Teamwork presentation	
7.	16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO3
Homework/Presentation (30%)		>50%pass
Midterm exam (20%)	>50%pass	
Final exam (50%)	>50%pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	Capstone	Milestone		Benchmark
	4	3	2	1
	polished and confident.			speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Learning outcome Matrix	CLO reduction	October 23th 2024	Dr. Doan Hoai Linh
2	Content	Content duration modification	October 23th 2024	Dr. Doan Hoai Linh
3	Course learning outcome	CLO changed	October 23th 2024	Dr. Doan Hoai Linh
4	Planned learning activities	Changed schedule	October 23th 2024	Dr. Doan Hoai Linh
5	Assessment plan	Changed assessments and CLO relationship	October 23th 2024	Dr. Doan Hoai Linh
6	Person in charge	Change lecturer name	October 23th 2024	Dr. Doan Hoai Linh
7	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
8	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
9	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
10	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
11	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Biomaterials

Course Code: CHE3221IU

1. General information

Course name	- <i>(in English)</i> Biomaterials - <i>(in Vietnamese)</i> Vật liệu sinh học
Course designation	An engineer of chemical engineering major should understand biomaterials, and its surface modification for specific applications. Also, an engineer must understand how to choose materials and how to design a scaffold for specific implantation zone.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course:						
Course objectives	To explain basic principles of biocompatibility and implants performance, review different strategies to modify and/or design materials that are biocompatible. Also, this course will explain what biodegradability is and how it affects biomaterial design. These allow students to understand material selection and structure-function relationships and read, understand and assimilate papers, publications and lectures in the biomaterials. Student will obtain enough knowledge to develop analysis and critical-thinking skills for the evaluation of relevant literature.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Give the definition of a biomaterial. [Analyzing] CLO2. Describe the structure and composition of naturally occurring biomaterials, such as tooth enamel, bone, collagen, skin etc. [Analyzing] (PLO 1&2) CLO3. Describe methods of manufacture of the different types of materials used in medicine and biosciences, their properties and their suitability for a particular function. [Analyzing] (PLO 1&2) CLO4. Describe methods of modifying surfaces and their impact on the material/biological interface. [Analyzing] (PLO 1&2) CLO5. Describe physical techniques used in biomaterials research, such as x-ray photoelectron spectroscopy, electron microscopy, scanning probe microscopy, force microscopy and quartz crystal resonance and apply these to qualitatively and quantitatively derive information about how materials interact with biological systems. [Analyzing] (PLO 1&2)					
	Skill	CLO6. Derive mathematical expressions relating to material stress, strain and viscoelastic properties and describe and quantify failure mechanisms. [Mechanism] (PLO 4&6)					

	Attitude	CLO7. Participate in a group research project and present the results of this project in a professional manner. [Organization] (PLO 7)					
Level of competence according to Bloom’s Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight</u> : lecture session (2.5 hours)						
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Course introduction				1	I, T
	2	Polymers: Polymer synthesis, Polymer characterization				2	T, U
	3	Biodegradable polymers: chemistry of hydrolysis, degradation mechanisms				1	T, U
	4	Hydrogels: hydrogel structure and crosslinking, hydrogel swelling and characterization				2	T
	5	Hydrogels: Polyelectrolyte swelling and applications				2	T, U
	6	Adhesives and coatings: Natural polymers and adhesion; Surface treatments and analysis				2	T
Examination forms	Multiple-choice questions				Oral examination		
	Report				Written examination		
	Presentation				Others, please specify:		
	Assignments						
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.						
Reading list	I. Textbooks						

	1. Encyclopedia of Biomaterials and Biomedical Engineering. Editors, Gary E. Wnek, Gary L. Bowlin. Informa Healthcare Publishing, 2008 2. Biomaterials Science: An Introduction to Materials in Medicine, eds. Ratner, B.D. et al. 2nd Ed. 2004. 3. Biomaterials: An Introduction, Park JB. 2007, 3rd Edition. (full text available online) 4. Materials Science and Engineering: An Introduction, Callister, W.D.Jr. 2002. 6th Ed. 5. Principles of Polymer Chemistry, Flory, Paul J., 1953. 6. Tissue engineering. Editors, Bernhard O. Palson, Sangeeta N. Bhatia. Prentice Hall Publishing. 2004
	II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-7) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	4	4					
	3	4	4					
	4	4	4					
	5	4	4					
Skills (Level: 1-7)	6				4		4	
Attitudes (Level: 1-5)	7							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	0.0	4.0	0.0	4.0	4.0
L,M,H conversion*		H	H		H		H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Course introduction	1,2	HW	Lecture	
2	2&3	Polymers: Polymer synthesis, Polymer characterization	3	HW	Lecture	
3	4&5	Biodegradable polymers: chemistry of hydrolysis, degradation mechanisms	3	HW	Lecture	
4	6	Hydrogels: hydrogel structure and crosslinking, hydrogel swelling and characterization	3	HW	Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
5	7	Hydrogels: Polyelectrolyte swelling and applications	3	HW	Lecture	
6	8	Adhesives and coatings: Natural polymers and adhesion; Surface treatments and analysis	3,4	HW	Lecture	
		Midterm exam				
7	9	Biomaterial analysis: Thermal & Advanced mechanical analysis	5			
8	10	Biologic Recognition: Protein adsorption; Engineered recognition	4	HW	Lecture	
9	11	Biologic Response: Thrombosis/Blood compatibility; Tissue compatibility and testing	3	HW	Lecture	
10	12	Controlled Release: Membrane systems; Swellable systems	3	HW	Lecture	
11	13	Micro and nanoparticle systems: Overview; Stealth systems	3	HW	Lecture	
12	14	Special Topics Presented by Students	7		Presentation	
13	15	Special Topics Presented by Students	7		Presentation	
14		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
HW/Presentation (30%)		>50%pass		>50%pass			
Midterm exam (30%)		>50%pass	>50%pass				
Final exam (40%)				>50%pass	>50%pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubric

Rubric for presentation

Criteria		Level						Point
		Excellent	Very good	Good	Fair	Average	Weak	
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50	
1. Report quality	40	85-100% of requirement					<50% of requirement	
2. PPT quality (follow the rule)	10	Follow the rule of PPT					Dull, small word, too	

Criteria	Level							Point
	%	Excellent	Very good	Good	Fair	Average	Weak	
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50	
of PPT Making, clear, attractive)		Making, clear, beautiful, attractive					much spelling and grammar mistakes	
3. Presentation (speaking skills, correct pronunciation, attractive, timing)	20	Confident, clear, correct pronunciation, attractive, timing					<50% content has not completed, not clear, dull	
4. Answer the questions from instructor and classmates (relevant to questions, satisfiable)	20	Relevant to questions, all answers are correct	80-90% correct	70-80% correct	60-70% correct	50-60% correct	<50% correct	
5. Team member participation	10	100% member participated in	$80\% \leq < 90\%$	$70\% \leq < 80\%$	$60\% \leq < 70\%$	$50\% \leq < 60\%$	<50% of members participated in	

6. Revision Date: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 2,4	Level of CLOs and Learning Outcomes matrix	21/8/2025	Nguyen Thi Thuy
2	Page 5-6	Add rubric		



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic Chemistry Synthesis

Course Code: CHE3311IU

1. General information

Course name	<i>- (in English)</i> Organic Chemistry Synthesis <i>- (in Vietnamese)</i> Tổng hợp hữu cơ				
Course designation	This course provides the students with intermediate level of organic chemistry with an emphasis on organic synthesis. Organic synthesis is the process of building organic molecules from simpler starting materials through chemical reactions. This is an important subject since organic molecules form the basic fabric of life.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5				
	☒ Semester 1 ☐ Semester 2 ☐ Summer				
Person responsible for the course	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☐ Compulsory ☒ Elective				

Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																										
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td><i>Credit</i></td><td>3</td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>4.64</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90.0</td><td>90.0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	3	3					<i>ECTS</i>	4.64						Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90.0	90.0	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
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Total workload	127.5	127.5	0	0	0	0																																					
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																										
Number of periods	Theory: 45 Practice: 0																																										
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: Organic Chemistry 2 CHE1091IU																																										
Course objectives	The students will gain understanding in fundamental reactions, mechanisms, and strategies of organic synthesis; will become proficient at reading organic chemistry literature and learn how to search for this information using modern information resources.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1. Demonstrate knowledge and understand concepts, principles and theories relating to organic synthesis. Apply such knowledge and understanding to the solution of problems related to the synthesis of organic target molecules</td></tr> <tr> <td>Skill</td><td>CLO2. Be able to communicate effectively in English</td></tr> <tr> <td>Attitude</td><td>CLO3. Demonstrate reasoned solutions to organic synthesis problems which reflect ethical standards and responsibilities.</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate knowledge and understand concepts, principles and theories relating to organic synthesis. Apply such knowledge and understanding to the solution of problems related to the synthesis of organic target molecules	Skill	CLO2. Be able to communicate effectively in English	Attitude	CLO3. Demonstrate reasoned solutions to organic synthesis problems which reflect ethical standards and responsibilities.																																		
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Synthesis design and stereochemical considerations in planning syntheses</td><td>1</td><td>I, T</td></tr> <tr> <td>2</td><td>The concept of protecting some functional groups N-H, O-H, diols</td><td>1</td><td>I, T</td></tr> <tr> <td>3</td><td>Protecting functional groups: aldehydes, ketones, carboxylic acids</td><td>2</td><td>I, T</td></tr> </tbody> </table>	No.	Topic	Weight	Level	1	Synthesis design and stereochemical considerations in planning syntheses	1	I, T	2	The concept of protecting some functional groups N-H, O-H, diols	1	I, T	3	Protecting functional groups: aldehydes, ketones, carboxylic acids	2	I, T																										
No.	Topic	Weight	Level																																								
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3	Protecting functional groups: aldehydes, ketones, carboxylic acids	2	I, T																																								

	4	Functional group transformation: oxidation and reduction	2	U, T
	5	Enolate chemistry 1,3-dicarbonyl enolates; ester and ketone enolates	1	U, T
	6	Imines, hydrazones and enamines	1	U, T
	7	Aldol reactions	2	U, T
	8	Mannich reaction, Michael addition, Robinson Annulation	1	U, T
	9	Formation of carbon-carbon π -bonds	2	I, T
	10	Wittig and related olefination reactions	1	I, T
	11	Synthesis of carbocyclic systems: cation- π cyclizations, Diels-Alder reaction	1	U, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] G. S. Zweifel and M. H. Nantz, Modern Organic Synthesis, An Introduction. 2007, W. H. Freeman. [2] E. J. Corey and Xue-min Chelg, The Logic of Chemical Synthesis. 1995, John Wiley & Sons II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2							
Skills (Level: 1-7)	3			3				
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	0.0	3.0
L,M,H conversion*		M		M				M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Synthesis design and stereochemical considerations in planning syntheses	1		- Lecture - Class discussion	
2.	2	The concept of protecting some functional groups N-H, O-H, diols	1		- Lecture - Class discussion	
3.	3, 4	Protecting functional groups: aldehydes, ketones, carboxylic acids	1,2,3	Assignment	- Lecture - Class discussion	
4.	5, 6	Functional group transformation: oxidation and reduction	1,2,3	Assignment	- Lecture - Class discussion	
5.	7	Enolate chemistry 1,3-dicarbonyl enolates; ester and ketone enolates	1,2, 3	Quiz, Assignment	- Lecture - Class discussion	
6.	8	Imines, hydrazones and enamines	1,2,3	Quiz	- Lecture - Class discussion	
		Midterm				
7.	9,10	The aldol reactions	1,2,3	Assignment	- Lecture - Class discussion	
8.	11	Mannich reaction, Michael addition, Robinson Annulation	1,2,3	Assignment	- Lecture - Class discussion	
9.	12,13	Formation of carbon-carbon π -bonds	1,2,3		- Lecture - Class discussion	
10.	14	Wittig and related olefination reactions	1,2,3	Assignment	- Lecture - Class discussion	
11.	15	Synthesis of carbocyclic systems: cation- π cyclizations, Diels-Alder reaction	1,2,3		- Lecture - Class discussion	
12.		Final Exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Assignment, Quiz (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass
Midterm exam (30%)	50%Pass	50%Pass	
Final exam (40%)	50 % Pass	50 % Pass	50 % Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional): No

6. Revision Date: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: Dr. Lê Quang Phong - Department of Applied Chemistry
- Email: lqphong@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Advanced Engineering Drawing

Course Code: CHE3414IU

1. General information

Course name	- <i>(in English)</i> Advanced Engineering Drawing - <i>(in Vietnamese)</i> Vẽ kỹ thuật Nâng cao
Course designation	This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Assignments, practice, discussion

Workload (incl. contact hours, self-study hours)		Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	2	0			
	Contact hours	25	0	0	0	0
	Self-Study hours	60	0	0	0	0
	Total workload	85	0	0	0	0
Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS					
Number of periods	Theory: 30 Practice: 0					
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course:					
Course objectives	The aim of this course is - To develop proficiency in creating, interpreting, and evaluating accurate 2D engineering drawings using Auto CAD software, while applying industry standards and geometric dimensioning and tolerancing principles. - To enhance the ability to communicate complex engineering designs effectively through technical drawings, ensuring clarity, precision, and adherence to conventions and standards.					
Course learning outcomes	Upon successful completion of this course, students will be able to:					
	Competency level¹	Course learning outcome (CLO)				
	Knowledge	CLO1. Analyze the effectiveness of various engineering drawing techniques in conveying complex technical information of chemical engineering. (Level 4 – Analyzing)				

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Analyze the application of geometric dimensioning and tolerancing principles in improving the accuracy and precision of engineering designs. (Level 4 – Analyzing)																																												
	Skills	CLO3. Construct 2D engineering drawings using CAD software, focusing on the accurate representation of chemical engineering systems. (Level 4 – Mechanism) CLO4. Construct technical drawings that ensure clarity and precision in design communication. (Level 4 – Mechanism) CLO5. Construct standard conventions and symbols in engineering drawings to represent chemical components, ensuring consistency and compliance with TCVN and ISO. (Level 4 – Mechanism)																																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Technical Drawing Overview</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Setting up and using the Drafting tools</td><td>1</td><td>T, U</td></tr><tr><td>3</td><td>Organizing Objects with Blocks and Groups</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Editing and Reusing Data to Work Efficiently</td><td>1</td><td>T, U</td></tr><tr><td>5</td><td>Introduce to Printing, Plotting and Layouts</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Using Field and Table</td><td>1</td><td>T, U</td></tr><tr><td>7</td><td>Advanced Editing and Organizing</td><td>1</td><td>T, U</td></tr><tr><td>8</td><td>Laying Out Your Printer Output</td><td>1</td><td>T, U</td></tr><tr><td>9</td><td>Using Dynamic Blocks</td><td>1</td><td>T, U</td></tr><tr><td>10</td><td>Getting and Exchanging Data from Drawings</td><td>1</td><td>I, U</td></tr></table>		No.	Topic	Weight	Level	1	Technical Drawing Overview	1	I, T	2	Setting up and using the Drafting tools	1	T, U	3	Organizing Objects with Blocks and Groups	1	T, U	4	Editing and Reusing Data to Work Efficiently	1	T, U	5	Introduce to Printing, Plotting and Layouts	1	I, T	6	Using Field and Table	1	T, U	7	Advanced Editing and Organizing	1	T, U	8	Laying Out Your Printer Output	1	T, U	9	Using Dynamic Blocks	1	T, U	10	Getting and Exchanging Data from Drawings	1	I, U
No.	Topic	Weight	Level																																											
1	Technical Drawing Overview	1	I, T																																											
2	Setting up and using the Drafting tools	1	T, U																																											
3	Organizing Objects with Blocks and Groups	1	T, U																																											
4	Editing and Reusing Data to Work Efficiently	1	T, U																																											
5	Introduce to Printing, Plotting and Layouts	1	I, T																																											
6	Using Field and Table	1	T, U																																											
7	Advanced Editing and Organizing	1	T, U																																											
8	Laying Out Your Printer Output	1	T, U																																											
9	Using Dynamic Blocks	1	T, U																																											
10	Getting and Exchanging Data from Drawings	1	I, U																																											
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☐ Written examination ☒ Others, please specify: Constructed-response test																																													
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																													
Reading list	I. Textbooks [1] George Omura, Brian C. Benton (2015), Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press 1st Edition, Sybex Publisher 2015. II. References [2] Trần Hữu Quế – Nguyễn Văn Tuấn (2009), Vẽ kỹ thuật theo tiêu chuẩn quốc tế, NXB Bách Khoa Hà Nội.																																													

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge (Level 1-6)	1		4					
	2	4						
Skills (Level 1-7)	3				4			
	4						4	
	5			4				
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE	4	4	4	4		4	
L,M,H Conversion*		M	M	M	M		M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Technical Drawing Overview	1,2	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1 [2] 1,2,3
2	2	Setting up and using the Drafting tools	1,2	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 2
3	3	Organizing Objects with Blocks and Groups	3	Attendance Q&A Midterm	Reading materials before class; Doing the lecture; Demo on the computer; Practicing,	[1] 3
4	4	Editing and Reusing Data to Work Efficiently	3	Attendance Q&A Midterm	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 4
5	5	Introduce to Printing, Plotting and Layouts	3	Attendance Q&A Midterm	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 5

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6	6	Using Field and Table	3	Attendance Q&A Midterm	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 6
7	7	Advanced Editing and Organizing	4,5	Attendance Q&A Final	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 7
8	8	Laying Out your Printer Output MIDTERM EXAM	4,5	Attendance Q&A Final PRACTICE ON COMPUTER	Reading materials before class; Doing the lecture; Demo on the computer; Practicing. EXAM	[1] 8
10	9	Using Dynamic Blocks	4,5	Attendance Q&A Final	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 9
11	10	Getting and Exchanging Data from Drawings	4,5	Attendance Q&A Final	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 10
12	16-17	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Class participation (10%)	80% Pass	80% Pass			
Assignments (20%)	80% Pass	80% Pass			
Midterm exam (Mid, 20%)			60%Pass		
Final exam (Fin, 50%)				60%Pass	60%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Revision Date: August 20, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Pham Thanh Tung
- Email: pttung@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Advanced Engineering Drawing Lab

Course Code: CHE3415IU

1. General information

Course name	- <i>(in English)</i> Advanced Engineering Drawing - <i>(in Vietnamese)</i> Vẽ kỹ thuật Nâng cao				
Course designation	This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5				
	☒ Semester 1 ☐ Semester 2 ☐ Summer				
Person responsible for the course	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☐ Compulsory ☒ Elective				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Assignments, practice, discussion				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	0	1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1 credit (Theory: 0 + Practice: 1) 2.00 ECTS						
Number of periods	Theory: 0 Practice: 30						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☒ Corequisites: <i>Advanced Engineering Drawing (CHE3414IU)</i> ☐ Previous course:						
Course objectives	The aim of this course is: - To develop practical skills in creating accurate 2D engineering drawings for chemical engineering systems, using advanced AutoCAD commands and applying industry standards. - To enhance the ability to interpret and construct complex technical drawings, ensuring clarity and precision in design communication.						
Course learning outcomes	Upon successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Analyze different engineering drawing methods used to represent chemical engineering systems to ensure clear communication and effective design. (Level 4 – Analyzing)					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Analyzing geometric dimensioning and tolerancing in creating precise and accurate drawings for chemical engineering equipment. (Level 4 – Analyzing)																												
	Skills	CLO3. Construct accurate 2D engineering drawings using AutoCAD drawing software for chemical engineering systems. (Level 4 – Mechanism) CLO4. Construct process flow diagrams and piping and instrumentation diagrams for chemical processes. (Level 4 – Mechanism) CLO5. Construct proper symbols and conventions in engineering drawings to represent equipment and instruments correctly in chemical engineering projects. (Level 4 – Mechanism)																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (4.2 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Read and interpret a drawing</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Analyze engineering drawing</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Generate a drawing</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Complete a drawing</td><td>1</td><td>T, U</td></tr><tr><td>5</td><td>Modify a drawing</td><td>1</td><td>T, U</td></tr><tr><td>6</td><td>Manage drawings</td><td>1</td><td>T, U</td></tr></table>		No.	Topic	Weight	Level	1	Read and interpret a drawing	1	I, T	2	Analyze engineering drawing	1	I, T	3	Generate a drawing	1	T, U	4	Complete a drawing	1	T, U	5	Modify a drawing	1	T, U	6	Manage drawings	1	T, U
No.	Topic	Weight	Level																											
1	Read and interpret a drawing	1	I, T																											
2	Analyze engineering drawing	1	I, T																											
3	Generate a drawing	1	T, U																											
4	Complete a drawing	1	T, U																											
5	Modify a drawing	1	T, U																											
6	Manage drawings	1	T, U																											
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☐ Written examination ☒ Others, please specify: Constructed-response test																													
Other requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																													
Reading list	I. Textbooks																													

	[1] George Omura, Brian C. Benton (2015), Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press 1st Edition, Sybex Publisher 2015. II. References [2] Trần Hữu Quế – Nguyễn Văn Tuấn (2009), Về kỹ thuật theo tiêu chuẩn quốc tế, NXB Bách Khoa Hà Nội.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge (Level 1-6)	1		4					
	2	4						
Skills (Level 1-7)	3				4			
	4						4	
	5			4				
Contribution of ILOs to CLOs								
Bloom's Taxonomy	AVE	4	4	4	4		4	
L,M,H Conversion*		M	M	M	M		M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Read and interpret a drawing	1,2	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
2	2	Analyze engineering drawing	1,2	Attendance Q&A Assignment	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
3	3	Generate a drawing	3,4,5	Attendance Q&A Final exam	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
4	4	Complete a drawing	3,4,5	Attendance Q&A Final exam	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
5	5	Modify a drawing	3,4,5	Attendance Q&A Final exam	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6	6	Manage drawings	3,4,5	Attendance Q&A Final exam	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
7	16-17	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Class participation (30%)	80%Pass	80%Pass			
Assignments (20%)	80%Pass	80%Pass			
Final exam (50%)			60%Pass	60%Pass	60%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Revision Date: August 20, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Pham Thanh Tung
- Email: pttung@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: **Environmental Chemistry 1**

Course Code: **CHE3121IU**

1. General information

Course name	- <i>(in English)</i> Environmental Chemistry 1 - <i>(in Vietnamese)</i> Hóa môi trường 1				
Course designation	This course is designed for students who are pursuing a degree in chemical engineering or any other related fields such as environmental chemistry, environmental science and environmental engineering.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☐ Year 3	☒ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☐ Compulsory ☒ Elective				
Teaching methods	Lecture				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	3	3				
	<i>ECTS</i>	4.64					
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90.0	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☒ Previous course: CHE1061IU Analytical chemistry 2						
Course objectives	Students are provided a fundamental understanding of water chemistry, including natural processes and pollution problems in water, that will serve the students as a basis in all common phases of practice and research on environmental engineering, water pollution control, management, and monitoring water resource quality.						

Course learning outcomes	Upon the successful completion of this course, students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Analyze the influence of pollutant chemical structures on their physical–chemical properties, environmental fate, and behavior in aquatic systems using advanced environmental chemistry concepts. <i>[4_analyze]</i> CLO2. Analyze engineering solutions for the removal of major water quality parameters from water/wastewater, ensuring compliance with public health and environmental protection standards. <i>[4_analyze]</i>
	Skill	CLO3. Display complex water quality problems, scientific findings, and potential solutions in clear, well-structured presentations and technical reports in English. <i>[4-Analyze]</i> CLO4. Organize effective teamwork strategies, contributing to collaborative investigations of water quality issues and integrating peer input to achieve project goals. <i>[4-Analyze]</i> CLO5. Analyze current and emerging practices in water resource conservation and pollution control to identify future professional development needs and apply appropriate learning strategies. <i>[4-Analyze]</i>
	Attitude	

Content	Weight: lecture session (2.5 hours/weight)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Course introduction. Water quality	1	I, T
	Contaminant behavior in the water environment	1	I, T
	Major water quality parameters and applications: pH, Acidity – Alkalinity, Oxidation – reduction potential (ORP), Biochemical oxygen demand (BOD), chemical oxygen demand (COD), Total organic carbon, Turbidity, Color, Solid and their removal methods	4	T, U
	Nutrients and odors: nitrogen, phosphorus, and sulfur and their removal methods	3	T, U
	Behavior of metal species in natural water and their removal methods	2	T, U
	Soil, Groundwater, and Subsurface Contamination	1	T, U
	Selected topics in environmental chemistry	2	I, T
Examination forms	☒ Multiple-choice questions ☐ Report ☒ Presentation ☒ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Eugene R. Weiner. <i>Applications of Environmental Aquatic Chemistry – A Practical Guide</i> . 3rd Edition. CRC Press, 2013. [2] Patrick L. Brezonik and William A. Arnold, <i>Water chemistry</i> . Oxford University Press, 2011.		

Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x

Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge	1	4						
	2		4					
Skill	3			4				
	4				4			
	5						4	
Attitudes								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion		H	H	H	H		H	

3. Planned learning activities and teaching methods.

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Course introduction. Water quality introduction	1	A1.1	Lecture, Discussion, In class	[1] chapter 1 [2] chapter 2
2	Contaminant behavior in the water environment	1	A1.2	Lecture, Discussion, In class activities	[1] chapter 2 [2] chapter 3
3	Major water quality parameters and applications: pH, Acidity – Alkalinity, Oxidation – reduction potential (ORP)	2	A1.3	Lecture, Discussion, In class activities	[1] chapter 3 [2] chapter 4
4,5	Major water quality parameters and applications: Hardness, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Total organic carbon.	2	A1.4	Lecture, Discussion, In class activities	[1] chapter 4 [2] chapter 3
6	Major water quality parameters and applications: Turbidity, color, solid. Drinking water treatment	2	A1.5	Lecture, Discussion, In class activities	[1] chapter 5 [2] chapter 4
7	Nutrients and odors: Ammonia, nitrite and nitrate. Method for nitrogen removal	2	A1.6	Lecture, Discussion, In class activities	[1] chapter 6 [2] chapter 5
8	Review and midterm exam	1,2	A2		
9	Nutrients and odors: Phosphorus, eutrophication, and algae problems. Method for phosphorus removal	2	A1.7	Lecture, Discussion, In class activities	[1] chapter 7 [2] chapter 6
10	Nutrients and odors: sulfide and hydrogen sulfide. Method for	2	A1.8	Lecture, Discussion, In class	[1] chapter 8 [2] chapter 7

Week	Topic	CLO	Assessments	Learning activities	Resources
	sulfur removal			activities	
11,12	Behavior of metal species in the natural water. Method for metal removal in water	2	A1.9	Lecture, Discussion, In class activities	[1] chapter 8 [2] chapter 7
13	Soil, Groundwater, and Subsurface Contamination	2	A1.10	Lecture, Discussion, In-class activities	[1] chapter 9 [2]chapter 10
14,15	Selected topics in environmental chemistry	3, 4	A1.11	Presentation Discussion,	
16	Reserved week				
17,18	Final exam	2,3,4,5	A3		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class activities (30%) (Quiz + HW + Presentation) (A1)	A1.1-A1.2 (>60% pass)	A1.3-A1.10 (>60% pass)	A1.11.I (>60% pass)	A1.11.II (>60% pass)	
Midterm exam (20%) (A2)	A2.I (>60% pass)	A2.II (>60% pass)			
Final exam (50%) (A3)		A3.I (>60% pass)	A3.II (>60% pass)	A3.II (>60% pass)	A3.III (>60% pass)

5. Rubrics

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Critical thinking value rubric for evaluating questions in exams

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	Capstone	Milestone		Benchmark
	4	3	2	1
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Date revised: 12/08/2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Ngo Thi Thuan
- Email: ntthuan@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Environmental Chemistry 2

Course Code: CHE3131IU

1. General information

Course name	- <i>(in English)</i> Environmental Chemistry 2 - <i>(in Vietnamese)</i> Hoá Môi trường 2				
Course designation	This course is designed for students pursuing a degree in chemical engineering and provides core knowledge in environmental monitoring with an emphasis on the chemistry of the atmosphere and solid waste. The knowledge of this course will be helpful for students to explain the fate and behaviors of typical compounds in solid waste and ambient air.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☐ Year 3	☒ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	Dr. Ngo Thi Thuan, nnthuan@hcmiu.edu.vn Dr. Tran Thanh Tu, ttu@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☐ Compulsory ☒ Elective				

Teaching methods	Lecture, lesson, homework						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	3	3				
	<i>ECTS</i>	4.64					
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90.0	90.0	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course						
Course objectives	Students will be provided with knowledge about basic concepts related to atmospheric chemistry, solid waste, and solid waste chemistry, as well as basic compositions of solid waste and relevant solid waste treatment methods. Through this unit, students will know how to use chemical reactions occurring in the environment to identify the origin of products in solid waste treatment and the atmosphere.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Analyze atmospheric and solid waste chemistry problems by integrating fundamental concepts,					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		environmental monitoring data, and chemical reaction mechanisms to propose scientific solutions [4_analyze] CLO2. Analyze environmentally sustainable air pollution and solid waste treatment strategies that address public health, ecological safety, and socio-economic considerations. [4_analyze]																																								
	Skill	CLO3. Analyze and interpret environmental chemistry data related to ambient air and solid waste to produce clear, evidence-based reports and presentations in English for technical and non-technical audiences. [4-Mechansim, PLO3] CLO4. Analyze collaborative team processes in environmental chemistry projects to identify strengths, resolve conflicts, and enhance the effectiveness of group work in meeting defined objectives. [4-Mechansim, PLO4] CLO5. Analyze emerging trends, technologies, and research in atmospheric chemistry and solid waste management to determine knowledge gaps and select appropriate lifelong learning strategies. [4-Mechansim, PLO6]																																								
	Attitude																																									
3 Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1.</td><td>Atmosphere and atmospheric chemistry</td><td>2</td><td>I, T</td></tr><tr><td>2.</td><td>Particles in the atmosphere</td><td>1</td><td>I, T</td></tr><tr><td>3.</td><td>Gaseous inorganic air pollutants</td><td>2</td><td>I, T</td></tr><tr><td>4.</td><td>Gaseous organic air pollutants</td><td>1</td><td>I, T</td></tr><tr><td>5.</td><td>Photochemical smog</td><td>1</td><td>I, T</td></tr><tr><td>6.</td><td>Classification, sources, component and characteristic of solid waste & hazardous waste</td><td>2</td><td>I, T</td></tr><tr><td>7.</td><td>Physical, chemical and biological properties of solid waste</td><td>1</td><td>I, T</td></tr><tr><td>8.</td><td>Chemistry in composting Compost quality indicators</td><td>1</td><td>I, T</td></tr><tr><td>9.</td><td>Chemistry in biogas</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1.	Atmosphere and atmospheric chemistry	2	I, T	2.	Particles in the atmosphere	1	I, T	3.	Gaseous inorganic air pollutants	2	I, T	4.	Gaseous organic air pollutants	1	I, T	5.	Photochemical smog	1	I, T	6.	Classification, sources, component and characteristic of solid waste & hazardous waste	2	I, T	7.	Physical, chemical and biological properties of solid waste	1	I, T	8.	Chemistry in composting Compost quality indicators	1	I, T	9.	Chemistry in biogas	1	I, T
No.	Topic	Weight	Level																																							
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7.	Physical, chemical and biological properties of solid waste	1	I, T																																							
8.	Chemistry in composting Compost quality indicators	1	I, T																																							
9.	Chemistry in biogas	1	I, T																																							

		Biogas purification		
	10.	Waste incineration Waste-to-energy	2	I, T
	11	Case study	1	I, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify ☐ Assignments			
Other requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Colin Baird, Michael Cann, <i>Environmental chemistry</i>. 5th edition, W. H. Freeman and Company, New York, 2012. [2] Stanley E. Manahan, <i>Environmental chemistry</i>, 9th edition, Taylor and Francis Group, 2009. [3] Roy M. Harrison, <i>Principles of Environmental Chemistry</i>, RSC Publishing, UK, 2007. [4] William A. Worrell and P. Aarne Vesilind, <i>Solid Waste Engineering 2nd edition</i>. CENGAGE learning. USA, 2012. [5] Pradyot Patnaik, <i>Handbook of Environmental Chemical Pollutants in Air, Water, Soil and Solid Wastes</i>, CRC Press, USA, 1997. [6] Murray B. McBride, <i>Environmental Chemistry of Soil</i>, Oxford University Press, New York, 2012. [7] L.F. Diaz, M. de Bertoldi, W. Bidlingmaier, <i>Compost Science and Technology Vol.8</i>. Elsevier. UK, 2007.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitude
		1	2	3	4	5	6	7
Knowledge	1	4						
	2		4					
Skill	3			4				
	4				4			
	5						4	
Attitudes								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion		H	H	H	H		H	

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1,2	Course introduction. The atmosphere and atmospheric chemistry	1,2,3 ,4,5	A1.1	Lecture, Discussion, In class	[1] Chapter 1 [2] Chapter 2
2.	3	Particles in the atmosphere	1,2,3 ,4,5	A1.1	Lecture, Discussion, In class activities	[1] Chapter 2 [2] Chapter 3
3.	4,5	Gaseous inorganic air pollutants	1,2,3 ,4,5	A1.3	Lecture, Discussion, In class activities	[1] Chapter 3 [2] Chapter 4
4.	6	Gaseous organic air pollutants	1,2,3 ,4,5	A1.4	Lecture, Discussion, In class activities	[1] Chapter 4 [2] Chapter 3
5.	7	Selected topics in atmospheric chemistry	1,2,3 ,4,5	A1.11	Lecture, Discussion, In class activities	[1] Chapter 5 [2] Chapter 4
6.	8	Review and Midterm	1,2,3 ,4,5	A2		

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	9,10	Classification, sources, component and characteristic of solid waste & hazardous waste	1,2,3 ,4,5	A1.6	Lecture, Discussion, Homework	[4] Chapter 2
8.	11	Physical, chemical and biological properties of solid waste	1,2,3 ,4,5	A1.7	Lecture, Discussion, Homework	[5] Part 2 [6] Chapter 2
9.	12	Chemistry in composting Compost quality indicators	1,2,3 ,4,5	A1.8	Lecture, Discussion, Homework	[4] Chapter 8 [7] Chapter 3,4
10.	13	Chemistry in biogas Biogas purification	1,2,3 ,4,5	A1.9	Lecture, Discussion, Homework	[7] Chapter 9
11.	14,15	Waste incineration Waste-to-energy	1,2,3 ,4,5	A1.10	Lecture, Discussion, Homework	[4] Chapter 7
13.	18	Reserved week				
14.	19,20	Final exam	1,2,3 ,4,5	A3		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
In-class activities (30%) (A1)	A1.1 >70% pass	A1.6-1.10 60%Pass	A1.2-A1.5 >70% pass)	A1.6-1.10 60%Pass	A1.11.I 60%Pass	A1.11.II 60%Pass
Midterm exam (20%) (A2)	A2 (>60% pass)		A2 (>60% pass)		A2 (>60% pass)	
Final exam (50%) (A3)		A3.Part1 A3.Part2		A3.Part2 60%Pass		A3.Part1 60%Pass

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
		60%Pass				

5. Rubrics

5.1. *Holistic rubric*

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. *Critical thinking value rubric for evaluating questions in exams*

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	Capstone	Milestone		Benchmark
	4	3	2	1
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Date revised: 20/08/2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Ngo Thi Thuan
- Email: ntthuan@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Heterogeneous Catalysis

Course Code: CHE3231IU

1. General information

Course name	- <i>(in English)</i> Heterogeneous Catalysis - <i>(in Vietnamese)</i> Xúc tác dị thể
Course designation	More than 90% of all the chemical product formation processes are catalytic in nature and heterogeneous catalysis plays an enormous role. Heterogeneous catalysis plays a very important and defining role in most of the chemical industry. This course will be very useful for undergraduate and post-graduate students, and practitioners to understand heterogeneous catalytic processes. This course starts with basics of catalysis and goes deeper into various aspects of catalytic preparation and characterization techniques. Aspects of catalytic testing and reactor types are to be included. The topics will also include the study of reaction mechanism and kinetics of heterogeneous catalytic reactions. The effect of external and internal transport processes on reaction rates will be covered. Topics will include Modeling, parameter estimations and model discriminations. Catalyst deactivation, which is the main problem faced in heterogeneous catalytic process will be covered in detail. Various actual industrial catalytic processes will be discussed. New developments in catalysis will be covered. The concept of fuel cell catalysts, monolith catalysts and nanocatalysts will be introduced. The latest methods of catalyst design and corresponding simulations techniques will also be included in the course. Each topic will be developed progressively and associated with up-to-date information along with references. Wherever required the concepts will be illustrated with case studies and solved problems.
Course type	☐ <i>General knowledge</i> ☐ <i>Fundamental</i> ☒ <i>Specialized knowledge</i> ☐ <i>Internship/Project/Thesis</i> ☐ <i>Others:</i>
	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5

Semester(s) in which the course is taught	☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person responsible for the course																																									
Language	English																																								
Relation to curriculum	☐ Compulsory ☒ Elective																																								
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Lecture</th> <th>Lab</th> <th>Project</th> <th>Internship</th> <th>Thesis</th> </tr> </thead> <tbody> <tr> <td></td> <td><i>Credit</i></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>37.5</td> <td>37.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>90</td> <td>90</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>127.5</td> <td>127.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
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Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																								
Number of periods	Theory: 45 Practice: 0																																								
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course: CHE2011IU - Reaction Kinetics and Catalysis																																								
Course objectives	At the end of the course, students should be able to (i) understand the historic perspective and future developments of catalysis, (ii) be able to formulate reaction mechanisms for chemical reactions and to derive correlations between material properties and catalysis, (iii) understand various nanomaterial synthesis/characterization and in-situ catalysis characterization techniques, (iv) have a deep understanding on a variety of industrial practices for energy conversion and unitizations, especially renewable energy conversion techniques, (v) criticize the scientific work by other researches in materials, catalysis, and energy; (vi) come up with the approaches for literature review of their research background and apply the principles and techniques covered in the course to their own research project.																																								

Course learning outcomes	Upon successful completion of this course, students will be able to:			
	Competency level ¹	Course learning outcome (CLO)		
	Knowledge	CLO1. Have knowledge about the fundamental principles and experimental techniques used to study the five steps in a heterogeneously catalyzed reaction [Analyzing]. CLO2. Apply engineering design in heterogeneous catalysis process [Analyzing].		
	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Mechanism]. CLO5. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	<u>Weight</u> : lecture session (2.5 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
1	Heterogeneous catalytic processes, types of heterogeneous reactions.	1	I, T	
2	Absorption, absorption isotherms, rates of absorption, physisorption and chemisorptions.	1	I, T	

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	3	Solid catalysis, types of catalysts, catalyst formulations and preparation methods.	3	I, T
	4	Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.	1	I, T
	5	Testing of catalysts, various types of reactors, activity and selectivity studies.	1	I, T
	6	Effect of external transport processes on observed rate of reactions.	1	I, T
	7	Effect of internal transport processes: reactions and diffusion in porous catalysts.	1	I, T
	8	Mechanism of catalytic reactions, rates of adsorption, desorption, surface reactions, rate determining steps.	1	I, T
	9	Kinetic modelling and parameter estimations, model discriminations.	1	I, T
	10	Catalysts promoters, Inhibitors, catalyst deactivations, kinetics of catalyst deactivations.	1	I, T
	11	Industrial processes involving heterogeneous solid catalysts.	1	I, T
	12	New development in solid catalysis, monolith catalysts, nanocatalysts, fuel cell catalysts, environmental catalysts, in-situ characterization.	1	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			

Reading list	I. Textbooks [1] C.H. Bartholomew, Robert J. Farrauto, <i>Fundamentals of Industrial Catalytic Processes</i> , 2nd edition, Wiley, 2010. [2]. Chorkendorff, J. W Niemantsverdriet, <i>Concept of Modern Catalysis and Kinetics</i> , 3 rd Edition, Wiley, 2017. II. References [1]. Bruce C. Gates, <i>Catalytic Chemistry</i> , Wiley, 1992 [2]. Roger Arthur Sheldon, Isabel W. C. E. Arends, Ulf Hanefeld, <i>Green Chemistry and Catalysis</i> , Wiley, 2007 [3]. M. Albert Vannice, <i>Kinetics of catalytic reactions</i> , Springer, 2005

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4				4			
	5						4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Heterogeneous catalytic processes, types of heterogeneous reactions.	1,4		- Lecture - Class discussion	[1]. [2].
2.	2	Absorption, absorption isotherms, rates of absorption,	1,4	Homework	- Lecture - Class discussion	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		physisorption and chemisorptions.				
3.	3,4,5	Solid catalysis, types of catalysts, catalyst formulations and preparation methods.	1,2	Homework	- Lecture - Class discussion	[1]. [2].
4.	6	Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.	1,4	Homework	- Lecture - Class discussion	[1]. [2].
5.	7	Testing of catalysts, various types of reactors, activity and selectivity studies.	1	Quiz	- Lecture - Class discussion	[1]. [2].
6.	8	Effect of external transport processes on observed rate of reactions.	1,2	Homework	- Lecture - Class discussion	[1]. [2].
		Midterm				
7.	9	Effect of internal transport processes: reactions and diffusion in porous catalysts.	1,2	Quiz	- Lecture - Class discussion	[1]. [2].
8.	10	Mechanism of catalytic reactions, rates of adsorption, desorption, surface reactions, rate determining steps.	1,5	Homework	- Lecture - Class discussion	[1]. [2].
9.	11	Kinetic modelling and parameter estimations, model discriminations.	1,5	Quiz	- Lecture - Class discussion	[1]. [2].
10.	12	Catalysts promoters, Inhibitors, catalyst deactivations, kinetics of catalyst deactivations.	1,4	Homework	- Lecture - Class discussion	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
11.	13	Industrial processes involving heterogeneous solid catalysts.	1,2,5	Homework	- Lecture - Class discussion	[1]. [2].
12.	14	New development in solid catalysis, monolith catalysts, nanocatalysts, fuel cell catalysts, environmental catalysts, in-situ characterization.	1,2,5		- Lecture - Class discussion	[1]. [2].
13.	15	Project presentations	1,2,3 ,4,5		-oral presentation - Class discussion	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes/ Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass
Midterm exam (25%)	Q3 50%Pass	Q1, Q2 50%Pass			
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass			Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

	Capstone	Milestone		Benchmark
	4	3	2	1
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email:

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Methods for Natural Products and Drugs

Course Code: CHE3324IU

1. General information

Course name	- <i>(in English)</i> Methods for Natural Products and Drugs - <i>(in Vietnamese)</i> Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc
Course designation	This course is to introduce the special methods and techniques used in studying of natural products and drugs. Topics to be covered include: typical methods for separation and isolation of natural products; structure determination of organic compound by modern analysis such as NMR, MS, IR,...; total synthesis of drugs and organic compounds.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify:												
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis						
	Credit	3											
Contact hours	37.5	37.5	0	0	0	0	0						
Self-Study hours	90	90	0	0	0	0	0						
Total workload	127.5	127.5	0	0	0	0	0						
Credit points	3 credits (Theory: 3+ Practice: 0) 4.64 ECTS												
Number of periods	Theory: 45 Practice: 0												
Requirements for taking the course	☐ None ☐ Prerequisites: (Please specify course ID & course title, if any) ☐ Corequisites: ☒ Previous course: Organic Chemistry 2 CHE1091IU; Analytical Chemistry 2 CHE1061IU												
Course objectives	The students will gain knowledge in separation and purification of natural products by using the chromatography techniques; be able to determinate structures of organic compounds by using instrument analysis methods; and to design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds; and can use lab equipment in isolation and synthesis of natural products and organic compounds.												
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td> CLO1. Evaluation of knowledge in separation and purification of natural products by using the chromatography techniques. CLO2. Analysis of the structures of organic compounds by using instrumental analysis methods; propose the protocol and conduct the total synthesis of typical drugs. </td></tr> <tr> <td>Skill</td><td>CLO3. Be able to communicate effectively in Vietnamese and English.</td></tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Evaluation of knowledge in separation and purification of natural products by using the chromatography techniques. CLO2. Analysis of the structures of organic compounds by using instrumental analysis methods; propose the protocol and conduct the total synthesis of typical drugs.	Skill	CLO3. Be able to communicate effectively in Vietnamese and English.
Competency level	Course learning outcome (CLO)												
Knowledge	CLO1. Evaluation of knowledge in separation and purification of natural products by using the chromatography techniques. CLO2. Analysis of the structures of organic compounds by using instrumental analysis methods; propose the protocol and conduct the total synthesis of typical drugs.												
Skill	CLO3. Be able to communicate effectively in Vietnamese and English.												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)												
	No.	Topic				Weight	Level						

	1	Introduction to Operations Research	1	I, T
	2	Study in natural products Separate determinate components of essential oils from plants by GC-MS; isolate natural products from essential oils. Theoretical study	3	I, T
	3	Study in natural products Extract and purify natural compounds from extracts of plants by using thin layer and column chromatography. Theoretical study	3	I, T
	4	Study in natural products identify organic compounds by analysis of the spectrums of NMR, MS, IR,...Theoretical study	4	U, T
	5	Total synthesis of drugs design the protocol and introduce chemicals and conditions for synthesis of organic compounds. Theoretical study	4	U, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Organic chemistry of drug synthesis, Vol. 1-4 II. References [1] Organic chemistry, J. McMurry. 8th edition			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4	▼				
	2	4						
Skills (Level: 1-7)	3			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*		H	H	H				

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Operations Research	1,3		- Lecture -Class discussion	
2.	2,3, 4	Study in natural products Separate determinate components of essential oils from plants by GC-MS; isolate natural products from essential oils. Theoretical study	1,3	Assignment	- Lecture -Class discussion	
3.	5, 6, 7	Study in natural products Extract and purify natural compounds from extracts of plants by using thin layer and column chromatography. Theoretical study	1,3	Assignment	- Lecture -Class discussion	
4.	8	Study in natural products identify organic compounds by analysis of the spectrums of NMR,				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		MS, IR,...Theoretical study (cont.) Midterm Exam				
5.	9, 10	Study in natural products (cont.) identify organic compounds by analysis of the spectrums of NMR, MS, IR,...Theoretical study	2,3	Quiz	- Lecture -Class discussion	
6.	11, 12, 13, 14	Total synthesis of drugs design the protocol and introduce chemicals and conditions for synthesis of organic compounds. Theoretical study The aldol reactions	2,3	Quiz	- Lecture -Class discussion	
7.	15	Final Exam (Mini report)	1-3			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Assignment, Quiz (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass
Midterm exam (30%)	50%Pass	50%Pass	
Final exam (Mini project) (40%)	50 % Pass	50 % Pass	50 % Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

Rubric for assignment, exams:

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Revision Date: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: Dr. Lê Quang Phong - Department of Applied Chemistry
- Email: lqphong@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Piping and Instruments System Design

Course Code: CHE3421IU

1. General information

Course name	- <i>(in English)</i> Piping and Instruments System Design. - <i>(in Vietnamese)</i> Thiết kế đường ống và thiết bị.				
Course designation	This course equips students with principles and practices of designing “Piping and Instrumentation Diagram - P & ID Diagram” for the process industries. More specifically, the main contents of this course are: 1. Principles and practices for creating / designing P& ID diagrams that satisfy requirements on operability and controllability of the process, as well as requirement on process safety. 2. Knowledge related to drawing / presenting equipment and instruments on the P & ID, as well as presenting technical information that describes characteristics of equipment and instruments on the P&ID 3. Knowledge related to drawing P & ID.				
Course type	☐ <i>General knowledge</i> ☐ <i>Fundamental</i> ☒ <i>Specialized knowledge</i> ☐ <i>Internship/Project/Thesis</i> ☐ <i>Others:</i>				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☐ Year 3	☒ Year 4	☐ Year 5
	☒ Semester 1		☐ Semester 2		☐ Summer
Person responsible for the course	Dr. Nguyen Thanh Duy Quang, ntdquang@hcmut.edu.vn Assoc.Prof. Nguyen Thi Thuy, ntthuy@hcmiu.edu.vn				
Language	English.				
Relation to curriculum	☐ Compulsory ☒ Elective				
Teaching methods	Lecture				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course.						
Course objectives	• Read and understand P & ID drawing • Select and specify valves, pipes and piping components, pumps in the design of P & ID drawing • Design the basic process control system (BPCS) and present results on the P & ID drawing • Create, design a P & ID drawing						
Course learning outcomes	Upon the successful completion of this course students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1: Analyze P & ID drawing [Analyzing]. CLO2: Select and specify valves, pipes and piping components, pumps; design the basic process control system (BPCS) in the design of P & ID drawing [Analyzing].					
	Skill	CLO3: Perform designing a P & ID drawing [Mechanism]. CLO4: Present the P & ID drawing [Mechanism].					
	Attitude						

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to P&ID design	1	I, T
	2	Management of P&ID Development	1	I, T
	3	Principles of P & ID Development	2	T, U
	4	P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)	2	T, U
	5	Measurement sensors and process instruments	1	T, U
	6	Valve Selection - Control Valve Sizing	2	T, U
	7	Designing the Basic Process Control System	2	T, U
	8	Design of process safeguarding systems	2	T, U
	9	P&ID design for process equipment	1	T, U
	10	Illustration examples	1	T, U
Examination forms	Written examination			
Study and examination requirements	<u>Attendance</u> : A minimum attendance of 70 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.			

Reading list	I. Textbooks [1]. Moe Toghraei. “ <i>Piping and Instrumentation Diagram Development</i> ”, Wiley, 2019 [2]. Franklyn W. Kirk, Thomas A. Weedon, Philip Kirk. <i>Instrumentation</i> , 5th Ed, American Technical Publishers, Inc, 2010 [3]. Ray Sinnott and Gavin Towler. Chapter 5 "PIPING AND INSTRUMENTATION" in the book “ <i>Chemical Engineering Design</i> ”, Elsevier, 2019 [4]. Charles E. Thomas. Chapter 11 and Chapter 12 in the book “ <i>Process Technology Equipment and Systems, 4th Edition</i> ”, Cengage Learning, 2015 II. References

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) and Program/Student Learning Outcomes (PLO) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skill (Level: 1-7)	3				4		4	
	4			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0		4.0	
L,M,H conversion *		M	M	M	M		M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Topic	CLO	Learning activities	Assessments	Resources
1	Introduction to P&ID design	1	Lecture, Discussion	Midterm exam	[1] [3] [4]

Week	Topic	CLO	Learning activities	Assessments	Resources
2	Management of P&ID Development	1	Lecture, Discussion	Midterm exam	[1] [3] [4]
3-4	Principles of P & ID Development	2, 3	Lecture, Discussion	Midterm exam	[1] [3] [4]
5-6	P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)	2, 3	Lecture, Discussion	Midterm exam; Final exam	[1] [3] [4]
7	Measurement sensors and process instruments	2, 3	Lecture, Discussion	Midterm exam; Final exam	[1] [2]
8	Valve Selection - Control Valve Sizing ❖ <u>Midterm exam</u>		Lecture, Discussion	Final exam HW1	[1] [3] [4]
9	Valve Selection - Control Valve Sizing (continued)		Lecture, Discussion	Final exam HW1	
10-11	Designing the Basic Process Control System	2, 3	Lecture, Discussion, HW	Final exam HW2	[1] [3] [4]
12-13	Design of process safeguarding systems	2, 3	Lecture, Discussion, HW	Final exam HW2	[1] [3] [4]
14	P&ID design for process equipment	2, 3	Lecture, Discussion, HW	Final exam HW2	[1] [3] [4]

Week	Topic	CLO	Learning activities	Assessments	Resources
15	Illustration examples	3,4	Lecture, Discussion	Final exam	[1] [3] [4]
---	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework exercises (30%)		HW1 70%Pass	HW2 70%Pass	HW2 70%Pass
Midterm exam (20%)	Q1 70%Pass	Q2 70%Pass		
Final exam (50%)		Q1 70%Pass	Q2 70%Pass	Q3 70%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

Rubric R1 for exam

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

Rubric R2 for homework

(Group presentation for selected units of a specific chemical and processing industry)

Criteria	Level							Point
	%	Excellent	Very good	Good	Fair	Average	Weak	
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50	
1. Report quality	40	85-100% of requirement					<50% of requirement	
2. PPT quality (follow the rule of PPT Making, clear, attractive)	10	Follow the rule of PPT Making, clear, beautiful, attractive					Dull, small word, too much spelling and grammar mistakes	
3. Presentation (speaking skills, correct pronunciation, attractive, timing)	20	Confident, clear, correct pronunciation, attractive, timing					<50% content has not completed, not clear, dull	
4. Answer the questions from instructor and classmates (relevant to questions, satisfiable)	20	Relevant to questions, all answers are correct	80-90% correct	70-80% correct	60-70% correct	50-60% correct	<50% correct	
5. Team member participation	10	100% member participated in	80% ≤ <90%	70% ≤ <80%	60% ≤ <70%	50% ≤ <60%	<50% of members participated in	

6. Date revised: August 19th, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: ntdquang@hcmut.edu.vn/ ntthuy@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 2	Revise CLOs	19/8/2025	Nguyen Thi Thuy
2	Page 4	Revise matrix and assessment		
3	Page 6	Revise assessment plan		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Sustainable Energy

Course Code: CHE3141IU

1. General information

Course name	<i>- (in English)</i> Sustainable Energy <i>- (in Vietnamese)</i> Năng lượng bền vững				
Course designation	This course will introduce students with concepts of sustainable energy conversion. Some of the main energy conversion such as solar, wind, hydroelectricity, hydrogen, biomass and geothermal energy together with technologies of energy storage will be discussed.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5				
	☒ Semester 1 ☐ Semester 2 ☐ Summer				
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar				
	Others, please specify:				

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis				
		<i>Credit</i>	3								
	Contact hours	37.5	37.5	0	0	0	0				
	Self-Study hours	90	90	0	0	0	0				
	Total workload	127.5	127.5	0	0	0	0				
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS										
Number of periods	Theory: 45 Practice: 0										
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course:										
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • Energy conversion, storage and consumption • The impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption. • Feasibility/cost of the most prominent sustainable energy conversion methods. • Challenges to achieve sustainable energy conversion. • Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, and the economics of energy. Develop the skills required to work as a member of a group Apply the knowledge learnt in class to solve real-life problem.										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, the economics of energy, the impact of the various energy conversion and storage technologies, as well as paths of</td></tr></table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, the economics of energy, the impact of the various energy conversion and storage technologies, as well as paths of
Competency level	Course learning outcome (CLO)										
Knowledge	CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, the economics of energy, the impact of the various energy conversion and storage technologies, as well as paths of										

		energy use/consumption, and the sustainable energy conversion methods [Analyze] (PLO 1&2).																												
	Skill	CLO2. Able to calculate energy consumption for different types of energy, performing cost-analysis for each energy system to solve real-life problems. [Mechanism] (PLO 3, 4, & 6)																												
	Attitude																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Sustainable energy Fossil fuels</td><td>3</td><td>I,T,U</td></tr><tr><td>2</td><td>Economics of Energy Generation and Conservation System</td><td>3</td><td>T,U</td></tr><tr><td>3</td><td>Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Capturing solar energy through biomass Wind energy</td><td>2</td><td>T,U</td></tr><tr><td>5</td><td>Nuclear energy Energy storage</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Ocean hydropower, and geothermal energy conversion</td><td>2</td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Sustainable energy Fossil fuels	3	I,T,U	2	Economics of Energy Generation and Conservation System	3	T,U	3	Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting	3	T,U	4	Capturing solar energy through biomass Wind energy	2	T,U	5	Nuclear energy Energy storage	2	T,U	6	Ocean hydropower, and geothermal energy conversion	2	T,U
No.	Topic	Weight	Level																											
1	Introduction to Sustainable energy Fossil fuels	3	I,T,U																											
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5	Nuclear energy Energy storage	2	T,U																											
6	Ocean hydropower, and geothermal energy conversion	2	T,U																											
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																													
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.																													

	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Kreith, Frank, Principles of Sustainable Energy Systems, CRC Press (2013)

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4					
Skills (Level: 1-7)	2			4	4		4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1-2	Introduction to Sustainable energy Fossil fuels	1,2	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]
2	3-4	Economics of Energy Generation and Conservation System	1,2	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]
3	5-7	Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting	1,2	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4	8	Midterm				
5	9-11	Capturing solar energy through biomass Wind energy	3,4	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]
6	12-13	Nuclear energy Energy storage	3,4	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]
7	14-15	Ocean hydropower, and geothermal energy conversion	3,4	Presentation	Lecture, Group work, Presentation, assignment, design problems	[1]
8	16	Final				

4. Assessment plan

Assessment Type	CLO1	CLO2
Presentation (30%)	50% pass	50% pass
Midterm Exam (20%)	50% pass	50% pass
Final Exam (50%)	50% pass	50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional):

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	Capstone	Milestone		Benchmark
	4	3	2	1
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

6. Revision Date: August 11, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Examination forms	Remove presentation	16/2/2024	Dr. Doan Hoai Linh
2	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
3	Learning Outcomes Matrix	Changed the contribution	05/06/2025	Dr. Doan Hoai Linh
4	Course learning outcomes	Removed all CLOs. Changed CLO1 and CLO2	05/06/2025	Dr. Doan Hoai Linh
5	Assessment plan	All assessments cover both CLOs	05/06/2025	Dr. Doan Hoai Linh
6	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
7	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
8	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
9	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Natural Gas Processing

Course Code: CHE3151IU

1. General information

Course name	- <i>(in English)</i> Natural Gas Processing - <i>(in Vietnamese)</i> Chế biến khí thiên nhiên
Course designation	This course is to provide an overview of chemical processes typically implemented to process the natural gas extracted from the ground into a valuable commodity. This course includes basic elements of economic analysis, optimization, and the description of a few unit operations that are essential for the implementation of natural gas processing plants.
Course type	☐ General knowledge ☐ Fundamental ☒ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice:0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course:						
Course objectives	- Students can gain fundamental insights into the thermodynamic principles for natural gas processing. - Students can have a clear picture of the basic design principles for the common units in the natural gas processing plant. - Students know how to formulate and solve problems using appropriate calculations for the plant design. - Students can interpret the solutions. - Students can set up a strategy, perform basic design and profitability analysis for natural gas processing plants. - Students are able to apply this knowledge confidently and correctly in industrial areas.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to identify various reserves, composition, properties, importance of natural gas and gain basic					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		knowledge of natural gas transportation technologies and natural gas processing; Able to gain deep knowledge of all processes in a natural gas processing plant from reserves to customers (raw gas transmission, phase separation, sweetening, dehydration, compression, and transportation); Able to solve problems involving simplified design for natural gas treating sweetening, dehydration and compression units using the appropriate calculations [Analyzing]. CLO2. Able to perform a preliminary unit sizing and design of equipment in natural gas processing facilities; Able to perform basic analysis and design of natural gas processing plants and evaluate the profitability and optimize via case studies [Analyzing].																																				
	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Mechanism]. CLO5. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Natural Gas</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Natural gas properties and thermodynamics</td><td>1</td><td>T, U</td></tr><tr><td>3</td><td>Processing Overview</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Raw Gas Transmission and Phase Separation</td><td>1</td><td>T</td></tr><tr><td>5</td><td>Natural Gas Sweetening</td><td>1</td><td>T, U</td></tr><tr><td>6</td><td>Natural Gas Dehydration</td><td>1</td><td>T</td></tr><tr><td>7</td><td>Natural Gas Compression</td><td>1</td><td>T, U</td></tr><tr><td>8</td><td>Transportation Systems</td><td>1</td><td>T, U</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Natural Gas	1	I, T	2	Natural gas properties and thermodynamics	1	T, U	3	Processing Overview	1	T, U	4	Raw Gas Transmission and Phase Separation	1	T	5	Natural Gas Sweetening	1	T, U	6	Natural Gas Dehydration	1	T	7	Natural Gas Compression	1	T, U	8	Transportation Systems	1	T, U
No.	Topic	Weight	Level																																			
1	Introduction to Natural Gas	1	I, T																																			
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6	Natural Gas Dehydration	1	T																																			
7	Natural Gas Compression	1	T, U																																			
8	Transportation Systems	1	T, U																																			

	9	Natural Gas Processing Plant Design 1	1	I, T
	10	Natural Gas Processing Plant Design 2	1	I, T
	11	Equipment Design 1	1	I, T
	12	Equipment Design 2	1	I, T
	13	Costing Engineering	1	I, T
	14	Profitability Analysis	1	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Arthur J. Kidnay, William R. Parrish, Daniel G. McCartney, Fundamentals of Natural Gas Processing, Third Edition, 3rd Edition, CRC Press, 2020. II. References [2] Saeid Mokhatab, William A. Poe and John Y. Mak, Handbook of Natural Gas Transmission and Processing, Elsevier, 3rd Edition, 2015.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4				4			
	5						4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Natural Gas	1,4		- Lecture - Class discussion	[1].
2.	2	Natural gas properties and thermodynamics	1,2	Homework	- Lecture - Class discussion	[1].
3.	3	Processing Overview		Homework	- Lecture - Class discussion	[1].
4.	4	Raw Gas Transmission and Phase Separation		Homework	- Lecture - Class discussion	[1].
5.	5	Natural Gas Sweetening		Quiz	- Lecture - Class discussion	[1].
6.	6	Natural Gas Dehydration		Homework	- Lecture - Class discussion	[1].
7.	7	Natural Gas Compression		Homework	- Lecture - Class discussion	[1].
8.	8	Transportation Systems		Quiz	- Lecture - Class discussion	
		Midterm				

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
9.	9	Natural Gas Processing Plant Design 1		Homework	- Lecture - Class discussion	[1].
10.	10	Natural Gas Processing Plant Design 2		Homework	- Lecture - Class discussion	[1].
11.	11	Equipment Design 1		Homework	- Lecture - Class discussion	[1].
12.	12	Equipment Design 2		Quiz	- Lecture - Class discussion	[1].
13.	13	Costing Engineering		Homework	- Lecture - Class discussion	[1].
14.	14	Profitability Analysis		Quiz	- Lecture - Class discussion	[1].
15.	15	Project Presentation	1,2, 3,4,5		- Class discussion	
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes/Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass
Midterm exam (25%)	Q3 50%Pass	Q1, Q2 50%Pass			
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass			Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone 4	Milestone 3 2		Benchmark 1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	Capstone	Milestone		Benchmark
	4	3	2	1
				when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		similar level of excellence/				
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often	Central message can be deduced but is not explicitly	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
		and strongly supported.)		repeated and is not memorable.	stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Bioinorganic Chemistry

Course Code: CHE3241IU

1. General information

Course name	- <i>(in English)</i> Bioinorganic Chemistry - <i>(in Vietnamese)</i> Hóa sinh vô cơ
Course designation	This course will take the students to the wonderland laying at the interface of inorganic chemistry and biochemistry. It first introduces the basic concepts of biochemistry and inorganic chemistry, which will serve as the basis for the extensive discussions on the diverse chemistry of metals in biology. As bioinorganic chemistry is a highly interdisciplinary field, this course cannot cover all aspects. This course focuses on the common themes found in the field. Some important systems and recent advances with potential applications will be highlighted.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Assoc.Prof. Nguyễn Thảo Trang
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Biochemistry CHE1104IU; Inorganic chemistry CHE2103IU						
Course objectives	- This course aims to provide the student with a deep understanding and thus appreciation for bioinorganic chemistry. - The students will acquire updated knowledge and techniques required to design studies of any bioinorganic chemistry systems. - The students will have a set of skills to understand, evaluate, summarize, and effectively present scientific literature.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level		Course learning outcome (CLO)				
	Knowledge		CLO1. Be able to differentiate basic concepts in biochemistry and inorganic chemistry, evaluate the roles of metals in biology; biologically important hydrolytic chemistry exerted by metalloenzymes; electron transport in proteins and biologically important oxidative chemistry exerted by metalloenzymes.				
	Skill		CLO3. Be able to communicate effectively in both Vietnamese and English.				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	Weight: lecture session (2.5 hours)						
	Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
1	Basic Concepts of Biochemistry Basic Concepts of Inorganic Chemistry						

	2	Metals in biology		
	3	Hydrolytic Chemistry		
	4	Electron transfer in proteins		
	5	Chemistry of O ₂		
	6	Other special enzymes		
	7	Model complexes and Bioinspired catalysts		
	8	Metals in Medicine		
	9	Final project presentations		
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	- Ivano Bertini, Harry B. Gray, Stephen J. Lippard, and Joan Selverstone Valentine; Biological Inorganic Chemistry, University Science Books, 2007 - Stephen J. Lippard and Jeremy M. Berg, Principles of Bioinorganic Chemistry, University Science Books, 1994			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-7) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	3			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*		H		H				

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No	Week	Content	Learning outcome	Teaching & learning activity	Assessment
1	1	Basic Concepts of Biochemistry: a. Building blocks of biology: Amino acids	CLO1,2	Lecture Class discussion	
2	2 -3	Basic Concepts of Inorganic Chemistry: b. Metal-ligand interaction c. Ligand field theory d. Redox properties e. Spectroscopy: Optical, CD, Mössbauer, EPR, XAS	CLO 1, 2	Lecture Class discussion	Homework
3	4-5	Metals in biology: a. Metal-protein interactions b. Metal based cofactors in biology c. Transport and storage of metal ions in biology	CLO 1, 2	Lecture Student presentation Class discussion	Homework Presentation
4	6	Hydrolytic Chemistry: a. Carbonic anhydrase b. Urease c. Acotinase	CLO 1,2	Lecture Group presentation Class discussion	Homework Presentation
5	7-8	Electron transfer in proteins a. Basic concepts b. Fe-S clusters c. Copper proteins d. Photosynthesis and respiration Midterm	CLO 1,2	Lecture Group presentation Class discussion	Homework Presentation
6	9-10	Chemistry of O ₂ a. Basic concepts b. O ₂ transport c. C-H bond cleaving enzymes: d. Recalcitrant polymer degrading oxidative enzymes	CLO1,2	Lecture Group presentation Class discussion	Homework Presentation
8	11	Other special enzymes a. Hydrogenase b. Nitrogenase c. Decarbonylase	CLO1,2	Lecture Group presentation Class discussion	Homework Presentation
9	12	Model complexes and Bioinspired catalysts	CLO1,2	Lecture Group presentation Class discussion	Presentation
10	13	Metals in Medicine: a. Anti-cancer agents b. Contrast agents	CLO 1,2	Lecture Group presentation Class discussion	Presentation
11	14	Final project presentations	CLO1,2	Group Presentation Class discussion	Presentation
12	15	Final exam			

4. Assessment plan

Assessment Type	CLO1	CLO2
Homework, Assignment, Project (Presentation) (30%)	50% pass	50% pass
Midterm examination (20%)	50% pass	50% pass
Final examination (50%)	50% pass	50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Rubric for presentation:

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
1. Selecting papers	20	Appropriate with the topic					Inappropriate with the topic, less relevant
2. Expanding the reading with various related references for unclear issues from papers	10	Expanding for more than 2 related other papers					No expanding the reading other references
3. Present about the contents of papers and answer the questions from instructor and classmates	60	Deeply understand about the contents of papers; all answers are correct					Little understanding about the paper contents; less than 50% answers are correct
4. Presentation skill	20	Well organize the slides; well illustrate the contents with figures/cartoons/tables; clear accent					Poorly organize the slides; poorly illustrate the contents with figures/cartoons/tables; read from slide

5.2 Rubric for assignment, exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

6. Revision Date: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Medicinal chemistry

Course Code: CHE3331IU

1. General information

Course name	- <i>(in English)</i> Medicinal chemistry - <i>(in Vietnamese)</i> Hóa dược
Course designation	This course will cover the principles of drug actions and the design and development of potential therapeutics. The action and behavior of pharmaceutical compounds and the relationship between their structure and their chemical and therapeutic properties, and the chemical considerations in drug design will also be explored. Methods of drug discovery will be introduced including computer modeling and rational drug design.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Assoc.Prof. Nguyen Thao Trang, nttrang@hcmiu.edu.vn
Language	English

Relation to curriculum	☐ Compulsory ☒ Elective																																								
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
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Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																								
Number of periods	Theory: 45 Practice: 0																																								
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: ☒ Previous course: Biochemistry CHE1104IU																																								
Course objectives	The students will be provided with fundamental knowledge of medicinal chemistry which allows to gain insights into how to choose a lead compound to be a medicinal drug, study its mechanism of action, identify the drug targets, evaluate its medicinal and toxic effects, synthesize better analogues, and study the pathways for metabolism and elimination from the body.																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Be able to analyze and evaluate the chemical nature with biochemical behavior of common classes of drug targets and modes of drug action; differentiate between pharmacodynamics and pharmacokinetics and evaluate how these processes impact drug activity within the body. CLO2. Be able to interpret the measure of the activity of enzymes and receptors; analyze the biological activity and pharmacokinetic properties of a molecule by structural </td></tr> </tbody> </table>						Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Be able to analyze and evaluate the chemical nature with biochemical behavior of common classes of drug targets and modes of drug action; differentiate between pharmacodynamics and pharmacokinetics and evaluate how these processes impact drug activity within the body. CLO2. Be able to interpret the measure of the activity of enzymes and receptors; analyze the biological activity and pharmacokinetic properties of a molecule by structural																															
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		changes; propose approaches for optimizing a molecule's structure into a safe and effective drug.																												
	Skill	CLO3. Be able to communicate effectively in both Vietnamese and English.																												
	Attitude																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Overview of Drugs and drug targets</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Structures and functions of important drug targets</td><td>6</td><td>I, T</td></tr><tr><td>4</td><td>Drug pharmacokinetics</td><td>2</td><td>I, T</td></tr><tr><td>5</td><td>Drug discovery</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Drug design</td><td>4</td><td>I, T, U</td></tr><tr><td>7</td><td>Computer tools in drug design</td><td>1</td><td>I, T, U</td></tr></table>		No.	Topic	Weight	Level	1	Overview of Drugs and drug targets	1	I, T	2	Structures and functions of important drug targets	6	I, T	4	Drug pharmacokinetics	2	I, T	5	Drug discovery	1	I, T	6	Drug design	4	I, T, U	7	Computer tools in drug design	1	I, T, U
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Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments																													
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																													
Reading list	I. Textbooks [1] Graham L. Patrick, In Introduction to Medicinal Chemistry, 5th edition, 2013, Oxford University Press. II. References																													

Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

Knowledge (Level: 1-6)	1	4						
	2	4						
Skills (Level: 1-7)	3			4				
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	0.0	0.0	0.0
L,M,H conversion*		H		H				

2. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Overview of Drugs and drug targets	1,2, 3	Quiz 1	- Lecture - Class discussion	
2.	2, 3	Receptor: structure and function Receptors and signal transduction	1, 2, 3	Quiz 1 Assignment 1	- Lecture - Class discussion	
3.	4	Nucleic acid: structure and function	1, 2, 3	Quiz 1 Assignment 1	- Lecture - Class discussion	
4.	5, 6	Enzyme and receptors as drug targets	1,2, 3	Quiz 2, Assignment 2	- Lecture - Class discussion	
5.	7	Nucleic acid as drug targets	1,2, 3	Quiz 2, Assignment 2	- Lecture - Class discussion	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Miscellaneous drug targets				
6.	8	Review Midterm exam				
7.	9	Drug pharmacokinetics: absorption, distribution, metabolism, excretion, administration and dosing	1,2, 3	Quiz 3, Assignment 3	- Lecture - Class discussion	
8.	10	Steps in Drug discovery: choosing a disease, choosing a drug target, identifying a bioassay, finding a lead compound	1,2, 3	Project	- Lecture - Class discussion	
9.	11- 12	Drug design: - structure and activity relationship. - optimizing interactions with the targets	1,2, 3	Assignment 4	- Lecture - Class discussion	
10.	13-14	Drug design: optimizing access to the target.	1,2, 3	Assignment 4	- Lecture - Class discussion	
11.	15	Introduction to Computer tools in drug design Review	1,2, 3	Quiz 4	- Lecture - Class discussion	
12.	16	Final exam				

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Assignment, Quiz, Project (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Assignment, Project 50 %Pass
Midterm exam (20%)	Q1, Q2 50%Pass	Q3, Q4 50%Pass	

Assessment Type	CLO1	CLO2	CLO3
Final exam (50%)	Q1, Q2 50 % Pass	Q3, Q4 50 % Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Rubric for presentation:

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
1. Selecting papers	20	Appropriate with the topic					Inappropriate with the topic, less relevant
2. Expanding the reading with various related references for unclear issues from papers	10	Expanding for more than 2 related other papers					No expanding the reading other references
3. Present about the contents of papers and answer the questions from instructor and classmates	60	Deeply understand about the contents of papers; all answers are correct					Little understanding about the paper contents; less than 50% answers are correct
4. Presentation skill	20	Well organize the slides; well illustrate the contents with figures/cartoons/tables; clear accent					Poorly organize the slides; poorly illustrate the contents with figures/cartoons/tables; read from slide

5.2 Rubric for assignment, exams

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Calculation	Totally correct in calculations with the differences (if have) in results in within 5%	Calculations mainly correct with 1-2 mistakes; Results are not strongly affected (within 10%)	Direction is correct, calculations with 50% steps containing mistakes; Results are strongly affected	Calculation is done but mainly wrong or less relevant	No calculation; calculation is not relevant

Criteria	Level				
	Excellent	Good	Average	Weak	
	100	75	50	25	0
Theory/suggestion	Answer is totally correct	Answer is mainly correct at 75%	Answer is correct at 50%	Answer is not clear and less relevant	No answer; answer is not relevant

4. Revision Date: August 19, 2025

5. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thao Trang
- Email: nttrang@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Treatment Plant Operation

Course Code: CHE3431IU

1. General information

Course name	- (in English) Treatment Plant Operation - (in Vietnamese) Vận hành nhà máy xử lý
Course designation	This course provides the fundamentals for the cost-effective, safe, and lawful operation of wastewater or sanitation treatment systems. This course provides skills in experimental set-up used for operation units of wastewater treatment plants. It also provides the basics of environmental legislation and regulations, risk management, and HSE.
Course type	☐ General knowledge ☐ Fundamental ☒ Specialized knowledge ☐ Internship/Project/Thesis ☐ Others:
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Associate Prof. Dr. Tran Tien Khoi, ttkhai@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3 credits (Theory: 3 + Practice:0) 4.64 ECTS						
Number of periods	Theory: 45 Practice: 0						
Required and recommended prerequisites for joining the course	- Prerequisites: - Corequisites: - Previous course:						
Course objectives	This course provides student knowledge of wastewater treatment systems, the legislation and regulations for the treatment, disposal, and management; application of knowledge for operation, analyzing factors, detecting technical problems.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Understand the wastewater treatment systems; List the fundamentals of the operational units that are part of the wastewater treatment plants; Analyze and estimate factors relating to planning of wastewater management system; Detect and assess technical problems in wastewater treatment plants operation [Analyzing].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Apply the legislation and regulations of wastewater treatment, disposal and management; Apply knowledge of physico-chemical processes and biological processes operation of wastewater treatment plants [Analyzing].																								
	Skill	CLO3. Communicate (in English) effectively with a range of audiences [Mechanism]. CLO4. Manipulate and operate wastewater treatment systems, Set up targets and requirements of wastewater treatment systems [Mechanism]. CLO5. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Lecture 1. Overview</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Lecture2. Wastewater Treatment Plant Management</td><td>3</td><td>T, U</td></tr><tr><td>3</td><td>Lecture 3. Management and Control of Emission from the Plant</td><td>3</td><td>T, U</td></tr><tr><td>4</td><td>Lecture 4. Operation</td><td>4</td><td>T,U</td></tr><tr><td>5</td><td>Lecture 5. Optimizing system operation</td><td>3</td><td>T, U</td></tr></table>		No.	Topic	Weight	Level	1	Lecture 1. Overview	1	I, T	2	Lecture2. Wastewater Treatment Plant Management	3	T, U	3	Lecture 3. Management and Control of Emission from the Plant	3	T, U	4	Lecture 4. Operation	4	T,U	5	Lecture 5. Optimizing system operation	3	T, U
No.	Topic	Weight	Level																							
1	Lecture 1. Overview	1	I, T																							
2	Lecture2. Wastewater Treatment Plant Management	3	T, U																							
3	Lecture 3. Management and Control of Emission from the Plant	3	T, U																							
4	Lecture 4. Operation	4	T,U																							
5	Lecture 5. Optimizing system operation	3	T, U																							
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☐ Written examination ☐ Presentation ☒ Others, please specify: Short answer questions ☐ Assignments																									
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																									
Reading list	I. Textbooks																									

	[1]. T. George, L.B. Franklin, H.D. Stensel, <i>Wastewater Engineering: Treatment and Resource Recovery</i>, 4th edition, Metcalf and Eddi Inc, 2003 II. References [2]. Wesley Eckenfelder, <i>Industrial Water Pollution Control</i>, 3rd edition, McGraw-Hill Education, 2000 [3]. Mecalf and Eddy, <i>Wastewater Engineering, Treatment, Disposal and Resource Recovery</i>, 5th edition, McGraw-Hill Education, 2013

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3			4				
	4				4			
	5						4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Lecture 1. Overview 1.1. Legislations and Regulations 1.2. Technical Standards Risk Management 1.3. Safety Regulations Important factor in management and operation of wastewater treatment system	1,2,5		Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
2.	2	Lecture2. Wastewater Treatment Plant Management 2.1. Management Concepts, Content and Objectives 2.2. Team Building 4Organization and Structure of M5anagement systems	1,2,4	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
3.	3	Lecture2. Wastewater Treatment Plant Management 2.3. Operation Instructions Forms, Documents and Records	1,2,4	Quiz	- Group discussion -Class discussion	[1], [2], [3]
4.	4	Lecture2. Wastewater Treatment Plant Management 2.4. Training and Maintenance plan 2.5. HSE Operation Cost Estimation	1,2,4,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
5.	5	Lecture 3. Management and Control of Emission from the Plant 3.1. Air and Odor Sources Sludge	1	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
6.	6	Lecture 3. Management and Control of Emission from the Plant 3.2. Solid Wastes Hazardous Wastes	1,4,5	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	7,8	Lecture 3. Management and Control of Emission from the Plant Sources Monitoring and Control	1	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
Midterm						
8.	9	Lecture 4. Operation 4.1. Operation Process Equipment and Instruments – PID Drawing	1,2,3,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
9.	10	Lecture 4. Operation 4.2. Pumps and Piping Systems Chemical Handling Systems	1,2,3,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
10.	11	Lecture 4. Operation 4.3. Aeration Systems Sludge Handling Systems	1,2,3,5	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
11.	12	Lecture 4. Operation 4.6. Sludge Handling Systems Electrical Control Systems	1,2,3,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
12.	13	Lecture 5. Optimizing system operation 5.1. Operation Diary Laboratory Management	1,2	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
13.	14	Lecture 5. Optimizing system operation 5.2. Energy Saving System Failure	1,2	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
14.	15	Lecture 5. Optimizing system operation 5.3. Lost and Prevention Biological Process Monitoring	1,2	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
Final exam						

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes/Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass	HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass
Midterm exam (25%)	Q3 50%Pass	Q1, Q2 50%Pass			
Final exam (45%)	Part I 50%Pass	Part II.1,2 50%Pass			Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and

	Capstone	Milestone		Benchmark
	4	3	2	1
	perspectives discussed in priority order.	implications) are identified clearly.	outcomes (consequences and implications) are identified clearly.	implications) are oversimplified.

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
		appropriate to audience.		appropriate to audience.		
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
				credibility/ authority on the topic.	credibility/ authority on the topic.	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 18, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1		Update syllabus	20/04/2024	PTKhoa
2		Change format	09/06/2025	PTKhoa
3		Change CLO & level of CLO	18/08/2025	PTKhoa



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Corrosion Chemistry

Course Code: CHE3251IU

1. General information

Course name	- <i>(in English)</i> Corrosion Chemistry - <i>(in Vietnamese)</i> Hóa học ăn mòn
Course designation	This course will introduce students with concepts of corrosion. The mechanism of corrosion including active corrosion, galvanic corrosion, passivity and localized corrosion and electrochemical reduction reactions and environmentally assisted cracking will be covered. The methods of corrosion mitigation including cathodic protection, coatings, inhibitors and passivators as well as the influence of material's chemical composition and microstructure on corrosion behavior will also be discussed.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective

Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
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Total workload	127.5	127.5	0	0	0	0																																				
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																									
Number of periods	Theory: 45 Practice: 0																																									
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Physical Chemistry 2 (CHE1043IU); Inorganic Chemistry (CHE2103IU); Organic Chemistry 1 (CHE1081IU)																																									
Course objectives	This course introduces to students the following special topics, including: aspects of electrochemistry and materials science relevant to corrosion phenomena; methods for predicting, measuring and analyzing corrosion performance of materials; and practices for the prevention and remediation of corrosion.																																									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Identify the origin of the difference in electrical potential across an interface, the relationship between the rate of electrochemical reaction and potential drop across interfaces. Evaluate the cause and mechanism of various types of corrosion. Identify materials that exhibit adequate corrosion resistance in a particular environment. [Analyze] (PLO 1&2)</td></tr> <tr> <td>Skill</td><td>CLO2. Discuss the influence of a material's composition and microstructure on its corrosion performance. [Mechanism] (PLO 3, 4 &6)</td></tr> <tr> <td>Attitude</td><td></td></tr> </table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Identify the origin of the difference in electrical potential across an interface, the relationship between the rate of electrochemical reaction and potential drop across interfaces. Evaluate the cause and mechanism of various types of corrosion. Identify materials that exhibit adequate corrosion resistance in a particular environment. [Analyze] (PLO 1&2)	Skill	CLO2. Discuss the influence of a material's composition and microstructure on its corrosion performance. [Mechanism] (PLO 3, 4 &6)	Attitude																												
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¹ Level of competence according to Bloom's Taxonomy: <table border="1"> <tr> <td></td><td>Level 1</td><td>Level 2</td><td>Level 3</td><td>Level 4</td><td>Level 5</td><td>Level 6</td><td>Level 7</td></tr> <tr> <td>Knowledge</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td><td>x</td></tr> </table>									Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x																			
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Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight:</u> lecture session (2.5 hours)						
	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Definition and importance of corrosion	1	I, T			
	2	Electrochemical mechanisms	2	T, U			
	3	Thermodynamics: Corrosion tendency and electrode potentials	1	T, U			
	4	Thermodynamics: Pourbaix diagrams. Construction and use of Pourbaix diagrams	2	T			
	5	Corrosion inhibitors	2	T, U			
	6	Corrosion inhibitors	2	T			
	7	Corrosion protection by coatings	1	T, U			
	8	Theories of passivity	1	T, U			
	9	Influence of microstructure on corrosion	0.5	I, T			
	10	Corrosion of nanostructures	0.5	I, T			
	11	Corrosion in non-aqueous electrolytes	0.5	I, T			
12	Hydrogen assisted cracking	0.5	I, T				
13	Atmospheric corrosion	0.5	I, T				
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:						
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.						
Reading list	I. Textbooks						

	1. R. Winston Revie and Herbert H. Uhlig, Corrosion and Corrosion Control - An Introduction to Corrosion Science and Engineering, Wiley-Interscience (2008). 2. D Jones, Principles and Prevention of Corrosion, Macmillan Publications New York, 1992. II. References 1. J J Meketta, Cathodic Protection Theory and Practice, Marcel Dekker Publication, New York, 1993. 2. S N Banerjee, An Introduction to Corrosion and Corrosion Inhibition, Oxonian Press Ltd., New Delhi.

3. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4	4				
Skills (Level: 1-7)	2			4	4		4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion*		H	H	H	H		H	

*L (Low); M (Medium); H (High)

4. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
	1	Definition and importance of corrosion		HW	Lecture	
	2&3	Electrochemical mechanisms		HW	Lecture	
	4	Thermodynamics: Corrosion tendency and electrode potentials		HW	Lecture	
	5	Thermodynamics: Pourbaix diagrams. Construction and use of Pourbaix diagrams		HW	Lecture	
	6	Corrosion inhibitors		HW	Lecture	
	7	Corrosion protection by coatings				
	8	Midterm				
	9	Theories of passivity		HW	Lecture	
	10	Influence of microstructure on corrosion		HW	Lecture	
	11	Corrosion of nanostructures		HW	Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
	12	Corrosion in non-aqueous electrolytes		HW	Lecture	
	13	Hydrogen assisted cracking		HW	Lecture	
	14-15	Atmospheric corrosion		HW	Lecture	
	16	Final exam				

5. Assessment plan

Assessment Type	CLO1	CLO2
Homework/Quiz/Presentation (30%)	>50%pass	>50%pass
Midterm exam (20%)	>50%pass	
Final exam (50%)	>50%pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

6. Rubrics:

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

7. Revision Date: August 11, 2025

8. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Doan Hoai Linh
- Email: dhlinh@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering

Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Planned learning activities	Changed Week and topic	05/06/2025	Dr. Doan Hoai Linh
2	Rubrics	Added	05/06/2025	Dr. Doan Hoai Linh
3	Learning Outcomes Matrix	Changed	11/08/2025	Dr. Doan Hoai Linh
4	Course learning outcomes	Changed	11/08/2025	Dr. Doan Hoai Linh
5	Assessment plan	Changed	11/08/2025	Dr. Doan Hoai Linh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Project 1
Course Code: CHE0042IU

1. General information

Course name	- <i>(in English)</i> Project 1 - <i>(in Vietnamese)</i> Đồ án 1
Course designation	This course is designed for chemical engineering students to supplement their knowledge and practical skills in research or design . The content of the project will vary depending on the requirements when organizing the course. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop inter-personal skills.
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar

Teaching methods	Others, please specify:																																			
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td>1</td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>0</td><td>0</td><td>37.5</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>0</td><td>30</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>67.5</td><td>0</td><td>0</td><td>67.5</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>			1			Contact hours	37.5	0	0	37.5	0	0	Self-Study hours	30	0	0	30	0	0	Total workload	67.5	0	0	67.5	0	0
		Lecture	Lab	Project	Internship	Thesis																														
	<i>Credit</i>			1																																
Contact hours	37.5	0	0	37.5	0	0																														
Self-Study hours	30	0	0	30	0	0																														
Total workload	67.5	0	0	67.5	0	0																														
Credit points	1 credit (Theory:0 + Project: 1) 2.45 ECTS																																			
Number of periods	Theory: 0 Project: 45																																			
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																			
Course objectives	Students practice a project for research/ design topics, including identification of problem, specifying requirements, research/ technology proposal, and performing necessary experiment/calculation and design for main/principal contents/units in the project.																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Separate the scientific research/ design processes and illustrate how each step interlinks with the other, the requirements for decent research/ design [Analyzing]. CLO2. Select methodological tools used in empirical research/ design, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods [Analyzing]</td></tr> <tr> <td>Skill</td><td>CLO3. Develop the research/ design proposal [Mechanism]. CLO4. Develop the skills of problem-solving/teamwork [Mechanism].</td></tr> <tr> <td>Attitude</td><td></td></tr> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Separate the scientific research/ design processes and illustrate how each step interlinks with the other, the requirements for decent research/ design [Analyzing]. CLO2. Select methodological tools used in empirical research/ design, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods [Analyzing]	Skill	CLO3. Develop the research/ design proposal [Mechanism]. CLO4. Develop the skills of problem-solving/teamwork [Mechanism].	Attitude																												
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No.	Topic	Weight	Level																																	

	1	Project assignment and discussion	0.5	T, U
	2	Project plan development	0.5	T, U
	3	Review of pilot experiment / technology	0.5	T, U
	4	Revision of project plan for final implementation	0.5	T, U
	5	Research implementation /Technical calculation and design	2	T, U
	6	Writing report /Presentation of project outcomes	2	T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the advisor meeting. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	Textbooks or references will vary depending on the requirements when organizing the course.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skill (Level: 1-7)	3			4			4	
	4				4			
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0		4.0	
L,M,H conversion *		M	M	M	M		M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1-2	Project assignment and discussion	1,2, 3,4		Meeting and practicing	
2.		Project plan development	1,2, 3,4		Meeting and practicing	
3.		Review of pilot experiment / technology	1,2, 3,4		Meeting and practicing	
4.		Revision of project plan for final implementation	1,2, 3,4		Meeting and practicing	
5.	3-4	Research implementation /Technical calculation and design	1,2, 3,4		Meeting and practicing	
6.	5-6	Writing and Presentation of project outcomes	1,2, 3,4		Meeting and practicing	
		Process assessment		Advisor assessment		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Progress assessment	60% pass	60% pass	60% pass	60% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubric

R1. Process evaluation (for academic advisor)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
1. Writing skill and format	5	Compliance well to guidelines					Not follow
2. Introduction, literature review	5	relevant, sufficient, clear					Irrelevant, insufficient, unclear
3. Research proposal/Technology choice	10	suitable and practical technology					Unsuitable; inapplicable
4. Experiment/Calculation	30	right, sufficient, clear					More than 50% of calculations are wrong.
5. Results and discussion /Drawing	30	Sufficient, significant					Insufficient, insignificant
6. Meeting with advisor, planning for project	5	Plan well and complete project on time					Without plan, manage time

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
and management of time							
7. Self-reading, reviewing and enhancing knowledge	5	Selecting appropriate references, expanding the reading with various related references for unclear issues, apply effectively the knowledge of the references into the project					Selecting inappropriate/unreliable references, no expanding the reading with various related references for unclear issues, apply ineffectively/do not apply the knowledge of the references into the project
Total	100						

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering
Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 1,2	Revise contents	19/8/2025	Nguyen Thi Thuy
2	Page 3	Revise study plan		
3	Page 3-4	Revise matrix and assessment		
4	Page 4-5	Add rubric		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering**

COURSE SYLLABUS

Course Name: Project 2
Course Code: CHE0072IU

1. General information

Course name	- <i>(in English)</i> Project 2 - <i>(in Vietnamese)</i> Đồ án 2
Course designation	This course is designed for chemical engineering students to supplement their knowledge and practical skills in research or design . The content of the project will vary depending on the requirements when organizing the class. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop inter-personal skills.
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective

Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:																																								
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td>2</td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>75</td><td>0</td><td>0</td><td>75</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>0</td><td>0</td><td>60</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>135</td><td>0</td><td>0</td><td>135</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>			2			Contact hours	75	0	0	75	0	0	Self-Study hours	60	0	0	60	0	0	Total workload	135	0	0	135	0	0
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Self-Study hours	60	0	0	60	0	0																																			
Total workload	135	0	0	135	0	0																																			
Credit points	2 credits (Theory:0 + Project: 2) 4.91 ECTS																																								
Number of periods	Theory: 0 Project: 90																																								
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																								
Course objectives	Upon successful completion of this course, the students should: •Demonstrate an understanding of scientific method •Communicate scientific knowledge, experiments and conclusions effectively •Demonstrate laboratory experience working																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Separate the scientific research/ design processes and illustrate how each step interlinks with the other, the requirements for decent research/ design [Analyzing]. CLO2. Select methodological tools used in empirical research/ design, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods [Analyzing] </td></tr> <tr> <td>Skill</td><td> CLO3. Develop the research/ design proposal [Mechanism] CLO4. Develop the skills of problem-solving and function effectively on a team [Mechanism] </td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>						Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Separate the scientific research/ design processes and illustrate how each step interlinks with the other, the requirements for decent research/ design [Analyzing]. CLO2. Select methodological tools used in empirical research/ design, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods [Analyzing]	Skill	CLO3. Develop the research/ design proposal [Mechanism] CLO4. Develop the skills of problem-solving and function effectively on a team [Mechanism]	Attitude																												
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Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) Time and place: To be arranged with supervisors. <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td rowspan="2">1-2</td><td>Project assignment and discussion</td><td>1</td><td>T, U</td></tr><tr><td>Project plan development</td><td>1</td><td>T, U</td></tr><tr><td rowspan="2">3-4</td><td>Review of pilot experiment / technology</td><td>1</td><td>T, U</td></tr><tr><td>Revision of project plan for final implementation</td><td>1</td><td>T, U</td></tr><tr><td>5-8</td><td>Research implementation /Technical calculation and design</td><td>4</td><td>T, U</td></tr><tr><td>9-12</td><td>Writing report /Presentation of project outcomes</td><td>4</td><td>T, U</td></tr></table>				No.	Topic	Weight	Level	1-2	Project assignment and discussion	1	T, U	Project plan development	1	T, U	3-4	Review of pilot experiment / technology	1	T, U	Revision of project plan for final implementation	1	T, U	5-8	Research implementation /Technical calculation and design	4	T, U	9-12	Writing report /Presentation of project outcomes	4	T, U
No.	Topic	Weight	Level																											
1-2	Project assignment and discussion	1	T, U																											
	Project plan development	1	T, U																											
3-4	Review of pilot experiment / technology	1	T, U																											
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5-8	Research implementation /Technical calculation and design	4	T, U																											
9-12	Writing report /Presentation of project outcomes	4	T, U																											
Examination forms	☐ Multiple-choice questions ☒ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☐ Written examination ☐ Others, please specify:																													
Study and examination requirements	<u>Attendance</u>: A minimum attendance of 80 percent is compulsory for the advisor meeting. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																													
Reading list	Textbooks or references will vary depending on the requirements when organizing the course.																													

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skill (Level: 1-7)	3			4			4	
	4				4			
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0		4.0	
L,M,H conversion *		M	M	M	M		M	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Project assignment and discussion	1,2,3,4		Meeting and practicing	
2.	2	Project plan development	1,2,3,4		Meeting and practicing	
3.	3	Review of pilot experiment	1,2,3,4		Meeting and practicing	
4.	4	Revision of project plan for final implementation	1,2,3,4		Meeting and practicing	
5.	5-8	Research implementation	1,2,3,4		Meeting and practicing	
6.		Research implementation	1,2,3,4		Meeting and practicing	
7.		Research implementation	1,2,3,4		Meeting and practicing	
8.		Research implementation	1,2,3,4		Meeting and practicing	
9.	9-12	Writing and Presentation of project outcomes	1,2,3,4		Meeting and practicing	
10		Writing and Presentation of project outcomes	1,2,3,4		Meeting and practicing	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
11		Writing and Presentation of project outcomes	1,2,3,4		Meeting and practicing	
12		Writing and Presentation of project outcomes	1,2,3,4		Meeting and practicing	
		Process assessment		Advisor assessment		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Progress assessment	60% pass	60% pass	60% pass	60% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubric

R1. Process evaluation (for academic advisor)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Writing skill and format	5	Compliance well to guidelines					Not follow
2. Introduction, literature review	5	relevant, sufficient, clear					Irrelevant, insufficient, unclear
3. Research / design proposal	10	suitable and practical technology					Unsuitable; inapplicable
4. Experiment/ calculation	30	right, sufficient, clear					More than 50% of calculations are wrong.
5. Results and discussion /Drawing	30	Sufficient, significant					Insufficient, insignificant
6. Meeting with advisor, planning for project and management of time	5	Plan well and complete project on time					Without plan, manage time
7. Self-reading, reviewing and enhancing knowledge	5	Selecting appropriate references, expanding the reading with various related references for unclear issues, apply effectively the knowledge of the					Selecting inappropriate/ unreliable references, no expanding the reading with various related references for unclear issues, apply ineffectively/do not

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
		references into the project					apply the knowledge of the references into the project
Total	100						

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering

Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 1,2	Revise contents	19/8/2025	Nguyen Thi Thuy
2	Page 3	Revise study plan		
3	Page 3-4	Revise competency level of CLOs, matrix and assessment		
4	Page 4-5	Add rubric		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Environmental Pollution Control Engineering

Course Code: CHE3511IU

1. General information

Course name	- (in English) Environmental Pollution Control Engineering - (in Vietnamese) Kỹ thuật kiểm soát ô nhiễm môi trường
Course designation	This course provides additional knowledge and skills applicable to water and wastewater, air pollution and solid waste treatment for chemical engineering students.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Nguyen Thi Thuy, Assoc. Prof. PhD, ntthuy@hcmiu.edu.vn
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective
	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar

Teaching methods	Others, please specify:																																																
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td><i>Credit</i></td><td>3</td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>4.64</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>									Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	3	3					<i>ECTS</i>	4.64						Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																											
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Total workload	127.5	127.5	0	0	0	0																																											
Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																																
Number of periods	Theory: 45 Practice: 0																																																
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>(Please specify course ID & course title, if any)</i> <i>CHE2041IU: Mass Transfer Operations</i> <i>CHE2071IU: Mechanical Unit Operations</i>																																																
Course objectives	This course will introduce students to a range of knowledge and skills applicable to water and wastewater, air pollution, and solid waste treatment. Students will gain an understanding of sources of pollution and the legislative framework. Principle and operation of key treatment units for water and wastewater, air pollution, and solid waste will be covered. Industrial pollution and waste treatment in some chemical and processing industries will be given as case studies.																																																
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <td>Competency level¹</td><td>Course learning outcome (CLO)</td></tr> </table>							Competency level¹	Course learning outcome (CLO)																																								
Competency level¹	Course learning outcome (CLO)																																																

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Knowledge</td><td>CLO1. Illustrate pollutants generated from specific chemical and processing industries [Analyzing]. CLO2. Identify the structure, functions, and principles of key treatment units for water, wastewater, air pollution, and solid waste [Analyzing].</td></tr><tr><td>Skill</td><td>CLO3. Propose and defend basic technological schemes for waste treatment of some chemical and processing industries [Mechanism]. CLO4. Display the skills of self – reading, reviewing and enhancing knowledge about treatment technology for waste from various chemical and processing industries [Mechanism].</td></tr><tr><td>Attitude</td><td></td></tr></table>	Knowledge	CLO1. Illustrate pollutants generated from specific chemical and processing industries [Analyzing]. CLO2. Identify the structure, functions, and principles of key treatment units for water, wastewater, air pollution, and solid waste [Analyzing].	Skill	CLO3. Propose and defend basic technological schemes for waste treatment of some chemical and processing industries [Mechanism]. CLO4. Display the skills of self – reading, reviewing and enhancing knowledge about treatment technology for waste from various chemical and processing industries [Mechanism].	Attitude																							
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Attitude																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Chapter 1. Introduction</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Chapter 2. Water supply and water treatment</td><td>2.5</td><td>T, U</td></tr><tr><td>3</td><td>Chapter 3. Wastewater treatment</td><td>4.5</td><td>T, U</td></tr><tr><td>4</td><td>Chapter 4. Air pollution control</td><td>3</td><td>T</td></tr><tr><td>5</td><td>Chapter 5. Solid waste management</td><td>3</td><td>T, U</td></tr><tr><td>6</td><td>Chapter 6. Industrial pollution and waste treatment in some chemical and processing industries</td><td>1</td><td>T</td></tr></table>	No.	Topic	Weight	Level	1	Chapter 1. Introduction	1	I, T	2	Chapter 2. Water supply and water treatment	2.5	T, U	3	Chapter 3. Wastewater treatment	4.5	T, U	4	Chapter 4. Air pollution control	3	T	5	Chapter 5. Solid waste management	3	T, U	6	Chapter 6. Industrial pollution and waste treatment in some chemical and processing industries	1	T
No.	Topic	Weight	Level																										
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Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☐ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☐ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																					
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☐ Report	☐ Written examination																												
☐ Presentation	☐ Others, please specify:																												
☐ Assignments																													
Other requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.																												

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Ruth F. Weiner and Robin Matthews, <i>Environmental Engineering</i>. 4th Edition, Elsevier Science, 2003. [2] Rao. C. S. <i>Environmental Pollution Control Engineering</i>. 4th Edition, New Age International Private Limited, 2022. II. References [1] Rao Y. Surampalli, , Tian C. Zhang, Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma, <i>Handbook of Environmental Engineering</i>. 1st Edition, New York: McGraw-Hill Education, 2018. [2] Srinivasan, D., <i>Environmental Engineering</i>. PHI Learning, 2008

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skills (Level: 1-7)	3		4	4	4			
	4						4	
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0		4.0	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Chapter 1. Introduction - The Environment	4		Lecture, Group discussion,	Chapter 1 [1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		- The interaction between Humans and Environment - The role of the environmental engineering - Environmental Legislations - Environmental Monitoring - Control techniques – general consideration				Chapter 1 [2]
2	2-3-4	Chapter 2. Water supply and water treatment - Sources of water pollution and water quality - Groundwater, surface water supplies and transmission - Treatment units: coagulation and flocculation, settling, filtration, disinfection - Case studies (E.g. Thu Duc water treatment plant, Tan Phu water treatment plant...)	1,2, 3,4	Assignment 1 Assignment 2	Lecture, Group discussion, Presentation	Chapter 4,5,6,7 [1]
3	4-5-6-7	Chapter 3. Wastewater treatment - Estimating wastewater quantities - Wastewater characteristics - On-site wastewater treatment - Central wastewater treatment - Primary treatment units: Screening, grit removal, primary sedimentation - Secondary treatment units: Biological units, secondary sedimentation, disinfection - Tertiary treatment units - Case studies (Municipal wastewater treatment plant, Wastewater treatment plants for brewing, pulp and paper industry, textile industry...)	1,2, 3,4	Assignment 1 Assignment 2	Lecture, Group discussion, Presentation	Chapter 8,9 [1] Chapter 7,8,9 [2]
4	8	- Case studies (Municipal wastewater treatment plant, Wastewater treatment plants for	1,2, 3,4			

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		brewing, pulp and paper industry, textile industry...) - Midterm exam				
5	9-10-11	Chapter 4. Air pollution control - Source collection and air pollutants characteristics - Cooling - Control of particulates (Settling chamber, cyclone, fabric filter, wet collectors, Electrostatic precipitators) - Control of gaseous pollutants (absorption, condensers, adsorption, combustion) - Case studies (Cement Industry, thermal power plant, ...)	1,2,3,4	Assignment 1 Assignment 2	Lecture, Group discussion, Presentation	Chapter 18,19,20, 21 [1] Chapter 2,3,4,5,6 [2]
6	12-13-14	Chapter 5. Solid waste management - Sources, types, and characteristics of solid waste - Solid waste management: + Storage + Collection + Transportation + Treatment and disposal: burial, landfilling, composting, burning/incineration, recycling - Case studies	1,2,3,4	Assignment 1 Assignment 2	Lecture, Group discussion, Presentation	Chapter 12,13,14 [1] Chapter 10 [2]
7	15	Chapter 6. Industrial pollution and waste treatment in some chemical and processing industries Fertilizer, brewing, soap and synthetic detergent, dairy, petrochemical industry, Semiconductor manufacturing ...	3,4	Assignment 1 Assignment 2	Discussion Presentation	
8		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Assignment 1	R1			R1

Assessment Type	CLO1	CLO2	CLO3	CLO4
(15%)	60% pass			60% pass
Assignment 2 (15%)	R2 60% pass	R2 60% pass	R2 60% pass	
Midterm exam (20%)	M_Q1 60% pass	M_Q2 60% pass	M_Q3 60% pass	
Final exam (50%)	F_Q1 60% pass	F_Q2 60% pass	F_Q3 60% pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

5.1. Individual presentation for selected technical reports about pollutant sources (assignment 1)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Introduction, purpose of report (relevant, sufficient, clear)	10	Relevant, sufficient, clear					Not clear, not relevant
2. Methodology (apply for original research report)	5	Sufficient, clear, easy to understand					<50% of contents are shown, not clear, not logical
3. Findings of research (sufficient, clear, understandable)	10	Sufficient, clear, understandable					<50% of contents are shown, not clear, not logical
4. Structure of a technical report (enough, clear)	10	Enough, clear, easy to understand					<50% of contents are shown, not clear, not logical
5. PPT quality (follow the rule of PPT Making, clear, attractive)	20	Follow the rule of PPT Making, clear, attractive					Dull, small word, a lot of spelling and grammar mistakes
6. Presentation (speaking skills, correct pronunciation, attractive, timing)	20	Confident, clear, correct pronunciation, attractive, timing					<50% content has not completed, not clear, dull

		Level					
Criteria	%	Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
7. Answer the questions from instructor and classmates (relevant to questions, satisfiable)	15	Relevant to questions, all answers are correct	80-90% correct	70-80% correct	60-70% correct	50-60% correct	$< 50\%$ correct
8. Attitude and behavior	5	Professional					Unprofessional
9. Ability for self-learning	5	Active and efficient					Passive, ineffective

5.2. Group presentation for selected technical reports about treatment units of a specific chemical and processing industry (assignment 2)

Criteria		Level						Point
	%	Excellent	Very good	Good	Fair	Average	Weak	
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50	
1. Report quality	40	85-100% of requirement					$< 50\%$ of requirement	
2. PPT quality (follow the rule of PPT Making, clear, attractive)	10	Follow the rule of PPT Making, clear, beautiful, attractive					Dull, small word, too much spelling and grammar mistakes	
3. Presentation (speaking skills, correct pronunciation, attractive, timing)	20	Confident, clear, correct pronunciation, attractive, timing					$< 50\%$ content has not completed, not clear, dull	
4. Answer the questions from instructor and classmates (relevant to questions, satisfiable)	20	Relevant to questions, all answers are correct	80-90% correct	70-80% correct	60-70% correct	50-60% correct	$< 50\%$ correct	

Criteria		Level						Point
	%	Excellent	Very good	Good	Fair	Average	Weak	
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50	
	10	100% member participated in	$80\% \leq < 90\%$	$70\% \leq < 80\%$	$60\% \leq < 70\%$	$50\% \leq < 60\%$	$< 50\%$ member participated in	

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Nguyen Thi Thuy
- Email: ntthuy@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 5	Rearrange the midterm exam into Week 8	19/8/2025	Nguyen Thi Thuy
2	Page 4,6	Revise CLO4 and the level of competence of CLOs		
3	Page 6-7	Revise ratio between three assessment types		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Climate Change Mitigation and Adaptation

Course Code: CHE3521IU

1. General information

Course name	- <i>(in English)</i> Climate Change Mitigation and Adaptation - <i>(in Vietnamese)</i> Giảm nhẹ và Thích ứng với Biến đổi Khí hậu
Course designation	This course provides knowledge about the science of the Earth's climate, driving forces of climate change, challenges and opportunities of climate change, effects of climate change on global natural resources and environments, and human's responding measures for climate change impacts.
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person responsible for the course	Dr. Tran Thanh Tu (tttu@hcmiu.edu.vn)
Language	English
Relation to curriculum	☐ Compulsory ☒ Elective

Teaching methods	☒ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify: -																																															
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> <tr> <td><i>Credit</i></td><td>3</td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td><i>ECTS</i></td><td>4.64</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>								Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	3	3					<i>ECTS</i>	4.64						Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																										
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Credit points	3 credits (Theory: 3 + Practice: 0) 4.64 ECTS																																															
Number of periods	Theory: 45 Practice: 0																																															
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites ☐ Corequisites ☐ Previous course																																															
Course objectives	Students will be provided with the knowledge about: (1) Understanding and remembering causes and effects of climate change; (2) Understanding and analyzing impacts of climate change on natural resources and the environments; (3) Understanding and identifying responding measures for climate change adaptation and mitigation at both global and local levels to meet the goal of sustainable development.																																															
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th><th colspan="5">Course learning outcome (CLO)</th></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>						Competency level ¹	Course learning outcome (CLO)																																								
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¹Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Knowledge	CLO1. Differentiates the driving forces and causes of climate change in the world. <i>[4-Analyzing]</i> CLO2. Identifies the effects of climate change on natural resources, the environments, and human life. <i>[4-Analyzing]</i>		
	Skill	CLO3. Constructs responding measures/ approaches to cope with climate change. <i>[4-Mechanism]</i> CLO4. Organizes teamwork and multidisciplinary cooperation under the context of climate change mitigation and adaptation. <i>[4-Mechanism]</i>		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to the course The Earth’s climate system	1	I
	2	Climate factors and their driving forces in the Earth’s system Definition of climate change	1	I, T
	3	Driving forces and causes of climate change	1	T
	4	Records and observations of climate change Relationship and correlation between greenhouse gases (GHGs) and global temperature	1	T
	5	Consequences and impacts of global climate change	1	T
	6	Evidences of climate change impacts on socio-economic development	1	T
	7	Measures for responding to climate change Definition of Mitigation and Adaptation to climate change	1	T
	8	Adaptation measures up to 2030 and beyond 2030	1	I, T
	9		1	T, U
	10	Mitigation measures up to 2030 and beyond 2030	1	I, T

	11		1	T, U
	12	Climate change impacts due to an increase in temperature and extreme weather events	1	T
	13	Group presentation (by case study)	1	T, U
	14		1	T, U
	15		1	T, U
Examination forms	☒ Multiple-choice questions ☐ Report ☒ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Hardy, J.T., <i>Climate Change: Causes, Effects and Solutions</i>, John Wiley & Sons, ISBN 0-470-85018-3, 2003. [2] James C. White, <i>Global Climate Change – The Economic Costs of Mitigation and Adaptation</i>, Elsevier, ISBN 0-444-01647-3, 1991. [3] Shyam S. Y., Robert J. R., Jerry L. H., Hermann L., <i>Crop Adaptation to Climate Change</i>, John Wiley & Sons, 2011. II. References [4] Rainer Walz and Joachim Shleich, <i>The Economics of Climate Change Policies – Macroeconomic Effects, Structural Adjustments and Technological Change</i>, Physica-Verlag, A Springer Company, ISBN 978-3-7908-2077-5, 2009. [5] The World Bank, <i>City and Climate Change – An Urgent Agenda</i>, 2010. [6] Simin D., Jenny C., Abid M., <i>Planning for Climate Change</i>, Earthscan, 2012.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		4					
Skill (Level: 1-7)	3			4				
	4				4		4	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	0.0	4.0	0.0
L,M,H conversion *		M	M	M	M		M	

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to the course The Earth's climate system	1		Lecture, Discussion	[1] Chapter 1
2.	2	Climate factors and their driving forces in the Earth's system Definition of climate change	1	HW1	Lecture, Discussion, Homework	[1] Chapter 2,3
3.	3	Driving forces and causes of climate change	1		Lecture, Discussion	[1] Chapter 4
4.	4	Records and observations of climate change; Relationship and correlation between greenhouse gases (GHGs) and global temperature	1		Lecture, Discussion	[1] Chapter 5,6
5.	5	Consequences and impacts of global climate change	2	HW2	Lecture, Discussion, Homework	[1] Chapter 7,8
6.	6	Evidences of climate change impacts on socio-economic development	2		Lecture, Discussion	[1] Chapter 9,10
7.	7	Climate change impacts due to an increase in temperature and extreme weather events	2		Lecture, Discussion	[2] Chapter 5,6,7,8
8.	8	Definition of Mitigation and Adaptation to climate change Midterm exam.	3	HW3 A1	Lecture, Discussion, Homework	[1] Chapter 11
9.	9	Adaptation measures up to 2030 and beyond 2030 (1)	3		Lecture, Discussion	[3] Chapter 3
10.	10	Adaptation measures up to 2030 and beyond 2030 (2)	3	HW4	Lecture, Discussion, Homework	[1] Chapter 19
11.	11	Mitigation measures up to 2030 and beyond 2030 (1)	3		Lecture, Discussion	[1] Chapter 11,12 [4] Chapter 6

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
12.	12	Mitigation measures up to 2030 and beyond 2030 (2)	3	HW5	Lecture, Discussion, Homework	[1] Chapter 11,12 [4] Chapter 6
13.	13-15	Group presentation	4	IP	Presentation, Discussion	[5], [6]
14		Reserved week				
15.		Final exam.		A2		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class presentation (IP) and homework (HW) (30%)	HW1 (R5.1) 60%Pass	HW2 (R5.1) 60%Pass	HW3-5 (R5.1) 60%Pass	IP 60%Pass
Midterm exam. (A1) (20%)	A1. Part1 (R5.3) 60%Pass	A1. Part1 (R5.3) 60%Pass		A1. Part2 (R5.3) 60%Pass
Final exam. (A2) (50%)			A2. (R5.3) 60%Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1 Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2 Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	Capstone	Milestone		Benchmark
	4	3	2	1
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

5.3 Critical thinking value rubric for evaluating questions in exams

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	Capstone	Milestone		Benchmark
	4	3	2	1
	position (perspective, thesis/ hypothesis).			
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

6. Date revised: August 19, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Dr. Tran Thanh Tu
- Email: ttu@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Revised syllabus version 2017, converted to new template	December 29th, 2023	Dr. Tran Thanh Tu
2	All	Updated syllabus for Chemical Engineering degree	April 18th, 2024	Dr. Tran Thanh Tu
3	All	Moved midterm exam. from week 9 to week 8	June 05th, 2025	Dr. Tran Thanh Tu
4	2	Updated ILOs	June 24th, 2025	Dr. Tran Thanh Tu
5	Course learning outcomes	Change the PLO competency level in the matrix (to level 4 and 5) Delete CLO Attitude	August 13th, 2025	Dr. Tran Thanh Tu
6	Assessment plan	Change the weight (%) of assessment type	August 13th, 2025	Dr. Tran Thanh Tu
7	Course learning outcomes	Change the PLO competency level in the matrix (back to level 4 for all)	August 19th, 2025	Dr. Tran Thanh Tu



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Research Methodology

Course Code: CHE0041IU

1. General information

Course name	- <i>(in English)</i> Research Methodology - <i>(in Vietnamese)</i> Phương pháp nghiên cứu khoa học						
Course designation	Lectures include an introduction to scientific research, research planning and proposal development, experimental design and hypothesis testing, and publication procedures focusing on thesis/internship preparation. Students are requested to conduct a course project to evaluate how theory is applied in practice and develop interpersonal skills. Discussion of scientific misconduct is also an important part of this course.						
Course type	☐ General knowledge ☐ Fundamental knowledge ☒ Specialized knowledge ☐ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person responsible for the course	Assoc.Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☒ Compulsory ☐ Elective						
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2				
Contact hours	25		25	0	0	0	0
Self-Study hours	60		60	0	0	0	0
Total workload	85		85	0	0	0	0

Credit points	2 credits (Theory: 2 + Practice: 0) 3.09 ECTS																																										
Number of periods	Theory: 30 Practice: 0																																										
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																										
Course objectives	The Research Methodology course is designed to provide participants with a comprehensive understanding of the fundamental principles, techniques, and processes involved in conducting rigorous and effective research across various disciplines. This course aims to equip students with the skills and knowledge necessary to design, execute, analyze, and interpret research studies ethically and methodologically soundly.																																										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Demonstrate the scientific research process and how each step interlinks with the other, which is a requirement for decent research <i>[Applying]</i>. CLO2. Demonstrate methodological tools, including AI-based ones <i>[Applying]</i>. </td></tr> <tr> <td>Skill</td><td> CLO3. Follow instructions to develop the research proposal (for an internship and thesis) <i>[Guided Response]</i>. CLO4. Follow instructions to develop the skills of presenting and publishing the research findings (including teamwork and problem-solving skills) <i>[Guided Response]</i>. </td></tr> <tr> <td>Attitude</td><td>CLO5. Show the ability to recognize and avoid scientific misconduct <i>[Valuing]</i></td></tr> </tbody> </table>			Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate the scientific research process and how each step interlinks with the other, which is a requirement for decent research <i>[Applying]</i> . CLO2. Demonstrate methodological tools, including AI-based ones <i>[Applying]</i> .	Skill	CLO3. Follow instructions to develop the research proposal (for an internship and thesis) <i>[Guided Response]</i> . CLO4. Follow instructions to develop the skills of presenting and publishing the research findings (including teamwork and problem-solving skills) <i>[Guided Response]</i> .	Attitude	CLO5. Show the ability to recognize and avoid scientific misconduct <i>[Valuing]</i>																																
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Other requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	“Research Methodology: A Practical And Scientific Approach” Vinayak Bairagi, Mousami V. Munot (2019), CRC Press. “How to write and publish a scientific paper” Day, R.A. (2011), Cambridge University Press, USA.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3			3	
	4			3	3			
Attitudes (Level: 1-5)	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0		3.0	3.0		3.0	3.0
L,M,H conversion*		M		M	M		M	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Research	1	Assignment	- Lecture - Class discussion	[1]. 1
2.	2	Literature Review - Problem Statement	1-2	Assignment	- Lecture - Class discussion	[1]. 2
3.	3	Research Design	1-2	Assignment	- Lecture - Class discussion	[1]. 3

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	4	Basic Instrumentation	1-2	Assignment	- Lecture - Class discussion	[1]. 4
5.	5	Applied Statistics	1-2	Assignment	- Lecture - Class discussion	[1]. 5
6.	6	Develop a Research Proposal	1-2	Assignment	- Lecture - Class discussion	In-house materials
7.	7	Presenting and Publishing the Research Findings	3-4	Assignment	- Lecture - Class discussion	[1]. 6
8.	8	Scientific Misconducts	5	Assignment	- Lecture - Class discussion	[1]. 7
9-10	9-10	<u>Midterm</u> Develop a Proposal for an Internship/Thesis	3-4	Assignment	- Lecture - Class discussion	In-house materials
9.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Assignment (30%)	60% pass	60% pass	60% pass	60% pass	60% pass
Midterm examination (20%)	50% pass	50% pass	50% pass	50% pass	50% pass
Final examination (50%)	50% pass	50% pass	50% pass	50% pass	50% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics:

5.1.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.2. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

	Capstone	Milestone		Benchmark
	4	3	2	1
			implications) are identified clearly.	

Source: Association of American Colleges and Universities

5.3. Rubric for group presentation

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Contributes to Team Meetings (based on the information of each team)	5 points	Help to team move forward by articulating the merits of alternative ideas and proposals	Offer alternative solutions or courses of actions that build the ideas of others	Offer new suggestions to advance the work of the group	Shares ideas but does not advance teamwork of the group	
Individual contributions outside of Team meetings (based on the information of each team)	5 points	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence/	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.	
Organization	10 points	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	
Language (in presentation slides and oral presentation)	10 points	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	

	Weight	Capstone	Milestone		Benchmark	Rating
		4	3	2	1	
Delivery (Presentation skills)	25 points	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	
Content	25 points	Content is clear and accurate. It is presented in a logical order and shows a thorough understanding of the topic	Most content is clear and accurate. It is presented in a logical order and shows a good understanding of the topic	Some content is not clear and/or accurate. It is presented in a somewhat logical order and shows some understanding of the topic.	Content is not clear and/or accurate, and/or presented in a somewhat logical order but shows some understanding of the topic.	
Central Message	5 points	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	
Supporting Material	10 points	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	

	Weight	Capstone	Milestone		Benchmark	Ratin g
		4	3	2	1	
Audience interaction	5 points	Involved audience in the discussion; held audience attention although out	Held audience attention most of the time; responds to most questions clearly	Presented information minimal audience contact; able to answer one question correctly	Presented information without audience contact; unable to answer questions	

6. Revision Date: August 19th, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Session 5	Add Rubric	09/06/2025	HKLam
2	Page 2,3,4	Revise CLOs, Matrix, and Planned learning activities and teaching methods	19/8/2025	Nguyễn Thị Thủy
3	Page 4	Revise ratio of three assessment types		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Research 1

Course Code: CHE4012IU

1. General information

Course name	- <i>(in English)</i> Research 1 - <i>(in Vietnamese)</i> Nghiên cứu 1						
Course designation	This is a fully project-based course integrating six core digital competence modules aligned with the national digital competence framework. Students will engage in hands-on chemical engineering research projects from conception to presentation, while developing skills in data exploitation, digital collaboration, content creation, digital safety, problem-solving, and AI applications. The entire course revolves around a real-world research project carried out in teams, incorporating both laboratory and digital environments.						
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others						
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person responsible for the course	Assoc.Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn						
Language	English						
Relation to curriculum	☒ Compulsory ☐ Elective						
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:						
Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>			1		
Contact hours		37.5	0	0	37.5	0	0
Self-Study hours		30	0	0	30	0	0
Total workload		67.5	0	0	67.5	0	0
Credit points	1 credit (Theory:0 + Project: 1) 2.45 ECTS						
Number of periods	Theory: 0 Project: 45						

Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: ☐ Corequisites: ☐ Previous course:		
Course objectives	Upon completion, students will be able to: • Demonstrate understanding of scientific methods and digital tools in research. • Communicate research findings effectively using digital media. • Apply digital competencies in data handling, collaboration, and AI integration. • Ensure ethical and safe use of digital technologies in research.		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Apply appropriate digital tools to collect, process, and analyze research data [Applying]. CLO2. Describe research projects and present them using digital platforms [Applying].	
	Skill	CLO3. Communicate and collaborate effectively in digital environments [Guided Response]. CLO4. Create and share digital content related to research outcomes [Guided Response].. CLO5. Solve research-related problems using digital and AI tools [Guided Response].	
	Attitude	CLO6. Demonstrate responsible and ethical behavior in digital environments [Valuing].	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Module	Weight	Teaching levels
	Module 1: Data exploitation and information retrieval	2	I, T, U
	Module 2: Digital communication and collaboration	2	I, T, U
	Module 3: Digital content creation	2	I, T, U
	Module 4: Digital safety	2	I, T, U
	Module 5: Problem solving	2	I, T, U
	Module 6: AI applications	2	I, T, U
	Module 7: Research seminar (Seminar attendance and evaluation)	3	I, T, U
	Examination forms	☐ Multiple-choice questions ☒ Report ☐ Presentation ☒ Assignments	
☐ Oral examination ☐ Written examination ☐ Others, please specify:			
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3				3	3	
	2		3	3				
Skills (Level: 1-7)	3			3		3		
	4			3				
	5	3	3			3		
Attitudes (Level: 1-5)	6						3	3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		M	M	M	M	M	M	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Module	Activities (guided questions)	Scenario
Module 1: Data exploitation and information retrieval	• Introduction to chemical engineering databases (Knovel, ScienceDirect, AIChE database, Scopus, Web of Science). • Accessing technical standards (ASTM, ISO) relevant to chemical processes. • Using process simulation data repositories. • Data cleaning and organization using Excel, Python (pandas), and chemical data formats (e.g., ChemDraw outputs). • Evaluating the credibility of experimental data and process design sources. <u>Guiding Questions:</u> 1. Which chemical engineering databases are most relevant for your project topic? 2. How do you assess the reliability of process simulation data? 3. - What tools will you use to manage experimental or simulation datasets	You are tasked with designing a new apparatus (e.g., distillation column for a petrochemical plant). The only available data comes from a 20-year-old plant with partial records. How will you source up-to-date, credible data and integrate it with legacy datasets?
Module 2: Digital communication and collaboration	• Using MS Teams/Zoom for remote collaboration with lab partners. • Sharing chemical process diagrams via cloud platforms. • Collaborative work on simulation files (Aspen Plus, HYSYS) with version control. • Best practices for virtual safety meetings and project updates. <u>Guiding Questions:</u>	Midway through your project, your lab becomes inaccessible due to maintenance. How will you maintain momentum and coordination using digital tools?

Module	Activities (guided questions)	Scenario
	1. How will you share and update chemical process simulation files with your team? 2. What are the safety communication protocols for online collaboration? 3. How can you ensure version control for your chemical engineering project files?	
Module 3: Digital content creation	• Creating process flow diagrams (PFD) and piping & instrumentation diagrams (P&ID) digitally. • Using ChemCAD/DWSIM tools for visualization. • Designing infographics to present mass and energy balances. • Recording video demonstrations of lab experiments. • Preparing digital posters for AIChE student conferences. <u>Guiding Questions:</u> 1. What tools will you use to create professional chemical process diagrams? 2. How can visualizing mass and energy balances improve presentation clarity? 3. - What are key elements of a strong chemical engineering conference poster?	Your team must present a process optimization project to a panel of chemical plant managers who have no research background. How will you adapt your content for clarity and impact?
Module 4: Digital safety	• Handling confidential process data and proprietary formulas. • Cybersecurity for lab equipment connected to networks. • Safety protocols when using remote monitoring tools for chemical processes. • Ethical handling of environmental and safety-sensitive chemical data. <u>Guiding Questions:</u> 1. What cybersecurity measures are essential for protecting lab equipment data? 2. How do you protect intellectual property in chemical engineering projects?	During a collaborative project with an overseas partner, you are asked to send raw process data via email. How do you ensure safe and compliant transfer? nt

Module	Activities (guided questions)	Scenario
	3. What are key ethical considerations for sharing process safety data?	
Module 5: Problem solving	- Using DWSIM (ite: https://dwsim.fossee.in) for process optimization. - Applying chemical reaction engineering principles in troubleshooting. - Using root cause analysis (RCA) for process issues. - Solving scale-up problems with computational tools. <u>Guiding Questions:</u> - How can process simulation tools help you optimize chemical operations? - What steps will you take to troubleshoot an unexpected lab result? - How can computational models assist in solving scale-up challenges?	<u>Background:</u> You are working on a lab-scale binary distillation of ethanol–water to produce ethanol at ≥ 95 wt% purity. Using DWSIM, your initial simulation predicts that with 10 trays, a reflux ratio of 1.4, and a feed rate of 5 L/h, you will meet the purity requirement. <u>Problem:</u> In the lab, your actual ethanol purity is only 92 wt%. You need to decide how to use simulation tools and computational models to troubleshoot the issue and prepare for scaling the process to a 50 L/h pilot unit.
Module 6: AI applications	Applying AI for predictive maintenance in chemical plants. - Using machine learning models for reaction yield prediction. - AI-assisted literature mining for new catalyst development. - Ethical implications of AI in environmental impact assessments. <u>Guiding Questions:</u> - How can AI improve prediction of reaction yields in your project? - What AI tools can help in screening potential catalysts? - What are potential risks of AI use in environmental decision-making?	You have access to 10 years of plant operational data and need to predict equipment failure before it happens. How will you design and validate an AI-based predictive maintenance system?
Module 7: Research seminars	Attending, recapping and reevaluating seminars (focusing on scientific seminars).	

4. Teaching methods

Fully project-based learning: students work in teams to conduct a semester-long research project.

- Guided tutorials on digital tools and AI applications embedded in project milestones.
- Regular project check-ins and sprint reviews.

- Group discussions, peer feedback, and online collaboration.
- Independent study and self-paced learning modules to support project progress.

5. Assessment plan

Assessment form (A.x.x)	Percentage %
A1.1 Attendance and Attitude	10
A1.2 Performance	30
A1.3 Written report (including Digital product)	60

Note: %Pass: The target is the % of students having scores greater than 50 out of 100.

6. Date revised: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of the Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Digital competency module	Add the modules for digital competency	2025.08.11	HKLam
2	Page 2,4	Revise level of CLOs, and matrix	2025.8.21	Nguyen Thi Thuy



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: INTERNSHIP 1

Course Code: CHE4062IU

1. General information

Course name	- <i>(in English)</i> Internship 1 - <i>(in Vietnamese)</i> Thực tập 1
Course designation	This course requires students to organize field trips by the School of Chemical and Environmental Engineering to learn about the functional activities in chemical engineering-related fields. By observing and exchanging information with officials and experts at research institutes and companies, students will better understand chemical engineering in practice and aggregate these understandings into a report.
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☒ Semester 2 ☐ Summer
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering On-site supervisors
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>				2	
	Contact hours	75	0	0	0	75	0
	Self-Study hours	60	0	0	0	60	0
	Total workload	135	0	0	0	135	0
Credit points	2 credits (Theory: 0 + Internship: 2) 4.91 ECTS						
Number of periods	Theory: 0 Internship: 90						
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	The course is aimed at helping students gain career awareness and orientation during study and research in the following academic years and after graduation. Through the course, students will develop the proactive ability to contact businesses, meet businesspeople, and deeply study some functional activities of companies in the field of chemical engineering.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Demonstrate the area of chemical engineering that the student worked in [Understanding]. CLO2. Demonstrate practical experience gained in environmental treatment processing, design, operation, analysis, and research [Understanding].					
	Skill	CLO3. Show observation and perception skills [Set]. CLO4. Show the ability to analyze information [Set]. CLO5. Display effective oral and written communication skills [Set].					
	Attitude	CLO6. Display a serious and professional attitude [Responding to Phenomena].					
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours)						

	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Background information on the company (4 trips to 4 companies) 1. Background 2. Organization 3. Related environmental engineering areas		T, U
	Evaluate knowledge/skills learned and developed. Conclude with ongoing considerations. Writing a report		T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments		
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	2						
Skills (Level: 1-7)	3			2				
	4						2	
	5					2		
Attitudes (Level: 1-5)	6							2
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	2.0	0.0	2.0	2.0	2.0
L,M,H conversion*		L		L		L	L	L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Fieldtrip 1	1 → 6	Report	Observation, discussion	
2	Fieldtrip 2	1 → 6	Report	Observation, discussion	
3	Fieldtrip 3	1 → 6	Report	Observation, discussion	
4	Fieldtrip 4	1 → 6	Report	Observation, discussion	

4. Assessment plan:

Students are required to participate in a minimum of four field trips and collaborate on a group report for each. The supervisor will evaluate the reports using the field trip report assessment form. The final grade will be calculated as the average of the scores from all four reports.

5. Rubric:

Field trip report assessment form:

Category	Weight	Score (1-5)	Comments	Final grade
1. Introduction	10%	[1-5]	Includes title, date, location, purpose, and company background.	
2. Site Description	10%	[1-5]	Clear overview of facilities, equipment, and company operations.	
3. Observations & Findings	40%	[1-5]	Depth of observations, data accuracy, and identified challenges/opportunities.	
4. Meetings & Interactions	10%	[1-5]	Documentation of discussions, feedback, and stakeholder engagement.	
5. Recommendations	5%	[1-5]	Actionable suggestions with realistic timelines (if applicable).	
6. Conclusion	15%	[1-5]	Concise summary of key takeaways and future actions.	
7. References	5%	[1-5]	Proper citations (footnotes or software like Zotero/EndNote).	
8. Appendices	5%	[1-5]	Relevant supporting materials (photos, diagrams, data).	
Total				

6. Date revised: August 21, 2025

7. Course coordinator/Lecturer

- School/Department: School of Chemical and Environmental Engineering
- Lecturer: Assoc. Prof. Huynh Kim Lam
- Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Minor details: rephrasing, typos, correct words, ...	09/04/2024	HKLam
2	Page 2,4	Revise the level of CLOs and matrix	21/8/2025	Nguyen Thi Thuy



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Internship 2

Course Code: CHE4072IU

1. General information

Course name	- <i>(in English)</i> Internship 2 - <i>(in Vietnamese)</i> Thực tập 2
Course designation	Internships are opportunities for students to learn about and apply chemical engineering principles outside the classroom in the laboratory, workplace, and field. Before the internship, the faculty mentor assigns the student responsibilities previously agreed upon and approved by the department/school chair. These duties will vary depending on the particular discipline. The student will work accordingly under the guidance and direction of an internship mentor who is an employee of the internship site. In the end, students will submit to the department a written report and give an oral presentation in front of the committee of works done, as well as a report card including remarks and recommendations from the internship mentor.
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5
	☐ Semester 1 ☐ Semester 2 ☒ Summer
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering On-site supervisors
Language	English

Relation to curriculum	☒ Compulsory ☐ Elective																																								
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar For others, please specify internship.																																								
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td></td><td>3</td><td></td></tr> <tr> <td>Contact hours</td><td>112.5</td><td>0</td><td>0</td><td>0</td><td>112.5</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>0</td><td>0</td><td>0</td><td>90</td><td>0</td></tr> <tr> <td>Total workload</td><td>202.5</td><td>0</td><td>0</td><td>0</td><td>202.5</td><td>0</td></tr> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>				3		Contact hours	112.5	0	0	0	112.5	0	Self-Study hours	90	0	0	0	90	0	Total workload	202.5	0	0	0	202.5	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>				3																																				
Contact hours	112.5	0	0	0	112.5	0																																			
Self-Study hours	90	0	0	0	90	0																																			
Total workload	202.5	0	0	0	202.5	0																																			
Credit points	3 credits (Theory: 0 + Internship: 3) 7.36 ECTS																																								
Number of periods	Theory: 0 Internship: 135																																								
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisite course: ☐ Corequisites: ☒ Previous course: Internship 1 (CHE4062IU)																																								
Course objectives	To get practical experience, students spend at least eight weeks at factories, R&D divisions, research institutes, or technical sales (preferable) departments in Vietnam or overseas. This course aims to provide students with opportunities to explore their career options as well as opportunities to relate their academic preparation to the reality of conducting professional practice, interact with others in practice effectively, develop professional skills, and communicate effectively in the workplace. It also aims to provide opportunities for students to gain real-world experience that will be essential for their future practice as engineers in their particular discipline after graduation.																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems [Applying].</td></tr> <tr> <td>Skill</td><td>CLO2. Respond in multidisciplinary teams and individuals to accomplish planned tasks and goals [Guided Response]. CLO3. Communicate in a professional environment, both orally and in writing, including technical report writing and presentation skills [Guided Response].</td></tr> </table>						Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems [Applying].	Skill	CLO2. Respond in multidisciplinary teams and individuals to accomplish planned tasks and goals [Guided Response]. CLO3. Communicate in a professional environment, both orally and in writing, including technical report writing and presentation skills [Guided Response].																													
Competency level ¹	Course learning outcome (CLO)																																								
Knowledge	CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems [Applying].																																								
Skill	CLO2. Respond in multidisciplinary teams and individuals to accomplish planned tasks and goals [Guided Response]. CLO3. Communicate in a professional environment, both orally and in writing, including technical report writing and presentation skills [Guided Response].																																								

	Attitude	CLO4. Study various engineering situations and form judgments on the basis of ethical codes and professional responsibilities [Valuing].					
Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<u>Weight:</u> lecture session (2.5 hours)						
	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Orientation and Training: Introduction to the internship program and its objectives. Familiarization with the workplace, safety protocols, and ethical guidelines. Training on specific tools, equipment, and software relevant to the internship.				1	I
	2	Project Assignment and Planning: Assignment of a specific project(s) based on the student's interests and the host organization's requirements. Development of a project plan, including objectives, timeline, and deliverables. Identification of resources needed for project execution.				2	T, U
	3	Project Execution and Technical Skills Development: Active involvement in chemical engineering projects under the guidance of a mentor. Application of engineering principles to solve practical problems and optimize processes. Hands-on experience in operating and troubleshooting equipment and processes. Data collection, analysis, and interpretation using appropriate tools and techniques. Collaboration with colleagues to achieve project milestones. Regular progress reporting and documentation of work.				1	U
4	Professional Development and Communication: Workshop on effective communication and presentation skills. Preparation of a final report summarizing the internship experience and project outcomes. Presentation of the internship project to a panel of industry professionals and peers. Reflection on the ethical and professional responsibilities associated with the chemical engineering field. Networking opportunities, including interaction with professionals from the host organization and industry.					U	

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments
Study and examination requirements	<u>Attendance:</u> Following the company's policy <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	Internal documents from the company

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3	3					
Skills (Level: 1-7)	2				3			
	3			3		3	3	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	3.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		M	M	M	M	M	M	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation and Training			Introduction	
2.	2	Project Assignment and Planning	1	report	Individual meeting	
3.	3	Project Execution and Technical Skills Development	2,4	report	meeting	
4.	4	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills		

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
5.	5	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills	Report	
6.	6	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills		
7.	7	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills	Review & Report	
8.	8	Professional Development and Communication	3	Writing Report	Report	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Evaluation of the instructor at the internship organization (50%) (R1)	R1_1,2	R1_3,4,6,7,8	R1_5	R1_9,10,11,12
Evaluation of faculty mentor (50%) (R2)	R2_4	R2_2	R2_1	R2_3,5

Note: 60 %Pass: Target that % of students have scores greater than 50 out of 100.

5. Rubric

R1. Company Assessment

Scoring Criteria	%	Grading scheme					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Ability in applying knowledge and skills learned in the university in a work setting	25	Excellent					Weak
0. Level of gaining practical experience within the company environment	25	Excellent					Weak
0. Level of achieving information/	5	Effectively exploit print and electronic literature, resulted					Do not exploit print and electronic

Scoring Criteria	%	Grading scheme					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
knowledge from print and electronic literature		in valuable information/knowledge					literature, non-valuable information/knowledge is archived
0. Level of thinking holistically in problem solving	5	Demonstrates complete understanding of the problem. All requirements of tasks are included in response					Demonstrates little understanding of the problem. More than 50% requirements of tasks are missing.
0. Level of effectively oral and written communication skills	5	Display effectively oral and written communication skills					No/little oral and written communication skills are displayed
0. Level of appreciating different enterprise cultures and working successfully in company environment	5	Adapt well different enterprise cultures and working successfully in company environment					Cannot adapt different enterprise cultures and cannot work in company environment
0. Level of perseverance, and flexibility in solving the problem	5	Stick to the task and keep working confidently until the task is complete; Being open-minded for comments and discussion					Little persistence on the tasks; Give up early; Closed-minded for comments and discussion
0. Organize plans and manage time during internship period	5	Frequently, plan well and complete tasks on time					Working without a plan, manage time; Cannot complete 50% of tasks on time
0. Level of proactive vision and intention in a career	5	Proactive					Inactive
0. Level of professional behavior that student	5	Treating managers, colleagues and clients with respect;					Treating managers, colleagues and

Scoring Criteria	%	Grading scheme					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
shows in organization		Projecting a positive attitude; Being polite; Showing good judgment; Dressing appropriately					clients without respect Projecting a negative attitude Being impolite Showing strongly bias judgment Dressing inappropriately
0. Ability of students in self-identifying their strength, weakness	5	Identifying accurately strength, weakness					Cannot identifying strength, weakness
0. Student shows ethics, integrity and responsibility in company environment	5	Being ethical, Integrity and highly responsible to the assigned works					Being unethical, Dishonesty, Irresponsible for the assigned works
Total (Tổng)	100						

R2. Advisor Assessment

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		$90 \leq \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
1. Writing skills and format	5	Compliance well to guidelines					Not follow
2. Background information on the company	5	relevant, sufficient, clear					Irrelevant, insufficient, unclear
3. Student position and responsibilities in the internship + Task + Achievement + Strengths + Weakness	80	Present clearly the tasks and the achievement; sufficient weight for an internship; Identifying accurately strength, weakness					Tasks and achievement are unclear; insufficient weight for an internship; Cannot identifying strength, weakness

<i>Criteria</i>	<i>%</i>	<i>Level</i>					
		<i>Excellent</i>	<i>Very good</i>	<i>Good</i>	<i>Fair</i>	<i>Average</i>	<i>Weak</i>
		$90 \leq 100$	$80 \leq < 90$	$70 \leq < 80$	$60 \leq < 70$	$50 \leq < 60$	< 50
4. Evaluate knowledge/skills learned and developed	5	Evaluate accurately the skills learned and developed					Cannot evaluate accurately the skills learned and developed
5. Conclude with ongoing considerations	5	Conclusion and recommendation are precise and accurate					Conclusion and recommendation are ambiguous and inaccurate
<i>Total</i>	<i>100</i>						

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering

Lecturer: Assoc. Prof. Huynh Kim Lam

Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics.
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences.
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Minor details: rephrasing, typos, correct words, ...	09/04/2024	HKLam
2	Page 5-7	Add rubric for assessment	19/8/2025	Nguyen Thi Thuy
3	Page 2,4	Add level of CLO, revise level of CLOs		



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Internship 3

Course Code: CHE4082IU

1. General information

Course name	- <i>(in English)</i> Internship 3 - <i>(in Vietnamese)</i> Thực tập 3
Course designation	The chemical engineering Internship program provides students with practical, hands-on experience in the field of chemical engineering. This course aims to bridge the gap between classroom learning and real-world application by offering students the opportunity to work in an industrial or research setting. Through this internship, students will gain valuable insights into the chemical engineering profession, enhance their technical skills, and develop a professional network.
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Semester(s) in which the course is taught	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☐ Semester 1 ☐ Semester 2 ☒ Summer
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering On-site supervisors
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:

Workload (incl. contact hours, self-study hours)		Lecture	Lab	Project	Internship	Thesis
	<i>Credit</i>	0			3	
	Contact hours	112.5	0	0	112.5	0
	Self-Study hours	90	0	0	90	0
	Total workload	202.5	0	0	202.5	0
Credit points	3 credits (Theory: 0 + Internship: 3) 7.36 ECTS					
Number of periods	Theory: 0 Internship: 135					
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisite course: ☐ Corequisites: ☒ Previous course: CHE4072IU Internship 2, CHE2081IU Occupational Health Safety and Environment (HSE)					
Course objectives	To get practical experience, students spend at least for eight (08) weeks at factories, R&D divisions, research institutes, or technical sales departments in Vietnam or overseas. This course aims to provide students with opportunities to explore their career options as well as opportunities to relate their academic preparation to the reality of conducting professional practice, interact with others in practice effectively, develop professional skills, and communicate effectively in the workplace. It also aims to provide opportunities for students to gain real-world experience essential for their future practice as engineers in their particular discipline after graduation.					
Course learning outcomes	Upon the successful completion of this course, students will be able to:					
	Competency level	Course learning outcome (CLO)				
	Knowledge	CLO1. Relate real-world engineering problems to the theoretical knowledge gained in their academic coursework [Analyzing].				
	Skill	CLO2. Function in multidisciplinary teams and individuals to accomplish planned tasks and goals [Mechanism]. CLO3. Communicate in a professional environment, both orally and in writing, including technical report writing and presentation skills [Mechanism].				
	Attitude	CLO4. Evaluate various engineering situations and formulate judgments on the basis of ethical codes and professional responsibilities [Organization].				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours)					

	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Orientation and Training: Introduction to the internship program and its objectives. Familiarization with the workplace, safety protocols, and ethical guidelines. Training on specific tools, equipment, and software relevant to the internship.	1	I
	2	Project Assignment and Planning: Assignment of a specific project(s) based on the student's interests and the host organization's requirements. Development of a project plan, including objectives, timeline, and deliverables. Identification of resources needed for project execution.	2	T, U
	3	Project Execution and Technical Skills Development: Active involvement in chemical engineering projects under the guidance of a mentor. Application of engineering principles to solve practical problems and optimize processes. Hands-on experience in operating and troubleshooting equipment and processes. Data collection, analysis, and interpretation using appropriate tools and techniques. Collaboration with colleagues to achieve project milestones. Regular progress reporting and documentation of work.	1	U
	4	Professional Development and Communication: Workshop on effective communication and presentation skills. Preparation of a final report summarizing the internship experience and project outcomes. Presentation of the internship project to a panel of industry professionals and peers. Reflection on the ethical and professional responsibilities associated with the chemical engineering field. Networking opportunities, including interaction with professionals from the host organization and industry.		U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> Following the company's policy <u>Assignments/Examination:</u> To pass this course, students must have more than 50/100 points overall.			
Reading list	Internal documents from the company			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4	4					
Skills (Level: 1-7)	2				4			
	3			4		4	4	
Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0	4.0	4.0	4.0	4.0
L,M,H conversion*		H	H	H	H	H	H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation and Training				
2.	2	Project Assignment and Planning	1			
3.	3	Project Execution and Technical Skills Development	2,4			
4.	4	Project Execution and Technical Skills Development	2,4			
5.	5	Project Execution and Technical Skills Development	2,4			
6.	6	Project Execution and Technical Skills Development	2,4			
7.	7	Project Execution and Technical Skills Development	2,4			
8.	8	Professional Development and Communication	3			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Evaluation of the instructor at the internship organization (50%) (R1)	R1_1,2,4	R1_4,6,7,8	R1_3,5	R1_9,10,11,12
Evaluation of faculty mentor (50%) (R2)	R2_3		R2_1	R2_2,3,4,5

Note: 60 %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

5.1. Rubrics for onsite supervisor assessment (R1)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Level of understanding of the area of chemical engineering that the student worked in	5	Excellent					Weak
2. Ability to apply knowledge and skills learned in the university in a work setting.	30	Excellent					Weak
3. Level of gaining practical experience within the company environment	30	Excellent					Weak
4. Level of problem-solving skills	5	Demonstrates a complete understanding of the problem. All requirements of the task are included in the response					Demonstrates little understanding of the problem. More than 50% requirements of task are missing.
5. Level of effective oral and written communication skills	5	Display effective oral and written communication skills					No/little oral and written communication skills are displayed.
6. Level of appreciation different enterprise cultures and working successfully in a company environment	5	Adapt well to different enterprise cultures and working successfully in a company environment					Cannot adapt to different enterprise cultures and cannot work in company environment
7. Level of professional behavior that the student shows in the organization	5	Treating managers, colleagues, and clients with respect; Projecting a positive attitude; Being polite; Showing good judgment; Dressing appropriately					Treating managers, colleagues, and clients without respect Projecting a negative attitude Being impolite Showing strongly biased judgment; Dressing inappropriately

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
8. Student shows ethics, integrity, and responsibility in a company environment	5	Being ethical, Integrity and high responsible for the assigned works					Being unethical Dishonesty, Irresponsible for the assigned work
9. Ability of student to self-identifying their strength weakness	5	Identifying accurately strengths, weakness					Cannot identify strength, weakness
10. Level of proactive vision and intention in career	5	Proactive					Inactive
Total	100						

5.2. Rubrics for instructor assessment (R2)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90-100	80-90	70-80	60-70	50-60	< 50
1. Writing skills and format	5	Compliance with guidelines					Not follow
2. Background information on the company	5	relevant, sufficient, clear					Irrelevant, insufficient, unclear
3. Student position and responsibilities in the internship - Task - Achievement - Strengths - Weakness	80	Present the tasks and the achievement; sufficient weight for an internship; Identifying accurately strengths, weakness					Tasks and achievement are unclear; insufficient weight for an internship; Cannot identify strengths, weakness
4. Evaluate knowledge/skills learned and developed	5	Evaluate accurately the skills learned and developed					Cannot evaluate accurately the skills learned and developed
5. Conclude with ongoing considerations	5	The conclusion and recommendation are precise and accurate					The conclusion and recommendation are ambiguous and inaccurate.
Total	100						

6. **Revision Date:** August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering

Lecturer: Assoc. Prof. Huynh Kim Lam

Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/ 8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics.
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences.
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

REVISION HISTORY AND NOTES

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Minor details: rephrasing, typos, correct words, ...	09/04/2024	HKLam
2	Page 4-5	Assessment plan	19/8/2025	Nguyen Thi Thuy
3	Page 2,4	Add level of CLO; revise level of CLOs		



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Pre-thesis

Course Code: CHE4512IU

1. General information

Course name	- <i>(in English)</i> Pre-thesis - <i>(in Vietnamese)</i> Đề cương luận văn				
Course designation	The Pre-Thesis in Chemical Engineering is a specialized course designed to guide students through the initial stages of their thesis research in the field of chemical engineering. Through interactive discussions, hands-on workshops, and expert guidance, students will develop a deep understanding of the research process, refine their research proposals, and lay the foundation for their upcoming thesis projects.				
Course type	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others				
Semester(s) in which the course is taught	☐ Year 1	☐ Year 2	☐ Year 3	☒ Year 4	☐ Year 5
	☐ Semester 1		☒ Semester 2	☐ Summer	
Person responsible for the course	Lecturers from the School of Chemical and Environmental Engineering				
Language	English				
Relation to curriculum	☒ Compulsory ☐ Elective				
	☐ Lecture	☐ Lesson	☒ Project	☐ Seminar	

Teaching methods	Others, please specify:																																			
Workload (incl. contact hours, self-study hours)	<table border="1"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td></td><td></td><td>2</td></tr> <tr> <td>Contact hours</td><td>75</td><td>0</td><td>0</td><td>0</td><td>0</td><td>75</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td><td>60</td></tr> <tr> <td>Total workload</td><td>135</td><td>0</td><td>0</td><td>0</td><td>0</td><td>135</td></tr> </tbody> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>					2	Contact hours	75	0	0	0	0	75	Self-Study hours	60	0	0	0	0	60	Total workload	135	0	0	0	0	135
		Lecture	Lab	Project	Internship	Thesis																														
	<i>Credit</i>					2																														
Contact hours	75	0	0	0	0	75																														
Self-Study hours	60	0	0	0	0	60																														
Total workload	135	0	0	0	0	135																														
Credit points	2 credits (Theory: 0 + Thesis: 2) 4.91 ECTS																																			
Number of periods	Theory: 0 Thesis: 90																																			
Required and recommended prerequisites for joining the course	☒ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																			
Course objectives	Understanding research landscape, research proposal development, methodology and experimental design, data collection and analysis, literature review refinement, ethical considerations, presentation and communication skills, time management and project planning																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Analyze the issues and the scope of technical issues, select the important factors [Analyzing] CLO2. Analyze chemical problems by parameters and calculations, then provide a conclusion about the chemical problem [Analyzing] CLO3. Analyze current applied solutions, their advantages/disadvantages and propose solutions for a practical chemical problem [Analyzing] </td></tr> <tr> <td>Skill</td><td>CLO4. Display a thesis proposal [Mechanism]</td></tr> <tr> <td>Attitude</td><td>CLO5. Recognize scientific misconduct and plagiarism; formulate a professional commitment to scientific ethics [Organization]</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Analyze the issues and the scope of technical issues, select the important factors [Analyzing] CLO2. Analyze chemical problems by parameters and calculations, then provide a conclusion about the chemical problem [Analyzing] CLO3. Analyze current applied solutions, their advantages/disadvantages and propose solutions for a practical chemical problem [Analyzing]	Skill	CLO4. Display a thesis proposal [Mechanism]	Attitude	CLO5. Recognize scientific misconduct and plagiarism; formulate a professional commitment to scientific ethics [Organization]																											
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Skill	CLO4. Display a thesis proposal [Mechanism]																																			
Attitude	CLO5. Recognize scientific misconduct and plagiarism; formulate a professional commitment to scientific ethics [Organization]																																			

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>Introduction</td><td>1</td><td>T,U</td></tr><tr><td>Literature review</td><td>2.5</td><td>T,U</td></tr><tr><td>Material and method</td><td>2.5</td><td>T,U</td></tr><tr><td>Preliminary results</td><td></td><td></td></tr></table>			Topic	Weight	Level	Introduction	1	T,U	Literature review	2.5	T,U	Material and method	2.5	T,U	Preliminary results		
Topic	Weight	Level																
Introduction	1	T,U																
Literature review	2.5	T,U																
Material and method	2.5	T,U																
Preliminary results																		
Examination forms	☐ Multiple-choice questions☐ Oral examination ☒ Report☐ Written examination ☐ Presentation☐ Others, please specify: ☐ Assignments																	
Study and examination requirements	<u>Attendance:</u> A minimum attendance of 80 percent is compulsory for the advisor meeting. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																	
Reading list																		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	4	4					
	3	4	4				4	
Skills (Level: 1-7)	4			4		4		
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	4.0	4.0		4.0	4.0	4.0
L,M,H conversion*		M	M	M		M	M	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Research topic	CLO	Assessments	Learning activities
1-3	Plan for doing pre-thesis Introduction	1,4,5		Meeting and practicing
4-6	Literature review	2,4,5		Meeting and practicing
7-10	Material and method Preliminary results	3,4,5		Meeting and practicing
	Process assessment		Advisor assessment	-
	Reviewer assessment		Reviewer assessment	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Process assessment	R1-2	R1-3	R1-4	R1-1,2,3,5	R1-6
Reviewer assessment	R2-2	R2-3	R2-4	R2-1,2,3,5	R2-6

Note: 60%Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubric

R1. Process evaluation (for academic advisor)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Writing skill and format (compliance to thesis guidelines)	10	Compliance well to guidelines					Not follow
2. Study goal and objectives (clear, achievable);	10	sufficient, clear					Insufficient, unclear, irrelevant,
3. Literature review (sufficient literature)	30	relevant, sufficient, clear					Irrelevant, insufficient, unclear

4. Methodology (clear, appropriate methods, materials and equipment)	30	Appropriate, applicable, reliable					Inappropriate, inapplicable, unreliable
5. Holistic level	10	Demonstrates complete understanding of the problem. All requirements of task are included in response					Demonstrates little understanding of the problem. Many requirements of task are missing (missing more than 50%)
6. Level of professional commitment to scientific ethics	10	Follow well the requirement about scientific ethics in terms of plagiarism, integrity in data collection and analysis					Do not follow the requirement, commit plagiarism at % higher than allowable value; having clear signal of data manipulation or data fabrication
Total	100						

R2. Evaluation of reviewer

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90 ≤ ≤100	80 ≤ <90	70 ≤ <80	60 ≤ <70	50 ≤ <60	<50
1. Writing skill and format (compliance to thesis guidelines)	10	Compliance well to guidelines					Not follow
2. Study goal and objectives (clear, achievable),	10	sufficient, clear					Insufficient, unclear, irrelevant,
3. Literature review (sufficient literature)	30	relevant, sufficient, clear					Irrelevant, insufficient, unclear
4. Methodology (clear, appropriate methods, materials and equipment)	30	Appropriate, applicable, reliable					Inappropriate, inapplicable, unreliable
5. Holistic level	10	Demonstrates complete understanding of the problem. All requirements of task are included in response					Demonstrates little understanding of the problem. Many requirements of task are missing (missing more than 50%)
6. Level of professional commitment to scientific ethics	10	Follow well the requirement about scientific ethics in terms of plagiarism, integrity in data collection and analysis					Do not follow the requirement, commit plagiarism at % higher than allowable value; having clear signal of data manipulation or data fabrication
Total	100						

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering
Lecturer: Assoc. Prof. Huynh Kim Lam
Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/ 8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 2, 3	Revise: contents, examination forms, requirements (attendance), level of CLO, and Learning Outcomes Matrix	07/6/2025	Nguyen Thi Thuy
2	Page 4-6	Add: Planned learning activities and teaching methods Revise: assessment plan Add: rubric	19/8/2025	Nguyen Thi Thuy



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Thesis
Course Code: CHE4522IU

1. General information

Course name	- <i>(in English)</i> Thesis - <i>(in Vietnamese)</i> Luận văn
Course designation	Thesis is a semester-long course taken at the senior year following the success of the pre-thesis work. This is independent work, students are expected to spend about 30 h/per week. Students work on a specific research topic whose plan has been developed in detail. Students and advisors meet to discuss together as much as needed. The work can be experiments to discover the effects of certain factors on a scientific issue. For unsatisfactory work, students must prolong the time until completion. In an unavoidable situation, students may require to change the topic or the advisor. The course culminates in a written thesis report. Students also defend their results in an oral presentation in front of a faculty committee, in due form.
Semester(s) in which the course is taught	☐ General knowledge ☐ Fundamental knowledge ☐ Specialized knowledge ☒ Project/Internship/Thesis ☐ Others
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☒ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person In-Charge	Lecturers from the School of Chemical and Environmental Engineering
Language	English
Relation to curriculum	☒ Compulsory ☐ Elective

Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:																																			
Workload (incl. contact hours, self-study hours)	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td></td><td></td><td>10</td></tr> <tr> <td>Contact hours</td><td>375</td><td>0</td><td>0</td><td>0</td><td>0</td><td>375</td></tr> <tr> <td>Self-Study hours</td><td>300</td><td>0</td><td>0</td><td>0</td><td>0</td><td>300</td></tr> <tr> <td>Total workload</td><td>675</td><td>0</td><td>0</td><td>0</td><td>0</td><td>675</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>					10	Contact hours	375	0	0	0	0	375	Self-Study hours	300	0	0	0	0	300	Total workload	675	0	0	0	0	675
		Lecture	Lab	Project	Internship	Thesis																														
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Contact hours	375	0	0	0	0	375																														
Self-Study hours	300	0	0	0	0	300																														
Total workload	675	0	0	0	0	675																														
Credit points	10 credits (Theory: 0 + Thesis: 10) 24.55 ECTS																																			
Number of periods	Theory: 0 Thesis: 450																																			
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisites: <i>(Please specify course ID & course title, if any)</i> ☐ Corequisites: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>Pre-thesis; 90% of the total accumulated credits</i>																																			
Course objectives	After finishing this course students acquire knowledge and comprehension of the research process. They know how to identify a scientific issue, apply their knowledge to solve a scientific problem. They learn how to communicate their scientific findings to the greater scientific community using manuscript, poster and oral presentation. They feel confident enough about their scientific discoveries to discuss and defend their findings and how they related to the greater scientific community.																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Searching the literature relevant to the topic; Interpreting the differences between primary, secondary and tertiary sources of information; Producing a critical review of the literature relevant to the topic to be studied [Evaluating].</td></tr> <tr> <td>Skill</td><td>CLO2. Formulating a hypothesis; Perform effectively the investigations/designs; Collecting, collating and analyzing effectively data from their investigations/designs [Expert]. CLO3. Drawing valid conclusions from the analysis of the data; Discussing the relevance of the conclusions in the context of the literature relating to that topic [Expert]. CLO4. Reporting the findings of the investigations via manuscript; oral presentation; poster. Efficient communication in explaining, debating, and justifying their work [Expert].</td></tr> <tr> <td>Attitude</td><td>CLO5. Displaying the perseverance, and flexibility in solving the problem [characterization]</td></tr> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Searching the literature relevant to the topic; Interpreting the differences between primary, secondary and tertiary sources of information; Producing a critical review of the literature relevant to the topic to be studied [Evaluating].	Skill	CLO2. Formulating a hypothesis; Perform effectively the investigations/designs; Collecting, collating and analyzing effectively data from their investigations/designs [Expert]. CLO3. Drawing valid conclusions from the analysis of the data; Discussing the relevance of the conclusions in the context of the literature relating to that topic [Expert]. CLO4. Reporting the findings of the investigations via manuscript; oral presentation; poster. Efficient communication in explaining, debating, and justifying their work [Expert].	Attitude	CLO5. Displaying the perseverance, and flexibility in solving the problem [characterization]																											
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Attitude	CLO5. Displaying the perseverance, and flexibility in solving the problem [characterization]																																			

		CLO6. Displaying proactive vision and intention in career [characterization]																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Chapter 1: Introduction</td><td></td><td></td></tr><tr><td>2</td><td>Chapter 2: Literature Review</td><td></td><td></td></tr><tr><td>3</td><td>Chapter 3: Methodology</td><td></td><td></td></tr><tr><td>4</td><td>Chapter 4: Case Studies</td><td></td><td></td></tr><tr><td>5</td><td>Chapter 5: Results and Discussion</td><td></td><td></td></tr><tr><td>6</td><td>Chapter 6: Conclusion and Future Work</td><td></td><td></td></tr><tr><td>7</td><td>References</td><td></td><td></td></tr><tr><td>8</td><td>Appendices (if applicable)</td><td></td><td></td></tr></table>		No.	Topic	Weight	Level	1	Chapter 1: Introduction			2	Chapter 2: Literature Review			3	Chapter 3: Methodology			4	Chapter 4: Case Studies			5	Chapter 5: Results and Discussion			6	Chapter 6: Conclusion and Future Work			7	References			8	Appendices (if applicable)		
No.	Topic	Weight	Level																																			
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Examination forms	☐ Multiple-choice questions ☒ Oral examination ☒ Report ☐ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments																																					
Study and examination requirements	<u>Attendance:</u> When A student does not meet with the advisor for 2 consecutive weeks without a valid reason, the advisor has the right to refuse to guide the student, and the School will suspend the thesis. When students submit a mid-term report/ thesis report, they will have to submit an "Attendance Record" with confirmation from the advisor. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																																					
Reading list																																						

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
Skills (Level: 1-7)	2	5	5			5		
	3					5	5	
	4			5				
Attitudes (Level: 1-5)	5							5
	6							5
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	5.0	5.0		5.0	5.0	5.0
L,M,H conversion*		H	H	H		H	H	H

*L (Low); M (Medium); H (High)

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Process assessment	70% pass	70% pass	70% pass	70% pass	70% pass	70% pass
Reviewer assessment	70% pass	70% pass	70% pass	70% pass	70% pass	70% pass
Committee assessment	70% pass	70% pass	70% pass	70% pass	70% pass	70% pass

Note: %Pass: Target that % of students have scores greater than 50 out of 100.

5. Rubric

R1. Academic Advisor

Criteria	Maximum mark
1. Meeting with advisor and level of commitment	10
2. Activeness and independence in work	10
3. Creativity	10
4. Writing skill and format (compliance to thesis guidelines)	10
5. Study goal and objectives (clear, achievable)	10
6. Literature review (sufficient literature)	10
7. Methodology (clear, appropriate methods, materials and equipment)	15
8. Results and discussion (evaluated based on the specific objectives of the study)	25
Total	100

R2. For reviewer

Criteria	Maximum mark
1. Study goal and objectives (clear, achievable)	15
2. Literature review (sufficient literature)	15
3. Methodology (clear, appropriate methods, materials and equipment)	20
4. Results and discussion (evaluated based on the specific objectives of the study)	30
5. Significant contribution/ novelty (significant/ moderate/ insignificant)	10
6. Writing skill and format (compliance to thesis guidelines)	10
Total	100

R3. For committee member

Criteria	Maximum mark
1. Study goal and objectives (clear, achievable)	05
2. Literature review (sufficient literature)	10
3. Methodology (clear, appropriate methods, materials and equipment)	15
4. Results and discussion (evaluated based on the specific objectives of the study)	20
5. Writing skill and format (compliance to thesis guidelines)	05
6. Significant contribution/ novelty (significant/ moderate/ insignificant)	05
7. Presentation (quality of slides, speaking skills, timing)	15
8. Answer the questions from reviewer and committee members (relevant to questions, satisfiable)	20
9. Attitude and behavior	05
Total	100

6. Revision Date: August 19, 2025

7. Course coordinator/Lecturer

School/Department: School of Chemical and Environmental Engineering

Lecturer: Assoc. Prof. Huynh Kim Lam

Email: hklam@hcmiu.edu.vn

Ho Chi Minh City, 21/8/2025

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
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5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	Page 3	Revise attendance requirement	19/8/2025	Nguyen Thi Thuy
2	Page 4	Add rubric for evaluation		
3	Page 2,4	Add/revise levels for each CLO, re-arrange CLO, and revise the learning outcomes matrix		