ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

CHƯƠNG TRÌNH ĐÀO TẠO KHÓA 2024 – NGÀNH THỐNG KÊ
TRÌNH ĐỘ ĐẠI HỌC

(Kèm theo Quyết định số 797 /QĐ-ĐHQT ngày 23 tháng 7 năm 2024 của Hiệu trưởng trường Đại học Quốc tế)

1. Thông tin chung

- Tên ngành đào tạo:

+ Tiếng Việt: Thống kê (chuyên ngành: Thống kê ứng dụng)

+ Tiếng Anh: Statistics (specialization: Applied Statistics)

- Mã ngành đào tạo: 7460201

- Trình độ đào tạo: Đại học

- Loại hình đào tạo: Chính quy

- Thời gian đào tạo: 4 năm

- Tên văn bằng sau khi tốt nghiệp:

+Tiếng Việt: Cử nhân Thống kê

+Tiếng Anh: Bachelor of Science in Statistics

- Nơi đào tạo: Trường Đại học Quốc tế, ĐHQG TP. 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 Đề án tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Đề án 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 Đề án tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Đề án tuyển sinh của trường Đại học Quốc tế.

c. Tổ hợp môn xét tuyển: A00, A01.

d. Dự kiến chỉ tiêu tuyển sinh năm 2024: 40 sinh viên

3. Mục tiêu đào tạo

a. Mục tiêu chung:

Trường Đại học Quốc tế đào tạo cử nhân khoa học Thống kê (chuyên ngành Thống kê ứng dụng) có phẩm chất chính trị, đạo đức và sức khỏe tốt, có kiến thức cơ bản về Toán học và chuyên sâu về Thống kê và Học máy, khả năng ứng dụng các công cụ và mô hình Thống kê hiện đại để giải quyết các vấn đề thực tế liên quan đến phân tích và dự báo trong các ngành khoa học khác nhau, đặc biệt trong lĩnh vực kinh tế, tài chính, bảo hiểm và quản trị. Cụ thể các sinh viên ngành Thống kê sau khi tốt nghiệp có các khả năng sau đây (Program Objectives-PO):

P.O.1. Có khả năng ứng dụng một cách hiệu quả các công cụ và mô hình trong Thống kê, Học máy và Toán học để giải quyết các vấn đề trong các lĩnh vực thuộc khoa học tính toán, khoa học dữ liệu, kinh tế, tài chính, quản trị và công nghiệp.

P.O.2. Có khả năng phổ biến và phát triển các mô hình lý thuyết Thống kê, tham gia nghiên cứu khoa học và sẵn sàng học tiếp lên bậc học cao hơn.

P.O.3. Có các kỹ năng mềm cần thiết. Có khả năng truyền đạt ý tưởng của mình và làm việc nhóm, khả năng giải quyết vấn đề, khả năng thuyết trình, khả năng lãnh đạo và kỹ năng quản lý.

P.O.4. Có phẩm chất đạo đức và phẩm chất chính trị tốt, sống và làm việc tuân theo các quy định của pháp luật nhà nước Việt Nam

P.O.5. Có khả năng tự học tập suốt đời, tự cập nhật và giáo dục thường xuyên trong lĩnh vực Thống kê và trong nghề nghiệp. Có trách nhiệm nghề nghiệp cao.

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
P.O.1. Có khả năng ứng dụng một cách hiệu quả các công cụ và mô hình trong Thống kê, Học máy và Toán học để giải quyết các vấn đề trong các lĩnh vực thuộc khoa học tính toán, khoa học dữ liệu, kinh tế, tài chính, quản trị và công nghiệp. **P.O.2.** Có khả năng phổ biến và phát triển các mô hình lý thuyết Thống kê, tham gia nghiên cứu khoa học và sẵn sàng học tiếp lên bậc học cao hơn. **P.O.3**. Có các kỹ năng mềm cần thiết. Có khả năng truyền đạt ý tưởng của mình và làm việc nhóm, khả năng giải quyết vấn đề, khả năng thuyết trình, khả năng	1. Đào tạo nguồn nhân lực có trình độ cao trong lĩnh vực của Toán ứng dụng và Thống kê trong kinh tế tài chính và Thống kê. 2. Gắn kết chặt chẽ nội dung đào tạo với nhu cầu thực tiễn của các doanh nghiệp và tổ chức tài chính tại Việt Nam. 3. Đào tạo và nghiên cứu về Toán ứng dụng và Thống kê, kỹ thuật tài chính và quản trị rủi ro theo xu hướng của các nước tiên tiến trên thế giới như Mỹ, Anh, Pháp. 4. Ứng dụng và kết hợp kiến thức của các ngành toán học, học máy và công nghệ thông tin vào hoạt động phân tích dữ liệu tài	1. Đào tạo đại học chất lượng cao trong các lĩnh vực Toán ứng dụng, Thống kê và các lĩnh vực liên ngành trong Toán ứng dụng. 2. Đào tạo các kỹ năng nghiên cứu bao gồm nghiên cứu cơ bản và ứng dụng, đào tạo và phát triển nghiên cứu độc lập và khả năng học tập suốt đời của người học để đáp ứng nhu cầu của ngành và xã hội. 3. Tiên phong phát triển lĩnh vực Toán ứng dụng và Thống kê, Kỹ thuật tài chính & Quản lý rủi ro và các lĩnh vực Toán ứng dụng	Mục tiêu chung: - Đào tạo nhân lực, nâng cao dân trí, bồi dưỡng nhân tài; nghiên cứu khoa học, công nghệ tạo ra tri thức, sản phẩm mới, phục vụ yêu cầu phát triển kinh tế - xã hội, bảo đảm quốc phòng, an ninh và hội nhập quốc tế; - Đào tạo người học có phẩm chất chính trị, đạo đức; có kiến thức, kỹ năng thực hành nghề nghiệp, năng lực nghiên cứu và phát triển ứng dụng khoa học và công nghệ tương xứng với trình độ đào tạo; có sức khỏe; có khả năng sáng tạo và trách nhiệm nghề

lãnh đạo và kỹ năng quản lý. **P.O.4.** Có phẩm chất đạo đức và phẩm chất chính trị tốt, sống và làm việc tuân theo các quy định của pháp luật nhà nước Việt Nam **P.O.5**. Có khả năng tự học tập suốt đời, tự cập nhật và giáo dục thường xuyên trong lĩnh vực Thống kê và trong nghề nghiệp. Có trách nhiệm nghề nghiệp cao.	chính và quản trị rủi ro tại Việt Nam.	khác tại Việt Nam bằng cách thúc đẩy ứng dụng Kỹ thuật tài chính & Quản lý rủi ro trong nhiều lĩnh vực sản xuất và dịch vụ tại Việt Nam 4. Giữ vai trò tiên phong trong giáo dục và nghiên cứu Toán học lý thuyết và ứng dụng tại Việt Nam.	nghiệp, thích nghi với môi trường làm việc; có ý thức phục vụ Nhân dân.

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

Phẩm chất chính trị và phẩm chất đạo đức: Có phẩm chất chính trị, đạo đức nghề nghiệp tốt, hiểu biết đúng đắn về đường lối, chính sách của Đảng và Nhà nước.

***Khả năng chuyên môn*:** Cử nhân ngành Thống kê (Chuyên ngành Thống kê ứng dụng) có khả năng sử dụng thành thạo các công cụ, các mô hình Thống kê hiện đại và các mô hình học máy để phân tích và dự báo cho các ngành nghề khác nhau. Có khả năng tham gia xây dựng và phân tích các mô hình Thống kê cụ thể, tính toán và xử lý dựa trên công cụ toán học và công nghệ thông tin (phần mềm thống kê) nhằm phân tích, đề xuất dự báo thống kê cho nhiều lĩnh vực trong kinh tế, tài chính và xã hội.

Kỹ năng: Am hiểu và có khả năng tổ chức các hoạt động trong lĩnh vực thống kê ứng dụng trong các ngành như kinh tế, tài chính, bảo hiểm, quản trị, y học…Thành thạo kỹ năng thu thập dữ liệu từ các nguồn khác nhau, đồng thời hiểu rõ các số liệu thống kê. Có khả năng ứng dụng các mô hình thống kê và các kỹ thuật phân tích dữ liệu kinh tế xã hội và dự báo, từ đó lựa chọn giải pháp thích hợp và đưa ra phương án tốt nhất trong các tình huống đa dạng, hỗ trợ việc ra quyết định cho các nhà quản lý.

Khả năng tự nâng cao trình độ và thích nghi được với sự phát triển của khoa học và xã hội:

- Có khả năng tự đọc, trang bị kiến thức mới, công cụ hiện đại thuộc chuyên ngành.
- Có khả năng đọc và phân tích các thành tựu khoa học thuộc chuyên môn trong và ngoài nước và áp dụng vào công việc chuyên môn của mình.
- Có khả năng tự học hỏi, nghiên cứu sâu về lý thuyết thống kê và thống kê ứng dụng.

Năng động và thích nghi tốt với môi trường:

- Có thể tham gia vào việc nghiên cứu, cải tiến phương pháp, tham gia các đề án Thống kê liên ngành và các vấn đề ứng dụng liên quan.

- Có năng lực độc lập suy nghĩ, sáng tạo trong các hoạt động nghề nghiệp, thích nghi được với sự thay đổi loại hình và tính chất công việc khi làm việc với các dự án thuộc đa ngành.

- Có khả năng nhận biết vấn đề, xử lý, đề xuất các phương án và có những kỹ năng làm việc tốt trong môi trường quốc tế (tiếng Anh tốt, kỹ năng làm việc nhóm, kỹ năng làm việc trong môi trường đa văn hóa).

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

Chương trình đào tạo có 8 chuẩn đầu ra. Cụ thể, cử nhân ngành Thống kê của trường Đại học Quốc tế ngay sau khi tốt nghiệp sẽ có các khả năng như sau:

Stt	Chuẩn đầu ra	Trình độ năng lực (theo thang Bloom)
1.	**Kiến thức và lập luận ngành (Cognitive/ knowledge/ thinking)**	
1.1	Có kiến thức nền tảng về Xác suất, Thống kê, các mô hình Toán học, bao gồm mô hình hóa và mô phỏng, phân tích dữ liệu, học máy và trí tuệ nhân tạo.	Bậc 2 (Understand)
1.2	Có khả năng ứng dụng tư duy Thống kê và tư duy phản biện nhằm giải quyết các vấn đề thực tế.	Bậc 3 (Apply)
1.3	Có khả năng đánh giá và vận dụng các phương pháp Thống kê trong các mô hình thống kê ứng dụng trong cuộc sống, bao gồm trong tài chính, kinh doanh, và kinh tế-xã hội.	Bậc 5 (Evaluate)
2.	**Kỹ năng, năng lực thực hành nghề nghiệp (Psychomotor/skill/doing)**	
2.1	Có kỹ năng giao tiếp (viết, nói, …) tốt, trong các môi trường chuyên môn, nghiên cứu, cũng như không chuyên môn. Có khả năng sử dụng tiếng Anh lưu loát trong giao tiếp. Có những kỹ năng làm việc tốt trong môi trường quốc tế, môi trường đa văn hóa. Có tinh thần và kỹ năng làm việc nhóm hiệu quả, tính chuyên nghiệp cao.	Bậc 3 (response)
2.2	Có kỹ năng lựa chọn, phân tích và cải tiến phương pháp thống kê và các mô hình dự báo. Xây dựng và tổ chức mô hình thống kê cho doanh nghiệp và xã hội.	Bậc 4 (articulation)
2.3	Thiết kế và xây dựng tính toán cho các mô hình Thống kê dữ liệu; bao gồm mô phỏng mô hình, phân tích và dự báo các mô hình Thống kê, với ứng dụng trong tài chính, quản trị kinh doanh, và kinh tế xã hội.	Bậc 5 (Mechanism-basic proficiency)
3.	**Thái độ, ý thức (Affective/attitude/feeling)**	

3.1	Có đạo đức cá nhân và đạo đức nghề nghiệp tốt và có trách nhiệm với cộng đồng. Có hiểu biết đúng đắn về pháp luật đại cương và pháp luật nghề nghiệp, về đường lối, chính sách của Đảng và Nhà nước. Có thế giới quan, nhân sinh quan đúng đắn và có khả năng nhận thức, đánh giá các hiện tượng một cách logic và tích cực.	Bậc 4 (Organization)
3.2	Có tính chủ động, tích cực, có nhu cầu tự hoàn thiện nghề nghiệp và thích nghi với những biến động của xã hội. Có ý thức và khả năng học tập suốt đời.	Bậc 5 (Characterization)

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

Bảng 2. Mối quan hệ giữa 11 CĐR (11 PLOs) và 04 mục tiêu đào tạo (POs)

	PLOs	**POs**				
		PO1	**PO2**	**PO3**	**PO4**	**PO5**
Kiến thức	**PLO1 (a)**	x				
	PLO2 (b)	x		x		
	PLO3 (c)		x			
Kỹ năng	**PLO4 (d)**			x		
	PLO5 (e)	x	x			
	PLO6 (f)		x			
Tự chủ và trách nhiệm	**PLO7 (g)**				x	x
	PLO8 (h)					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-ĐHQT 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
Kém	Từ 30 đến cận 40	D	1,0
	Dưới 30	F	0,0

8. Khối lượng kiến thức toàn khóa

Tổng số tín chỉ: **139 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	%
I	Khối kiến thức giáo dục đại cương	42	30
II	Khối kiến thức cơ sở ngành	32	23
III	Kiến thức chuyên ngành	39	28
IV	Kiến thức bổ trợ	11	8
V	Thực tập, khóa luận/luận văn tốt nghiệp	15	11
	Tổng cộng	**139**	**100**

9. Nội dung chương trình đào tạo

Bảng 5. 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 Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
I. Khối kiến thức giáo dục đại cương									
Lý luận chính trị (11 tín chỉ)									
1	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism	Bắt buộc	3	3			
2	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism	Bắt buộc	2	2			
3	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2			
4	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2			
5	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2			
Pháp luật, Khoa học xã hội và nhân văn (3 tín chỉ)									
6	PE021IU	Pháp luật đại cương	General law	Bắt buộc	3	3			
Ngoại ngữ (8 tín chỉ)									
7	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2			
8	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2			

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)	Ghi chú
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
9	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2			
10	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2			
Toán - Tin học - Khoa học tự nhiên - Công nghệ - Môi trường (16 tín chỉ)									
11	MAFE101IU	Giải tích 1	Analysis 1	Bắt buộc	4	4			
12	MAFE109IU	Giới thiệu về Python	Introduction to Python	Bắt buộc	4	3	1		
13	MAFE103IU	Giải tích 2	Analysis 2	Bắt buộc	4	4			
14	MAFE104IU	Đại số tuyến tính	Linear Algebra	Bắt buộc	4	4			
Kinh tế - Quản lý (4 tín chỉ)									
15	MAFE212IU	Tài chính kế toán	Financial Accounting	Bắt buộc	4	4			
II. Kiến thức cơ sở ngành									
16	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4			
17	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3			
18	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3			
19	MAFE204IU	Hệ quản trị dữ liệu	Database Management system	Bắt buộc	3	2	1		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)	Ghi chú
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
20	MAAS220IU	Giới thiệu về thống kê	Introduction to Statistics	Bắt buộc	2	2			
21	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4			
22	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4			
23	MAAS221IU	Giới thiệu về học máy	Introduction to Machine Learning	Bắt buộc	3	2	1		
24	MAFE207IU	Lý thuyết ra quyết định	Decision making	Bắt buộc	3	3			
25		Môn học tự chọn #1	MAAS Elective #1	Tự chọn	3	3			
	IS055IU	Các nguyên lý logistic và chuỗi cung ứng	Principles of Logistics and Supply Chain Management		3	3			
	MAFE306IU	Toán tài chính 1	Financial Mathematics 1		3	3			
	MAFE209IU	Thị trường Tài chính	Financial Markets		3	3			
	PE008IU	Tư duy phản biện	Critical Thinking		3	3			
III. Kiến thức chuyên ngành									
26	MAAS318IU	Mô hình ngẫu nhiên	Stochastic Modeling	Bắt buộc	3	3			
27	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4			

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)	Ghi chú
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
28	MAAS320IU	Mô hình hồi quy	Regression Models	Bắt buộc	3	3			
29	MAAS322IU	Thống kê tính toán	Statistical Computing	Bắt buộc	3	3			
30	MAAS324IU	Phân tích chuỗi thời gian ứng dụng	Applied Time Series Analysis	Bắt buộc	3	3			
31		Môn tự chọn #2	MAAS Elective #2	Tự chọn	3	3			
	MAAS325IU	Phân tích dự báo	Predictive Analytics		3	3			
	IS065IU	Quản trị rủi ro và an toàn chuỗi cung ứng	Supply Chain Security and Risk Management		3	3			
	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk management 1		3	3			
	MAAS326IU	Toán bảo hiểm cho cuộc sống	Actuarial Mathematics for Life Contingent		3	3			
32	IT157IU	Học sâu	Deep Learning	Bắt buộc	4	4			
33	MAAS410IU	Thống kê Bayes	Bayesian Statistics	Bắt buộc	3	3			
34		Môn học tự chọn #3	MAAS Elective #3	Tự chọn	3	3			
	MAAS411IU	Mô hình thống kê cho khoa học Bảo hiểm	Statistical Models for Actuarial Science		3	3			

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)	Ghi chú
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
	MAAS412IU	Phương pháp thống kê trong tài chính	Statistical Methods for Finance		3	3			
	IS066IU	Khai phá dữ liệu trong chuỗi cung ứng	Data Mining in Supply Chain		3	3			
35		Môn học tự chọn #4	MAAS Elective #4	Tự chọn	3	3			
	MAFE307IU	Tối ưu hoá 2	Optimization 2		3	3			
	MAAS414IU	Phương pháp lấy mẫu điều tra	Survey Sampling		3	3			
	MAAS415IU	Mô hình xác suất ứng dụng trong khoa học Bảo hiểm	Applied Probability Models in Actuarial Science		3	3			
36	MAFE303IU	Tối ưu hoá 1	Optimization 1	Bắt buộc	4	4			
37	MAAS413IU	Phân tích thống kê nhiều chiều	Multivariate Statistical Analysis	Bắt buộc	3	3			
IV. Kiến thức bổ trợ									
38	IT069IU	Lập trình hướng đối tượng	Object-Oriented programming	Bắt buộc	4	3	1		
39	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data structures	Bắt buộc	4	3	1		

Stt	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)	Ghi chú
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm		
40	BA115IU	Giới thiệu về quản trị kinh doanh	Introduction to Business Administration	Bắt buộc	3	3			
V. Thực tập, khóa luận/luận văn tốt nghiệp									
41	MAAS328IU	Thực tập hè	Summer Internship	Bắt buộc	3	3			
42	MAAS420IU	Khóa luận tốt nghiệp	Graduation thesis	Bắt buộc	12	12			
	Tổng số (tín chỉ)				**139**	**134**	**5**		

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

Tùy vào trình độ tiếng Anh của người học đạt trình độ AE1, IE2, IE1 và IE0, kế hoạch giảng dạy các môn học được cụ thể tương ứng được trình bày trong các Bảng 6, Bảng 7, Bảng 8 và Bảng 9.

10.1. Trình độ AE1

Bảng 6. Kế hoạch giảng dạy đối với người học đạt trình độ AE1

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I (21 tín chỉ)	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2		
	EN008IU	Listening AE1	Tiếng Anh chuyên	Bắt buộc	2	2		

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
			ngành 1 (kỹ năng nghe)					
	MAFE101IU	Analysis 1	Giải tích 1	Bắt buộc	4	4		
	PE021IU	General Law	Pháp Luật đại cương	Bắt buộc	3	3		
	MAFE109IU	Introduction to Python	Giới thiệu về Python	Bắt buộc	4	3	1	
	PT001IU	Physical Training 1		Bắt buộc	3	3		
	PE015IU	Philosophy of Marxism and Leninism	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Bắt buộc	3	3		
	Tổng				**21**			
II (22 tín chỉ)	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2		TQ: Writing AE1
	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2		TQ: Writing AE1 Listening AE1
	MAFE103IU	Analysis 2	Giải tích 2	Bắt buộc	4	4		HT: Analysis 1
	MAFE104IU	Linear Algebra	Đại số tuyến tính	Bắt buộc	4	4		
	IT069IU	Object-Oriented programming	Lập trình hướng đối tượng	Bắt buộc	4	3	1	
	MAFE212IU	Financial Accounting	Tài chính kế toán	Bắt buộc	4	4		
	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2		SH: Philosophy of Marxism and Leninism

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	Tổng				**22**			
III (17 tín chỉ)	MAFE201IU	Real Analysis	Giải tích thực	Bắt buộc	4	4		HT: Analysis 2
	MAFE203IU	Analysis 3	Giải tích 3	Bắt buộc	3	3		HT: Analysis 2
	MAFE206IU	Probability	Xác suất	Bắt buộc	3	3		HT: Analysis 2 SH: Analysis 3, Real Analysis
	MAFE204IU	Database Management system	Hệ quản trị dữ liệu	Bắt buộc	3	2	1	
	MAAS220IU	Introduction to Statistics	Giới thiệu về thống kê	Bắt buộc	2	2		
	PE017IU	Scientific Socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism
	Tổng				**17**			
IV (19 tín chỉ)	MAFE316IU	Statistics	Thống kê	Bắt buộc	4	4		HT: Probability
	MAAS221IU	Introduction to Machine Learning	Giới thiệu về học máy	Bắt buộc	3	2	1	TQ: Introduction to Python, Linear Algebra, Analysis 3
	MAFE202IU	Differential Equations	Phương trình vi phân	Bắt buộc	4	3		HT: Analysis 2
	PE018IU	History of Vietnamese Communist Party	Lịch sử đảng cộng sản Việt Nam	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
								Leninism, Scientific Socialism
	BA115IU	Introduction to Business Administration	Giới thiệu về quản trị kinh doanh	Bắt buộc	3	3		
	PT002IU	Physical Training 2		Bắt buộc	3	3		
	Tổng				**19**			
Summer Semester 2	Military Education							
V (19 tín chỉ)	MAAS318IU	Stochastic Modeling	Mô hình ngẫu nhiên	Bắt buộc	3	3		TQ: Probability
	MAFE208IU	Numerical Analysis	Giải tích số	Bắt buộc	4	4		HT: Analysis 3
	MAAS320IU	Regression Models	Mô hình hồi quy	Bắt buộc	3	3		TQ: Probability, Statistics
	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng Hồ Chí Minh	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism, Scientific Socialism
	IT013IU	Algorithms and Data Structure	Cấu trúc dữ liệu và giải thuật	Bắt buộc	4	3	1	HT: Object-Oriented programming
		MAAS Elective #1		Bắt buộc	3	3		
	Tổng				**19**			
VI	MAFE303IU	Optimization 1	Tối ưu hoá 1	Bắt buộc	4	4		HT: Analysis 3, Linear Algebra

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
(16 tín chỉ)	MAFE207IU	Decision making	Lý thuyết ra quyết định	Bắt buộc	3	3		HT: Probability, Optimization 1
	MAAS322IU	Statistical Computing	Thống kê tính toán	Bắt buộc	3	3		TQ: Statistics; Stochastic Modeling
	MAAS324IU	Applied Time Series Analysis	Phân tích chuỗi thời gian ứng dụng	Bắt buộc	3	3		TQ: Probability, Regression Models
		MAAS Elective #2		Bắt buộc	3	3		
	Tổng				**16**			
Summer Semester 3	MAAS328IU	Summer Internship	Thực tập hè		3	3		
	Tổng				**3**			
VII (16 tín chỉ)	IT157IU	Deep Learning	Học sâu	Bắt buộc	4	4		
	MAAS410IU	Bayesian Statistics	Thống kê Bayes	Bắt buộc	3	3		TQ: Probability, Statistics
	MAAS413IU	Multivariate Statistical Analysis	Phân tích thống kê nhiều chiều	Bắt buộc	3	3		TQ: Regression Models, Introduction to Machine Learning
		MAAS Elective #3		Bắt buộc	3	3		
		MAAS Elective #4		Bắt buộc	3	3		
	Tổng				**16**			
VIII (12 tín chỉ)	MAAS420IU	GRADUATION THESIS	Khóa luận tốt nghiệp	Bắt buộc	12	12		
	Tổng				**12**			

<u>Tổng số tín chỉ 139 (total credits 139)</u>

10.2. Trình độ IE2

Bảng 7. Kế hoạch giảng dạy đối với người học đạt trình độ IE2

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I (21 tín chỉ)	ENTP02	IE2	Tiếng Anh tăng cường 2	Bắt buộc	13	13		
	PT001IU	Physical Training 1		Bắt buộc	3	3		
	PE015IU	Philosophy of Marxism and Leninism	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Bắt buộc	3	3		
	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2		SH: Philosophy of Marxism and Leninism
	Tổng				**21**			
II (22 tín chỉ)	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2		
	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2		
	MAFE101IU	Analysis 1	Giải tích 1	Bắt buộc	4	4		
	MAFE104IU	Linear Algebra	Đại số tuyến tính	Bắt buộc	4	4		
	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3		
	MAFE109IU	Introduction to Python	Giới thiệu về Python	Bắt buộc	4	3	1	
	PT002IU	Physical Training 2		Bắt buộc	3	3		
	Tổng				**22**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
Sumer Semester 1 (6 tín chỉ)	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2		TQ: Writing AE1
	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2		TQ: Writing AE1 Listening AE1
	PE017IU	Scientific Socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism
	Tổng				6			
III (20 tín chỉ)	MAFE103IU	Analysis 2	Giải tích 2	Bắt buộc	4	4		HT: Analysis 1
	IT069IU	Object-Oriented programming	Lập trình hướng đối tượng	Bắt buộc	4	3	1	
	MAFE212IU	Financial Accounting	Tài chính kế toán	Bắt buộc	4	4		
	MAFE204IU	Database Management system	Hệ quản trị dữ liệu	Bắt buộc	3	2	1	
	MAAS220IU	Introduction to Statistics	Giới thiệu về thống kê	Bắt buộc	2	2		
	BA115IU	Introduction to Business Administration	Giới thiệu về quản trị kinh doanh	Bắt buộc	3	3		
	Tổng				**20**			
IV (19 tín chỉ)	MAAS221IU	Introduction to Machine Learning	Giới thiệu về học máy	Bắt buộc	3	2	1	TQ: Introduction to Python, Linear Algebra, Analysis 3

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	MAFE202IU	Differential Equations	Phương trình vi phân	Bắt buộc	4	3		HT: Analysis 2
	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng sản Việt Nam	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism, Scientific Socialism
	MAFE201IU	Real Analysis	Giải tích thực	Bắt buộc	4	4		HT: Analysis 2
	MAFE203IU	Analysis 3	Giải tích 3	Bắt buộc	3	3		HT: Analysis 2
	MAFE206IU	Probability	Xác suất	Bắt buộc	3	3		HT: Analysis 2 SH: Analysis 3, Real Analysis
	Tổng				**19**			
Summer Semester 2	Military Education							
V **(21 tín chỉ)**	MAAS318IU	Stochastic Modeling	Mô hình ngẫu nhiên	Bắt buộc	3	3		TQ: Probability
	MAFE208IU	Numerical Analysis	Giải tích số	Bắt buộc	4	4		HT: Analysis 3
	MAAS320IU	Regression Models	Mô hình hồi quy	Bắt buộc	3	3		TQ: Probability, Statistics
	IT013IU	Algorithms and Data Structure	Cấu trúc dữ liệu và giải thuật	Bắt buộc	4	3	1	HT: Object-Oriented programming
	MAFE316IU	Statistics	Thống kê	Bắt buộc	4	4		HT: Probability
		MAAS Elective #1		Bắt buộc	3	3		
	Tổng				**21**			
VI	MAFE303IU	Optimization 1	Tối ưu hoá 1	Bắt buộc	4	4		HT: Analysis 3, Linear Algebra

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
(18 tín chỉ)	MAFE207IU	Decision making	Lý thuyết ra quyết định	Bắt buộc	3	3		HT: Probability, Optimization 1
	MAAS322IU	Statistical Computing	Thống kê tính toán	Bắt buộc	3	3		TQ: Statistics; Stochastic Modeling
	MAAS324IU	Applied Time Series Analysis	Phân tích chuỗi thời gian ứng dụng	Bắt buộc	3	3		TQ: Probability, Regression Models
	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng Hồ Chí Minh	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism, Scientific Socialism
		MAAS Elective #2		Bắt buộc	3	3		
	Tổng				**18**			
Summer Semester 3	MAAS328IU	Summer Internship	Thực tập hè		3	3		
	Tổng				**3**			
VII (16 tín chỉ)	IT157IU	Deep Learning	Học sâu	Bắt buộc	4	4		
	MAAS410IU	Bayesian Statistics	Thống kê Bayes	Bắt buộc	3	3		TQ: Probability, Statistics
	MAAS413IU	Multivariate Statistical Analysis	Phân tích thống kê nhiều chiều	Bắt buộc	3	3		TQ: Regression Models, Introduction to Machine Learning
		MAAS Elective #3		Bắt buộc	3	3		
		MAAS Elective #4		Bắt buộc	3	3		
	Tổng				**16**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
VIII (12 tín chỉ)	MAAS420IU	GRADUATION THESIS	Khóa luận tốt nghiệp	Bắt buộc	12	12		
	Tổng				12			

Total credits: 139 + 13 (IE2) = 152

10.3. Trình độ IE1

Bảng 8. Kế hoạch giảng dạy đối với người học đạt trình độ IE1

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I (30 tín chỉ)	ENTP01	IE1	Tiếng Anh tăng cường 1	Bắt buộc	17	17		
	ENTP02	IE2	Tiếng Anh tăng cường 2	Bắt buộc	13	13		
	Tổng				30			
II (22 tín chỉ)	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2		
	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2		
	MAFE101IU	Analysis 1	Giải tích 1	Bắt buộc	4	4		

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
	MAFE104IU	Linear Algebra	Đại số tuyến tính	Bắt buộc	4	4		
	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3		
	MAFE109IU	Introduction to Python	Giới thiệu về Python	Bắt buộc	4	3	1	
	PT001IU	Physical Training 1		Bắt buộc	3	3		
	Tổng				**22**			
Sumer Semester 1 (9 tín chỉ)	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2		TQ: Writing AE1
	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2		TQ: Writing AE1 Listening AE1
	PE015IU	Philosophy of Marxism and Leninism	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Bắt buộc	3	3		
	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2		SH: Philosophy of Marxism and Leninism
	Tổng				**9**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
III (22 tín chỉ)	MAFE103IU	Analysis 2	Giải tích 2	Bắt buộc	4	4		HT: Analysis 1
	IT069IU	Object-Oriented programming	Lập trình hướng đối tượng	Bắt buộc	4	3	1	
	MAFE212IU	Financial Accounting	Tài chính kế toán	Bắt buộc	4	4		
	MAFE204IU	Database Management system	Hệ quản trị dữ liệu	Bắt buộc	3	2	1	
	MAAS220IU	Introduction to Statistics	Giới thiệu về thống kê	Bắt buộc	2	2		
	BA115IU	Introduction to Business Administration	Giới thiệu về quản trị kinh doanh	Bắt buộc	3	3		
	PE017IU	Scientific Socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism
	Tổng				**22**			
IV (22 tín chỉ)	MAAS221IU	Introduction to Machine Learning	Giới thiệu về học máy	Bắt buộc	3	2	1	TQ: Introduction to Python, Linear Algebra, Analysis 3
	MAFE202IU	Differential Equations	Phương trình vi phân	Bắt buộc	4	3		HT: Analysis 2
	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng sản Việt Nam	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism,

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
								Scientific Socialism
	MAFE201IU	Real Analysis	Giải tích thực	Bắt buộc	4	4		HT: Analysis 2
	MAFE203IU	Analysis 3	Giải tích 3	Bắt buộc	3	3		HT: Analysis 2
	MAFE206IU	Probability	Xác suất	Bắt buộc	3	3		HT: Analysis 2 SH: Analysis 3, Real Analysis
	PT002IU	Physical Training 2		Bắt buộc	3	3		
	Tổng				**22**			
Summer Semester 2	Military Education							
V **(21 tín chỉ)**	MAAS318IU	Stochastic Modeling	Mô hình ngẫu nhiên	Bắt buộc	3	3		TQ: Probability
	MAFE208IU	Numerical Analysis	Giải tích số	Bắt buộc	4	4		HT: Analysis 3
	MAAS320IU	Regression Models	Mô hình hồi quy	Bắt buộc	3	3		TQ: Probability, Statistics
	IT013IU	Algorithms and Data Structure	Cấu trúc dữ liệu và giải thuật	Bắt buộc	4	3	1	HT: Object-Oriented programming
	MAFE316IU	Statistics	Thống kê	Bắt buộc	4	4		HT: Probability
		MAAS Elective #1		Bắt buộc	3	3		
	Tổng				**21**			
VI	MAFE303IU	Optimization 1	Tối ưu hoá 1	Bắt buộc	4	4		HT: Analysis 3, Linear Algebra

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
(18 tín chỉ)	MAFE207IU	Decision making	Lý thuyết ra quyết định	Bắt buộc	3	3		HT: Probability, Optimization 1
	MAAS322IU	Statistical Computing	Thống kê tính toán	Bắt buộc	3	3		TQ: Statistics; Stochastic Modeling
	MAAS324IU	Applied Time Series Analysis	Phân tích chuỗi thời gian ứng dụng	Bắt buộc	3	3		TQ: Probability, Regression Models
	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng Hồ Chí Minh	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism, Scientific Socialism
		MAAS Elective #2		Bắt buộc	3	3		
	Tổng				**18**			
Summer Semester 3	MAAS328IU	Summer Internship	Thực tập hè		3	3		
	Tổng				**3**			
VII (16 tín chỉ)	IT157IU	Deep Learning	Học sâu	Bắt buộc	4	4		
	MAAS410IU	Bayesian Statistics	Thống kê Bayes	Bắt buộc	3	3		TQ: Probability, Statistics
	MAAS413IU	Multivariate Statistical Analysis	Phân tích thống kê nhiều chiều	Bắt buộc	3	3		TQ: Regression Models, Introduction to Machine Learning
		MAAS Elective #3		Bắt buộc	3	3		
		MAAS Elective #4		Bắt buộc	3	3		
	Tổng				**16**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
VIII (12 tín chỉ)	MAAS420IU	GRADUATION THESIS	Khóa luận tốt nghiệp	Bắt buộc	12	12		
	Tổng				**12**			

<u>Total credits: 139 + 30 = 169</u>

10.4. Trình độ IE0

Bảng 9. Kế hoạch giảng dạy đối với người học đạt trình độ IE0

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I (34 tín chỉ)	ENTP00	IE0	Tiếng Anh tăng cường 0	Bắt buộc	17	17		
	ENTP01	IE1	Tiếng Anh tăng cường 1	Bắt buộc	17	17		
	Tổng				**34**			
II (19 tín chỉ)	ENTP02	IE2	Tiếng Anh tăng cường 2	Bắt buộc	13	13		
	PT001IU	Physical Training 1		Bắt buộc	3	3		
	PE015IU	Philosophy of Marxism and Leninism	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Bắt buộc	3	3		
	Tổng				**19**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
Sumer Semester 1 (8 tín chỉ)	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2		
	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2		
	MAFE101IU	Analysis 1	Giải tích 1	Bắt buộc	4	4		
	Tổng				**8**			
III (22 tín chỉ)	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2		TQ: Writing AE1
	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2		TQ: Writing AE1 Listening AE1
	MAFE103IU	Analysis 2	Giải tích 2	Bắt buộc	4	4		HT: Analysis 1
	MAFE104IU	Linear Algebra	Đại số tuyến tính	Bắt buộc	4	4		
	IT069IU	Object-Oriented programming	Lập trình hướng đối tượng	Bắt buộc	4	3	1	
	MAFE212IU	Financial Accounting	Tài chính kế toán	Bắt buộc	4	4		
	MAAS220IU	Introduction to Statistics	Giới thiệu về thống kê	Bắt buộc	2	2		
	Tổng				**22**			
	MAFE109IU	Introduction to Python	Giới thiệu về Python	Bắt buộc	4	3	1	

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
IV (20 tín chỉ)	MAFE201IU	Real Analysis	Giải tích thực	Bắt buộc	4	4		HT: Analysis 2
	MAFE203IU	Analysis 3	Giải tích 3	Bắt buộc	3	3		HT: Analysis 2
	MAFE206IU	Probability	Xác suất	Bắt buộc	3	3		HT: Analysis 2 SH: Analysis 3, Real Analysis
	PT002IU	Physical Training 2		Bắt buộc	3	3		
	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3		
	Tổng				**20**			
Summer Semester 2	Military Education							
V (20 tín chỉ)	MAFE204IU	Database Management system	Hệ quản trị dữ liệu	Bắt buộc	3	2	1	
	MAFE202IU	Differential Equations	Phương trình vi phân	Bắt buộc	4	3		HT: Analysis 2
	MAFE316IU	Statistics	Thống kê	Bắt buộc	4	4		HT: Probability
	IT013IU	Algorithms and Data Structure	Cấu trúc dữ liệu và giải thuật	Bắt buộc	4	3	1	HT: Object-Oriented programming
	BA115IU	Introduction to Business Administration	Giới thiệu về quản trị kinh doanh	Bắt buộc	3	3		
	PE017IU	Scientific Socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism
	Tổng				**20**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
VI (18 tín chỉ)	MAAS221IU	Introduction to Machine Learning	Giới thiệu về học máy	Bắt buộc	3	2	1	TQ: Introduction to Python, Linear Algebra, Analysis 3
	MAAS318IU	Stochastic Modeling	Mô hình ngẫu nhiên	Bắt buộc	3	3		TQ: Probability
	MAFE208IU	Numerical Analysis	Giải tích số	Bắt buộc	4	4		HT: Analysis 3
	MAAS320IU	Regression Models	Mô hình hồi quy	Bắt buộc	3	3		TQ: Probability, Statistics
	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng sản Việt Nam	Bắt buộc	2	2		TQ: Philosophy of Marxism and Leninism, Political economics of Marxism and Leninism, Scientific Socialism
		MAAS Elective #2		Bắt buộc	3	3		
	Tổng				**18**			

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
Summer Semester 3	MAAS328IU	Summer Internship	Thực tập hè		3	3		
	Tổng				3			
VII (16 tín chỉ)	MAFE303IU	Optimization 1	Tối ưu hoá 1	Bắt buộc	4	4		HT: Analysis 3, Linear Algebra
	MAAS322IU	Statistical Computing	Thống kê tính toán	Bắt buộc	3	3		TQ: Statistics; Stochastic Modeling
	MAAS324IU	Applied Time Series Analysis	Phân tích chuỗi thời gian ứng dụng	Bắt buộc	3	3		TQ: Probability, Regression Models
		MAAS Elective #2		Bắt buộc	3	3		
		MAAS Elective #3		Bắt buộc	3	3		
	Tổng				**16**			
VIII (16 tín chỉ)	IT157IU	Deep Learning	Học sâu	Bắt buộc	4	4		
	MAAS410IU	Bayesian Statistics	Thống kê Bayes	Bắt buộc	3	3		TQ: Probability, Statistics
	MAAS413IU	Multivariate Statistical Analysis	Phân tích thống kê nhiều chiều	Bắt buộc	3	3		TQ: Regression Models, Introduction to Machine Learning:
	MAFE207IU	Decision making	Lý thuyết ra quyết định	Bắt buộc	3	3		HT: Probability, Optimization 1
			MAAS Elective #4	Bắt buộc	3	3		
	Tổng				**16**			
IX (12 tín chỉ)	MAAS420IU	GRADUATION THESIS	Khóa luận tốt nghiệp	Bắt buộc	12			
	Tổng				**12**			

<u>Total credits:</u> 139 + 47 = 186

Môn tự chọn (Elective courses)

	Codes	Subjects	Credits			
			Total	Theory	Practice	% practice /total
MAAS Elective #1						
	IS055IU	Principles of Logistics and Supply Chain Management	3			
	MAFE306IU	Financial Mathematics 1	3			
	MAFE209IU	Financial Markets	3			
	PE008IU	Critical Thinking	3			
MAAS Elective #2						
	MAAS325IU	Predictive Analytics	3			
	IS065IU	Supply Chain Security and Risk Management	3			
	MAFE308IU	Financial Risk Management 1	3			
	MAAS326IU	Actuarial Mathematics for Life Contingent	3			
MAAS Elective #3						
	MAAS411IU	Statistical Models for Actuarial Science	3			
	MAAS412IU	Statistical Methods for Finance	3			
	IS066IU	Data Mining in Supply Chain	3			
MAAS Elective #4						
	MAFE307IU	Optimization 2	3			
	MAAS414IU	Survey Sampling	3			
	MAAS415IU	Applied Probability Models in Actuarial Science	3			

11. Ma trận các môn học và chuẩn đầu ra (kỹ năng)

Mức độ đóng góp của các môn học vào chuẩn đầu ra của CTĐT ngành Thống kê được trình bày trong Bảng 10.

Bảng 10. Đóng góp của các môn học vào CĐR của CTĐT

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
1	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism					2			2

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
2	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism				2	2			2
3	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party				3				2
4	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts				3				3
5	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism					2	3		3
6	PE021IU	Pháp luật đại cương	General law				5				
7	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1						4		3
8	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1						4		3
9	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2						4		3

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
10	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2						4		3
11	MAFE101IU	Giải tích 1	Analysis 1	4	3	4				3	
12	MAFE109IU	Giới thiệu về Python	Introduction to Python	4	4						3
13	MAFE103IU	Giải tích 2	Analysis 2	4	4	4					
14	MAFE104IU	Đại số tuyến tính	Linear Algebra	4	4						3
15	MAFE212IU	Tài chính kế toán	Financial Accounting			3	4	4			
16	MAFE201IU	Giải tích thực	Real Analysis	3	3					4	
17	MAFE203IU	Giải tích 3	Analysis 3	4	4					4	
18	MAFE206IU	Xác suất	Probability	4	4						
19	MAFE204IU	Hệ quản trị dữ liệu	Database Management system	4		4					3
20	MAAS220IU	Giới thiệu về thống kê	Introduction to Statistics	4	4	4					3

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
21	MAFE208IU	Giải tích số	Numerical Analysis	4	4	4					
22	MAFE202IU	Phương trình vi phân	Differential Equations	4	4	4				3	3
23	MAAS221IU	Giới thiệu về học máy	Introduction to Machine Learning	4	5	4					4
24	MAFE207IU	Lý thuyết ra quyết định	Decision making	4	5	3		4	3		3
25		Môn học tự chọn 1	MAAS Elective #1								
	IS055IU	Các nguyên lý logistics và chuỗi cung ứng	Principles of Logistics and Supply Chain Management			3		3	3		3
	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	5	4	3					3
	MAFE209IU	Thị trường Tài chính	Financial Markets	3		5	4		3	3	3
	PE008IU	Tư duy phản biện	Critical Thinking					5	3		3
26	MAAS318IU	Mô hình ngẫu nhiên	Stochastic Modeling	4	5					4	

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
27	MAFE316IU	Thống kê	Statistics	5		4		4		4	
28	MAAS320IU	Mô hình hồi quy	Regression Models	4	5	3			3	3	3
29	MAAS322IU	Thống kê tính toán	Statistical Computing	4	5	4					3
30	MAAS324IU	Phân tích chuỗi thời gian ứng dụng	Applied Time Series Analysis		4	5				4	
31		Môn tự chọn 2	MAAS Elective #2								
	MAAS325IU	Phân tích dự báo	Predictive Analytics	4	5	5		4	3		4
	IS065IU	Quản trị rủi ro và an toàn chuỗi cung ứng	Supply Chain Security and Risk Management	3		4	3	4			3
	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk management 1	4		4	4				3
	MAAS326IU	Toán bảo hiểm cho cuộc sống	Actuarial Mathematics for Life Contingent		4	5	5				
32	IT157IU	Học sâu	Deep Learning	5	4	4	3		3		

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
33	MAAS410IU	Thống kê Bayes	Bayesian Statistics	4	5		3	4			
34		Môn học tự chọn 3	MAAS Elective #3								
	MAAS411IU	Mô hình thống kê cho khoa học Bảo hiểm	Statistical Models for Actuarial Science		4			5	4		
	MAAS412IU	Phương pháp thống kê trong tài chính	Statistical Methods for Finance	5		4	5		3	3	3
	IS066IU	Khai phá dữ liệu trong chuỗi cung ứng	Data Mining in Supply Chain	4		5				4	
35		Môn học tự chọn 4	MAAS Elective #4								
	MAFE307IU	Tối ưu hoá 2	Optimization 2	4	5	5		3			
	MAAS414IU	Phương pháp lấy mẫu điều tra	Survey Sampling	4	4	3	5				3
	MAAS415IU	Mô hình xác suất ứng dụng trong khoa học Bảo hiểm	Applied Probability Models in Actuarial Science	4		4		4			

STT	Mã MH	Tên môn học (MH)		Chuẩn đầu ra của CTĐT (PLO)							
		Tiếng Việt	Tiếng Anh	a	b	c	d	e	f	g	h
36	MAFE303IU	Tối ưu hoá 1	Optimization 1	4	5	4		3	3		3
37	MAAS413IU	Phân tích thống kê nhiều chiều	Multivariate Statistical Analysis	5	4	4				3	3
38	IT069IU	Lập trình hướng đối tượng	Object-Oriented programming	3	5				4		
39	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data structures	4	5				3		
40	BA115IU	Giới thiệu về quản trị kinh doanh	Introduction to Business Administration			3	3				3
41	MAAS328IU	Thực tập hè	Summer Internship	4	4	4	5	5	5	6	4
42	MAAS420IU	Luận văn tốt nghiệp	Graduation thesis	5	5	6	5	5	6	6	6

12. Mô tả vắn tắt nội dung và khối lượng các môn học *(số thứ tự của môn học tương ứng với số thứ tự của môn học trong nội dung chương trình đào tạo)*

12. 1. Những nguyên lý cơ bản của chủ nghĩa Mác-Lênin (Philosophy of Marxism and Leninism)

Mã môn học: PE015IU

Số tín chỉ: 3 lý thuyết

Điều kiện: Môn học tiên quyết: không

Môn học trước: không

Mô tả nội dung môn học:

- Môn học trang bị cho sinh viên những nội dung cơ bản về thế giới quan, phương pháp luận triết học Mác - Lênin.

- Giúp cho sinh viên vận dụng những tri thức về thế giới quan, phương pháp luận triết học triết học Mác - Lênin một cách sáng tạo trong hoạt động nhận thức và thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đang đặt ra.

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

Mã môn học: PE016IU

Số tín chỉ: 2 lý thuyết

Điều kiện: Môn song hành: Những nguyên lý cơ bản của chủ nghĩa Mác-Lênin

Môn học trước: không

Mô tả nội dung môn học:

Nội dung chương trình gồm 6 chương: Trong đó chương 1 bàn về đối tượng, phương pháp nghiên cứu và chức năng của Kinh tế chính trị Mác - Lênin. Từ chương 2 đến chương 6 trình bày nội dung cốt lõi của Kinh tế chính trị Mác - Lê nin theo mục tiêu của môn học. Cụ thể các vấn đề như: Hàng hóa, thị trường và vai trò của các chủ thể trong nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; Cạnh tranh và độc quyền trong nền kinh tế thị trường; Kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế ở Việt Nam.

12.3. Lịch sử Đảng Cộng sản Việt nam (History of Vietnamese communist party)

Mã môn học: PE018IU

Số tín chỉ: 2 lý thuyết

Điều kiện: Môn học trước: Những nguyên lý cơ bản của chủ nghĩa Mác - Lê nin, Kinh tế chính trị Mác - Lênin, Chủ nghĩa xã hội khoa học

Môn học trước: không

Mô tả nội dung môn học:

Môn học trang bị cho sinh viên những kiến thức cơ bản về lịch sử Đảng Cộng sản Việt Nam

12.4. Tư tưởng Hồ Chí Minh (Ho Chi Minh's Thoughts)

Mã môn học: PE019IU

Số tín chỉ: 2 lý thuyết

Môn học trước: Triết học Mác - Lênin, . Kinh tế chính trị Mác - Lênin, Chủ nghĩa xã hội khoa học

Mô tả nội dung môn học:

Môn học 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.

12.5. Chủ nghĩa xã hội khoa học (Scientific Socialism)

Mã môn học: PE017IU

Số tín chỉ: 2 lý thuyết

Điều kiện: Môn học tiên quyết: Những nguyên lý cơ bản của chủ nghĩa Mác - Lê nin, Kinh tế chính trị Mác - Lênin

Môn học trước: không

Mô tả nội dung môn học:

Môn học trang bị cho sinh viên kiến thức cơ bản về chủ nghĩa xã hội khoa học,

12.6. Pháp luật Đại cương (General Law)

Mã môn học: Số tín chỉ: 3 lý thuyết

Điều kiện: Môn học tiên quyết: không

Môn học trước: không

Mô tả nội dung môn học:

Môn học này cung cấp cho sinh viên kiến thức cơ bản về hệ thống pháp luật Việt Nam. Đặc biệt, sinh viên sẽ hiểu về quyền và nghĩa vụ của mình trong Hiến pháp, Luật hình sự, Luật hành chính, Luật dân sự, Luật lao động và Luật doanh nghiệp của Việt Nam. Từ đó, sinh viên sẽ nâng cao nhận thức về trách nhiệm của mình để đảm bảo công bằng trong xã hội.

12.7. Tiếng Anh chuyên ngành 1 (Kỹ năng viết 1) (Writing AE1)

Mã môn học: EN007IU

Số tín chỉ: 02

Điều kiện: Môn học tiên quyết: Sinh viên phải đạt TOEFL pBT 500 hoặc TOEFL iBT 60

Mô tả nội dung môn học:

Môn học nhằm cải thiện kỹ năng viết chuẩn bị cho khóa viết luận nâng cao. Chương trình chú trọng xây dựng bài văn dựa trên các kỹ năng viết như: viết bài, viết luận, kết nối và sắp xếp trật tự đoạn văn, từ ngữ, cụm từ để tạo nên bài viết mạch lạc. Các dạng viết luận bao gồm: mô tả người, đồ vật, quy trình, trình bày quan điểm, so sánh và đối chiếu, nguyên nhân - kết quả, vấn đề - giải pháp, thảo luận.

12.8. Tiếng Anh chuyên ngành 1 (Kỹ năng nghe) (Listening AE1)

Mã môn học: EN008IU

Số tín chỉ: 02

Điều kiện: Môn học tiên quyết**:** Sinh viên phải đạt TOEFL pBT 500 hoặc TOEFL iBT 60

Mô tả nội dung môn học:

Kỹ năng nghe, ghi chú và thảo luận bằng tiếng Anh học thuật sẽ giúp học sinh làm quen với những khó khăn khi học tiếng Anh ở trường đại học. Sinh viên sẽ được học các kỹ năng cần thiết cho sinh viên đại học quốc tế, bao gồm: chủ động nghe giảng, ghi chép hiệu quả, tự tin tham gia thảo luận. Cùng với kỹ năng nghe, môn học còn giúp sinh viên cải thiện vốn từ vựng học thuật của mình.

12.9. Tiếng Anh chuyên ngành 2 (Kỹ năng viết) (Writing AE2)

Mã môn học: EN011IU

Số tín chỉ: 02

Điều kiện: Môn học trước: EN007IU: Tiếng Anh chuyên ngành 1 (Kỹ năng viết 1)

Mô tả nội dung môn học:

Sinh viên được học bố cục của một báo cáo, các kỹ năng chọn và giới hạn đề tài, viết bài văn, lập dàn ý, tìm và dẫn chứng tài liệu, ghi chú, viết mở bài, nội dung chính và kết luận, viết và sửa bản nháp. Sinh viên cũng sẽ thực hành về các chủ đề liên quan đến các môn học của mình.

12.10. Tiếng Anh chuyên ngành 2 (Kỹ năng nói) (Speaking AE2)

Mã môn học: EN012IU

Số tín chỉ: 02

Điều kiện: Môn học trước: EN008IU Listening AE1 (kỹ năng nghe 1)

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên những chiến lược thực tế để sử dụng trong việc thuyết trình. Ngoài ra, sinh viên còn được giúp phát triển kỹ năng lắng nghe, nhận xét và phản hồi cho các bài thuyết trình khác trên lớp.

12.11. Giải tích 1 (Analysis 1)

Mã môn học: MAFE101IU

Số tín chỉ: 04

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Giải tích I là môn học nền tảng dành cho sinh viên khoa Toán. Môn học giải tích nhập môn này bao gồm các nội dung: lý luận toán học, dãy số thực, giới hạn, tính liên tục và vi phân của hàm một biến, cùng với các ứng dụng.

12.12. Giới thiệu về Python (Introduction to Python)

Mã môn học: MAFE109IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học giới thiệu về 4 khía cạnh chính trong lập trình Python: lập trình; cấu trúc dữ liệu; Numpy, Pandas, MatPlotlib; và lập trình hướng đối tượng.

12.13. Giải tích 2 (Analysis 2)

Mã môn học: MAFE103IU

Số tín chỉ: 04

Điều kiện: Môn học trước: Giải tích 1

Mô tả nội dung môn học:

Môn học này là phần tiếp theo của Giải tích 1. Mục đích của môn học là trang bị cho sinh viên các khái niệm cơ bản về dãy, chuỗi và tích phân cùng với các ứng dụng của chúng.

12.14. Đại số tuyến tính (Linear Algebra)

Mã môn học: MAFE104IU

Số tín chỉ: 04

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học cung cấp các khái niệm và kỹ thuật để giải các hệ phương trình tuyến tính, ma trận, định thức, không gian vectơ, phép biến đổi tuyến tính, giá trị riêng và vectơ riêng.

12.15. Tài chính kế toán (Financial Accounting)

Mã môn học: MAFE212IU

Số tín chỉ: 04

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học trang bị cho sinh viên những lý thuyết, các nguyên tắc và ứng dụng cơ bản của kế toán và báo cáo tài chính, các yếu tố cần thiết theo tiêu chuẩn Hoa Kỳ. Các chủ đề chính bao gồm lý thuyết ghi nợ và tín dụng, tài khoản, nhật ký đặc biệt, kế toán chu kỳ, ghi chú và tiền lãi, dồn tích và trả chậm, tiền mặt, khoản phải thu, hàng tồn kho, tài sản cố định và việc lập báo cáo tài chính. Sinh viên được cung cấp kiến thức cơ bản trong việc chuẩn bị và xử lý các giao dịch kế toán để trình bày các chi tiết tài chính một cách phù hợp và hiệu quả, cũng như giải thích thông tin kế toán cho các loại nhà đầu tư nội bộ và bên ngoài, ban quản lý và các đối tượng khác.

12.16. Giải tích thực (Real Analysis)

Mã môn học: MAFE201IU

Số tín chỉ: 04

Điều kiện: Môn học trước: Giải tích 2

Mô tả nội dung môn học:

Môn học là phần tiếp theo của Giải tích II. Môn học giới thiệu về lý thuyết không gian metric và tập trung vào các nguyên tắc cơ bản về độ đo và tích phân.

12.17. Giải tích 3 (Analysis 3)

Mã môn học: MAFE203IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Giải tích 2

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên kiến thức chuyên sâu về hàm vectơ và hàm nhiều biến mà ứng dụng của chúng tạo nên nội dung chính của Môn học. Các chủ đề bao gồm: Hàm vectơ: Đường cong không gian, Giới hạn và tính liên tục, Đạo hàm, Tích phân của hàm vectơ, Độ dài của đường cong không gian; Hàm Nhiều Biến: Giới hạn, Tính liên tục, Đạo hàm riêng; Cực đại, cực tiểu và Tối ưu hóa; nhân tử Lagrange; Tích phân bội: Tích phân kép, Tích phân ba, Kỹ thuật tích phân; Trường vectơ; Tích phân đường thẳng; Định lý Green; Tích phân bề mặt; Toán tử Curl và Divergence; Tích phân bề mặt; Định lý phân kỳ (Divergence theorem); Định lý Stokes.

12.18. Xác suất (Probability)

Mã môn học: **MAFE206IU**

Số tín chỉ: 03 lý thuyết

Điều kiện: Môn học trước: Giải tích 2

Môn học song hành: Giải tích 3, Giải tích thực

Mô tả nội dung môn học:

Lý thuyết xác suất là một trong những trung tâm cốt lõi của toán học ứng dụng. Môn học cung cấp cho sinh viên về các chủ đề cơ bản và nâng cao của xác suất trên hai quan điểm (lý thuyết xác suất cổ điển và lý thuyết xác suất trên nền tảng độ đo). Môn học cung cấp nền tảng lý thuyết cho nhiều môn học như Thống kê, Phương pháp hồi quy, Mô hình ngẫu nhiên.

12.19. Hệ quản trị dữ liệu (Database Management System)

Mã môn học: MAFE204IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học giới thiệu tổng quan về các hệ quản trị cơ sở dữ liệu. Nội dung chính của môn học bao gồm thiết kế, phát triển cơ sở dữ liệu và các ứng dụng trong thực tế với các hệ quản trị cơ sở dữ liệu.

12.20. Giới thiệu về Thống kê (Introduction to Statistics)

Mã môn học: MAAS220IU

Số tín chỉ: 02

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học giới thiệu về các khái niệm, công cụ cơ bản, ngôn ngữ và diễn giải số liệu thống kê cho các ứng dụng trong khoa học xã hội và ứng dụng như kinh tế, kinh doanh và định phí bảo hiểm. Môn học được thiết kế để giúp sinh viên làm quen với các thuật ngữ và

kỹ thuật cơ bản trong thống kê và phân tích dữ liệu. Các chủ đề bao gồm thống kê mô tả; biểu diễn số và đồ họa của thông tin; trực quan hóa dữ liệu; phương pháp đo lường vị trí, sự phân tán, vị trí, ngoại lệ và sự phụ thuộc; phân tích khám phá dữ liệu; phương pháp lấy mẫu.

12.21. Giải tích số (Numerical Analysis)

Mã môn học: MAFE208IU

Số tín chỉ: 04

Điều kiện: Môn học trước: Giải tích 3

Mô tả nội dung môn học:

Môn học cung cấp các khái niệm cơ bản và kỹ năng giải quyết vấn đề trong giải tích số. Môn học bao gồm các chủ đề sau: Độ đúng và độ chính xác (Accuracy and precision), sai số, nghiệm của phương trình phi tuyến tính, giải hệ phương trình tuyến tính, **điều chỉnh và nội suy đường cong, nội suy spline** (curve fitting and interpolation, spline interpolation); vi phân và tích phân số, phương pháp số cho phương trình vi phân, phương pháp số cho phương trình đạo hàm riêng.

12.22. Phương trình vi phân (Differential equation)

Mã môn học: MAFE202IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện: Môn học trước: Giải tích 2

Mô tả nội dung môn học:

Môn học giới thiệu các phương pháp toán học cơ bản và phân tích trong phương trình vi phân; ứng dụng của chúng; và giới thiệu ngắn về phương trình đạo hàm riêng.

12.23. Giới thiệu về học máy (Introduction to Machine Learning)

Mã môn học: MAAS221IU

Số tín chỉ: 02 lý thuyết, 01 thực hành

Điều kiện: Môn học tiên quyết: Giới thiệu về Python, Giải tích 3, Đại số tuyến tính

Mô tả nội dung môn học:

Môn học cung cấp cái nhìn tổng quan về các nguyên tắc cơ bản của học máy. Học sinh sẽ tìm hiểu về loại vấn đề có thể được giải quyết, các yếu tố và nguyên tắc cơ bản của việc xây dựng các mô hình trong học máy. Một số thuật toán chính cũng sẽ được tìm hiểu trong Môn học này.

12.24. Lý thuyết ra quyết định (Decision Making)

Mã môn học: MAFE207IU

Số tín chỉ: 03

Điều kiện: Môn học trước: Xác suất, Tối ưu hóa 1

Mô tả nội dung môn học:

Ra quyết định là một trong những bộ phận quan trọng trong nghiên cứu hoạt động hay khoa học quản lý. Kỹ thuật ra quyết định giúp các nhà quản lý lựa chọn phương án tốt nhất dựa trên các tiêu chí định lượng. Môn học này cung cấp cho học viên những kiến thức cơ bản về xây dựng mô hình quyết định để có thể ra quyết định dựa trên mô hình. Môn học này cũng cung cấp cho sinh viên những kiến thức cơ bản về việc ra quyết định trong mối quan hệ với lý thuyết trò chơi. Cụ thể, sinh viên được cung cấp cấu trúc của các vấn đề ra quyết định, có hoặc không có sự không chắc chắn, lý thuyết trò chơi và ra quyết định, và Quản lý dự án PERT/CPM.

12.25. Tên môn học tự chọn #1

12.25.1: Các nguyên lý logistics và quản lý chuỗi cung ứng (Principles of Logistics and Supply Chain Management)

Mã môn học: IS055IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Đây là môn học giới thiệu về Logistics và quản lý chuỗi cung ứng (SCM). Môn học cung cấp cho sinh viên các khái niệm cơ bản, quy trình kinh doanh và các mô hình/công cụ. Môn học này kết hợp kiến thức kinh doanh SCM với tư duy phân tích và xác định chính xác vai trò của SCM so với các ngành kinh doanh khác.

12.25.2: Toán tài chính 1 (Financial Mathematics 1)

Mã môn học: MAFE306IU

Số tín chỉ: 03

Điều kiện: Môn học trước: Probability

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên các công cụ cơ bản trong Toán học tương ứng với các công cụ tài chính: lợi nhuận, lãi suất, tiền/dòng tiền, trái phiếu, danh mục đầu tư, định giá tài sản và các nguyên tắc cơ bản của tài chính.

12.25.3: Thị trường tài chính (Financial Markets)

Mã môn học: MAFE209IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên những kiến thức và hiểu biết về vai trò của các tổ chức tài chính trung gian trên thị trường tài chính. Từ đó giúp sinh viên có thể phân biệt giữa các tổ chức tài chính có tiền gửi và không có tiền gửi, hiểu và phân tích cấu trúc hoạt động của thị trường tài chính, phân biệt biệt các loại chứng khoán như cổ phiếu, tiền tệ, trái phiếu và các công cụ tài chính khác.

12.25.4. Tư duy phản biện (Critical Thinking)

Mã môn học: PE008IU

Số tín chỉ: 3 lý thuyết

Điều kiện: Môn học tiên quyết: không

Môn học trước: không

Mô tả nội dung môn học: Môn học này cung cấp sinh viên những kiến thức nền về tư duy phân tích, kỹ năng hữu ích đối với mọi đối tượng ngành nghề. Sinh viên thực hành với các dạng lý luận, phân tích, đánh giá các lý luận của mình và của người khác. Sinh viên được hỗ trợ các phương pháp tìm kiếm thông tin để lý luận và kiểm định lý luận.

12.26. Mô hình ngẫu nhiên (Stochastic Modeling)

Mã môn học: MAAS318IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Xác suất

Mô tả nội dung môn học:

Môn học cung cấp nền tảng vững chắc về quá trình ngẫu nhiên bao gồm các khái niệm cơ bản trong quá trình ngẫu nhiên, chẳng hạn như thuộc tính Markov và tập trung vào việc lập công thức/ phân tích hệ thống xác suất để hiểu được các kết quả tiềm năng và đưa ra quyết định.

12.27. Thống kê (Statistics)

Mã môn học: MAFE316IU

Số tín chỉ: 04 lý thuyết

Điều kiện: Môn học trước: Xác suất

Mô tả nội dung môn học:

Thống kê là nghệ thuật học hỏi từ dữ liệu và dự đoán kết quả trong tương lai. Môn học này cung cấp cho sinh viên các nội dung sau ở bậc đại học: Nhập môn thống kê, Thống kê mô tả, Phân phối mẫu, Ước lượng tham số, Kiểm định giả thuyết, So sánh hai quần thể chuẩn, Hồi quy, Phân tích phương sai (ANOVA), Nhập môn R, thực hành Thống kê trong R và Excel.

12.28. Mô hình hồi quy (Regression Models)

Mã môn học: MAAS320IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Xác suất**,** Thống kê

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên nền tảng và các ví dụ thực tế về các mô hình hồi quy, đồng thời giải quyết các vấn đề liên quan đến kinh tế và kinh doanh cụ thể. Môn học giới thiệu cho học viên các phương pháp xây dựng và diễn giải mô hình hồi quy. Các chủ đề chính trong Môn học bao gồm: mô hình hồi quy tuyến tính và phi tuyến tính đơn giản, bội số, bình phương nhỏ nhất OLS, suy luận cho mô hình hồi quy thông thường, cộng

tuyến, diễn giải các tác động chính, mô hình hồi quy cho các yếu tố dự đoán định lượng và định tính, lựa chọn và xác nhận mô hình.

12.29. Thống kê tính toán (Statistical Computing)

Mã môn học: MAAS322IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Thống kê, Mô hình ngẫu nhiên

Mô tả nội dung môn học

Môn học cung cấp cho sinh viên các công cụ và kỹ thuật để khám phá các hệ thống ngẫu nhiên và tính toán thống kê bằng R/Python. Môn học bao gồm các chủ đề chính: phương pháp tạo biến ngẫu nhiên, trực quan hóa dữ liệu đa biến, Monte Carlo (MC), phương sai, bootstrap và jackknife, và Markov Chain Monte Carlo (MCMC).

12.30. Phân tích chuỗi thời gian ứng dụng (Applied Time Series Analysis)

Mã môn học: MAAS324IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Xác suất, Mô hình hồi quy

Mô tả nội dung môn học:

Môn học giới thiệu lý thuyết và ứng dụng của các phương pháp chuỗi thời gian cho dữ liệu được thu thập theo thời gian. Các chủ đề bao gồm các công cụ phân tích dữ liệu, các phương pháp giảm xu hướng và điều chỉnh dữ liệu theo mùa, các kỹ thuật làm mịn bao gồm phương pháp liên tiến lũy thừa (exponential smoothing), lập mô hình và dự báo dựa trên lớp mô hình ARIMA và các mô hình ARCH/GARCH. Sinh viên có được kinh nghiệm thực hành về các phương pháp chuỗi thời gian được áp dụng cho các tập dữ liệu thực tế thông qua việc sử dụng phần mềm thống kê.

12.31. Tên môn học tự chọn #2

12.31.1. Phân tích dự báo (Predictive Analysis)

Mã môn học: MAAS325IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Mô hình hồi quy, Học máy

Mô tả nội dung môn học:

Môn học được thiết kế để cung cấp các kỹ thuật thống kê nâng cao trong việc lập mô hình dự đoán với các ứng dụng trong phân tích kinh doanh. Môn học bao gồm các khái niệm cơ bản về thống kê và sử dụng ngôn ngữ lập trình R. Môn học còn cung cấp cho sinh viên thấy được sự chuyển đổi từ lý thuyết thống kê toán học sang phân tích dự đoán và ứng dụng trong kinh doanh và định phí bảo hiểm.

12.31.2. Quản lý rủi ro và an toàn chuỗi cung ứng (Supply Chain Security and Risk Management)

Mã môn học: IS065IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Không

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên kiến thức cơ bản về quản lý rủi ro chuỗi cung ứng, từ chiến lược đến mô hình hóa xác suất hoạt động và phân tích. Môn học cũng trang bị cho sinh viên các công cụ và kỹ thuật định tính và định lượng rủi ro chiến lược, rủi ro tài chính và rủi ro hoạt động.

12.31.3. Quản trị rủi ro Tài chính 1 (Financial Risk Management 1)

Mã môn học: MAFE308IU

Số tín chỉ: 03

Điều kiện: Môn học trước: Xác suất

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên các khái niệm cơ bản và các công cụ toán học để quản lý rủi ro định lượng tại ngân hàng, tổ chức tài chính và bảo hiểm. Môn học tập trung chủ yếu vào rủi ro thị trường tài chính, rủi ro phát sinh từ những thay đổi bất ngờ về giá cả và lãi suất. Môn học cũng cung cấp các bộ công cụ để đo lường định lượng rủi ro. Ngoài ra, Môn học còn cung cấp các thước đo rủi ro định lượng, ví dụ: Giá trị rủi ro, thâm hụt dự kiến, rủi ro lãi suất.

12.31.4. Toán bảo hiểm cho cuộc sống (Actuarial Mathematics for Life Contingent)

Mã môn học: MAAS326IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Xác suất

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên kiến thức về các mô hình xác suất cho các tình huống bất ngờ trong cuộc sống làm cơ sở để phân tích bảo hiểm nhân thọ, tiền trợ cấp cũng như xác định phí bảo hiểm.

12.32. Học sâu (Deep Learning)

Mã môn học: IT157IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện tiên quyết: không

Mô tả nội dung môn học:

Môn học này giúp sinh viên hiểu được những khả năng, thách thức và kết quả của việc học sâu (deep learning) và chuẩn bị cho sinh viên kiến thức, kỹ năng để tham gia vào quá trình phát triển công nghệ AI hiện nay.

12.33. Thống kê Bayes (Bayesian statistics)

Mã môn học: MAAS410IU

Số tín chỉ: 03 lý thuyết

Điều kiện: Môn học tiên quyết: Xác suất, Thống kê

Mô tả nội dung môn học:

Môn học này cung cấp cho sinh viên phần giới thiệu về suy luận thống kê Bayes, đề cập đến cả khía cạnh cơ bản và thực tế của các phương pháp Bayes. Các vấn đề cụ thể về kinh tế và kinh doanh sẽ được xem xét. Học sinh sẽ bắt đầu bằng cách hiểu sự khác biệt giữa phương pháp cổ điển và phương pháp Bayes, cách xử lý các mô hình đơn giản. Các chủ đề bao gồm: Quy tắc Bayes, suy luận Bayes cho các mô hình đơn và đa tham số, mô hình phân cấp, kiểm tra giả thuyết, hồi quy tuyến tính và phương pháp tính toán Bayes (Markov Chain Monte Carlo, Metropolis-Hastings và Gibbs Sampling).

12.34. Tên môn học tự chọn #3

12.34.1. Mô hình thống kê cho khoa học Bảo hiểm (Statistical Models for Actuarial Science)

Mã môn học: MAAS411IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Mô hình hồi quy

Mô tả nội dung môn học

Môn học cung cấp cho sinh viên lý thuyết và khái niệm về mô hình hóa thống kê như mô hình tuyến tính tổng quát, mô hình phi tuyến tính, hồi quy Poisson…

với các ứng dụng trong khoa học tính toán.

12.34.2. Phương pháp thống kê trong tài chính (Statistical Methods for Finance)

Mã môn học: MAAS412IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Xác suất**,** Thống kê, Mô hình ngẫu nhiên

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên những kiến thức chính về các phương pháp định lượng quan trọng và kỹ thuật thống kê cho tài chính và kinh tế. Hơn nữa, Môn học cũng hướng dẫn cách sử dụng ngôn ngữ lập trình R hoặc Python trong phân tích dữ liệu tài chính.

12.34.3. Khai phá dữ liệu trong chuỗi cung ứng (Data Mining in Supply Chain)

Mã môn học: IS066IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: không

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên kiến thức tổng quan về trí tuệ doanh nghiệp trong lĩnh vực quản lý chuỗi cung ứng và tiếp thị. Ngoài ra sinh viên được học về cách tận dụng các hệ thống kinh doanh thông minh để xác định KPI, nâng cao độ chính xác của dự báo và lập kế hoạch, theo dõi các hoạt động kinh doanh và cung cấp bảng điều khiển, phiếu ghi điểm, báo cáo chiến lược và báo cáo hoạt động/thời gian thực để nâng cao quá trình ra

quyết định cho chuỗi cung ứng và tiếp thị thông qua ví dụ minh họa trí tuệ doanh nghiệp SAP.

12.35. Tên môn học tự chọn #4

12.35.1. Tối ưu hóa 2 (Optimization 2)

Mã môn học: MAFE307IU

Số tín chỉ: 03

Điều kiện: Môn học trước: Xác suất, Tối ưu hóa 1

Mô tả nội dung môn học:

- Cung cấp cho sinh viên những ý tưởng và kỹ thuật chính của quy hoạch tuyến tính ứng dụng và kiến thức cơ bản về quy hoạch tuyến tính đa mục tiêu.

- Phát triển các kỹ năng trong mô hình toán học và giải quyết vấn đề và cung cấp ý nghĩa thực tế/ ứng dụng của những ý tưởng và kỹ thuật này, thông qua các ví dụ thực tế được rút ra từ nhiều lĩnh vực kỹ thuật, khoa học đời sống, quản lý và tài chính.

- Phát triển khả năng tư duy, nhận thức về các vấn đề/câu hỏi mới và trả lời/giải quyết/chứng minh chúng trong một số điều kiện mới nảy sinh trong thực tiễn.

12.35.2. Phương pháp lấy mẫu điều tra (Survey Sampling)

Mã môn học: MAAS414IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Statistics

Mô tả nội dung môn học:

Môn học cung cấp cho sinh viên các phương pháp và kỹ thuật lấy mẫu theo các khía cạnh thực tế của các vấn đề khảo sát. Môn học bắt đầu giới thiệu ngắn gọn về vai trò của các cuộc khảo sát mẫu trong thế giới hiện đại. Sau đó, Môn học giới thiệu những thiết kế khảo sát mẫu hoặc quy trình ước tính thích hợp cho những vấn đề thực tế. Ngoài ra sinh viên còn được cung cấp những phương pháp để giải quyết vấn đề được mô tả, chi tiết về quy trình ước tính, bao gồm phần trình bày ngắn gọn các công thức cần thiết để hoàn thành phân tích cùng các ví dụ thực tế được giải quyết chi tiết.

12.35.3. Mô hình xác suất ứng dụng trong khoa học Bảo hiểm (Applied Probability Model in Actuarial Science)

Mã môn học: MAAS415IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Probability, Statistics

Mô tả nội dung môn học:

Môn học tập trung vào các ứng dụng của mô hình xác suất cho bảo hiểm tài sản và tai nạn. Đầu tiên Môn học giới thiệu một số mô hình quan trọng và hữu ích. Sau đó, Môn học giúp sinh viên hiểu các bước liên quan đến quy trình mô hình hóa và cách thực hiện các bước này trong việc giải quyết các vấn đề kinh doanh.

12.36. Tối ưu hóa 1 (Optimization 1)

Mã môn học: MAFE303IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện: Môn học trước: Đại số tuyến tính, Giải tích 3

Mô tả nội dung môn học:

Đây là môn học đầu tiên về tối ưu hóa dành cho sinh viên ngành Kỹ thuật tài chính và Quản lý rủi ro và Thống kê ứng dụng. Nội dung chính của môn học bao gồm:

- Các yếu tố của giải tích lồi (convex analysis)

- Các bài toán quy hoạch tuyến tính (QHTT): Mô hình QHTT từ các bài toán thực tế (đặc biệt là các bài toán tài chính), các tính chất của QHTT, phương pháp đơn hình (simplex method), tính đối ngẫu (duality)

- Các bài toán quy hoạch phi tuyến tính, bài toán không ràng buộc: điều kiện Karush-Kuhn-Tucker, bài toán lồi, một số phương pháp giải (phương pháp dốc nhất, phương pháp Newton, phương pháp hướng liên hợp, phương pháp Quasi-Newton).

- Quy hoạch phi tuyến tính, bài toán ràng buộc: điều kiện Karush-Kuhn-Tucker, một số phương pháp giải (phương pháp chiếu gradient, phương pháp penalty, phương pháp barrier, phương pháp đối ngẫu).

- Các mô hình trong tài chính và quản lý rủi ro.

12.37. Phân tích thống kê nhiều chiều (Multivariate Statistical Analysis)

Mã môn học: MAAS413IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Mô hình hồi quy, Học máy

Mô tả nội dung môn học

Môn học cung cấp cho sinh viên các phương pháp được sử dụng trong phân tích thống kê đa biến. Các chủ đề được giới thiệu và ứng dụng trong Môn học bao gồm ôn tập đại số ma trận, kỹ thuật mô tả, phân phối đa biến, lý thuyết ước lượng và kiểm định giả thuyết, nguyên lý phân tích thành phần, đặc biệt là lý thuyết Copula và một số ứng dụng trong tài chính.

12.38. Lập trình hướng đối tượng (Object-Oriented Programming)

Mã môn học: IT069IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện tiên quyết: không

Mô tả nội dung môn học:

Môn học giới thiệu cho sinh viên về lập trình hướng đối tượng từ các khái niệm cơ bản đến các nguyên tắc nghiệp vụ để thiết kế một phần mềm hướng đối tượng.

12.39. Cấu trúc dữ liệu và giải thuật (Algorithms and Data Structures)

Mã môn học: IT013IU

Số tín chỉ: 03 lý thuyết, 01 thực hành

Điều kiện: Môn học trước: Lập trình hướng đối tượng

Mô tả nội dung môn học:

Môn học này giới thiệu cho sinh viên các cấu trúc dữ liệu và thuật toán cơ bản, bao gồm thiết kế, phân tích và triển khai.

12.40. Giới thiệu về quản trị kinh doanh (Introduction to Business Administration)

Mã môn học: BA115IU

Số tín chỉ: 03

Điều kiện: Môn học tiên quyết: Không.

Mô tả nội dung môn học: Môn học này nhằm giới thiệu cho sinh viên về sự phức tạp và các khía cạnh đa chiều của kinh doanh. Đồng thời môn học sẽ cố gắng cung cấp những kiến thức nền tảng và các ứng dụng trong các chủ đề cốt lõi: Tiếp thị, Quản lý, Nguồn nhân lực. Ngoài ra, môn học cũng làm tăng nhận thức và hiểu biết của sinh viên về các vấn đề toàn cầu.

12.41. Thực tập hè (Summer Internship)

Mã môn học: MAAS328IU

Số tín chỉ: 03

Điều kiện: Điểm trung bình tích lũy tối thiểu từ 50 trở lên và số tín chỉ tích lũy tối thiểu là 85 tín chỉ.

Mô tả nội dung môn học:

Thực tập mùa hè là khóa học bắt buộc đối với Cử nhân bằng Thống kê. Việc thực tập của sinh viên được giám sát về mặt học thuật bởi một giảng viên của trường và được hướng dẫn công việc bởi một người quản lý hay hướng dẫn thực tập phía công ty. Trong giai đoạn thực tập, sinh viên sẽ làm việc tại vị trí thực tập ở công ty khoảng 40 giờ một tuần trong ít nhất 32 ngày làm việc (khoảng 1 tháng và 2 tuần). Sinh viên sau thời gian thực tập phải viết báo cáo cuối cùng bao gồm các phần sau:

- Giới thiệu
- Thông tin chung về công ty.
- Mô tả nhiệm vụ/dự án/công việc trong công ty
- Báo cáo các kỹ năng, kiến thức thu được trong quá trình thực tập
- Thảo luận và kết luận.

12.42. Khóa luận tốt nghiệp (Graduation Thesis)

Mã môn học: MAAS420IU

Số tín chỉ: 12

Điều kiện: Điểm trung bình tích lũy tối thiểu từ 50 trở lên và số tín chỉ tích lũy tối thiểu là 112 tín chỉ.

Mô tả nội dung môn học:

Làm khóa luận tốt nghiệp là yêu cầu bắt buộc của sinh viên ngành Thống kê ứng dụng. Sinh viên làm khóa luận tốt nghiệp sẽ thực hiện và hoàn thành một dự án nghiên cứu về mô hình Thống kê trong tài chính, kinh tế, hay khoa học dữ liệu, ML/AI. Sinh viên sẽ làm việc trực tiếp với GVHD để trao đổi và lập kế hoạch nghiên cứu trong suốt quá trình làm khóa luận. Sinh viên phải viết báo cáo đề xuất đề tài và bản thảo sơ khởi (proposal) và trình bày đề cương trước Hội đồng. Hội đồng sẽ góp ý và có những nhận xét hoặc điều chỉnh phù hợp để phát triển đề tài. Sau khi báo cáo đề cương, sinh viên tiếp tục thực hiện đề tài và viết báo cáo luận văn. Việc làm khóa luận và viết luận văn tốt nghiệp đòi hỏi sinh viên những kỹ năng tích hợp đã được tích lũy trong suốt quá trình học Đại học, bao gồm các kiến thức nền tảng về Toán và Thống kê, phát triển khả năng nghiên cứu, viết báo cáo khoa học, tư duy phản biện, tư duy độc lập và giao tiếp và hợp tác hiệu quả. Sinh viên phải bảo vệ khóa luận tốt nghiệp trước Hội đồng chấm luận văn tốt nghiệp.

TRƯỞNG BỘ MÔN	**KT. HIỆU TRƯỞNG** **PHÓ HIỆU TRƯỞNG**
Phạm Hữu Anh Ngọc	**Đinh Đức Anh vũ**

ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

Phụ lục 1
NỘI DUNG ĐIỀU CHỈNH CHƯƠNG TRÌNH ĐÀO TẠO THỐNG KÊ KHÓA 2024 SO VỚI KHÓA 2023
(Kèm theo Quyết định số 797 /QĐ-ĐTĐH ngày 23 tháng 7 năm 2024 của Hiệu trưởng Trường Đại học Quốc tế)

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

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

3. Các điều chỉnh khác:

STT	Môn học	Điều kiện tiên quyết cũ	Điều kiện tiên quyết điều chỉnh
1	MAFE103IU Analysis 2	Môn tiên quyết: MAFE101IU Analysis 1	Môn học trước: MAFE101IU Analysis 1
2	MAFE203IU Analysis 3	Môn tiên quyết: MAFE103IU Analysis 2	Môn học trước: MAFE103IU Analysis 2
3	MAFE201IU Real Analysis	Môn tiên quyết: MAFE103IU Analysis 2	Môn học trước: MAFE103IU Analysis 2
4	MAFE202IU Differential Equations	Môn tiên quyết: MAFE103IU Analysis 2	Môn học trước: MAFE103IU Analysis 2
5	MAFE206IU Probability	Môn tiên quyết: MAFE103IU Analysis 2	Môn học trước: MAFE103IU Analysis 2
6	MAFE303IU Optimization 1	Môn tiên quyết: MAFE203IU Analysis 3 MAFE104IU Linear Algebra	Môn học trước: MAFE203IU Analysis 3 MAFE104IU Linear Algebra
7	MAFE308IU Financial Risk Management 1	Môn tiên quyết: MAFE206IU Probability	Môn học trước: MAFE206IU Probability
8	MAFE306IU Financial Mathematics 1	Môn tiên quyết: MAFE206IU Probability	Môn học trước: MAFE206IU Probability

9	MAFE207IU Decision Making		Môn học trước: MAFE206IU Probability MAFE303IU Optimization 1

ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

Phụ lục 2

ĐỀ CƯƠNG CHI TIẾT CÁC MÔN HỌC

(Kèm theo Quyết định số 797 /QĐ-ĐHQT ngày 23 tháng 7 năm 2024 của Hiệu trưởng trường Đại học Quốc tế)

01. PHILOSOPHY OF MARXISM AND LENINISM

1. General Information

- Course Title:	
Vietnamese: Triết học Mác-Lênin	
English: Philosophy of Marxism and Leninism	
- Course ID: PE015IU	
- Course type ☑ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits: 3	
Lecture: 3	
Laboratory: 0	
- Prerequisites:	
- Parallel Course: - Course standing in curriculum: Year 1	

2. Course Description

Môn học cung cấp những nội dung cơ bản về thế giới quan và phương pháp luận của chủ nghĩa Mác-Lênin.

3. Textbooks and References

Textbooks:

- Bộ Giáo dục và Đào tạo (2019), Giáo trình Triết học Mác – Lênin, 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 Triết học Mác – Lenin, NXB Chính trị quốc gia, Hà Nội

4. Course Objectives

- Môn học trang bị cho sinh viên những nội dung cơ bản về thế giới quan, phương pháp luận triết học Mác – Lênin.
- Giúp cho sinh viên vận dụng những tri thức về thế giới quan, phương pháp luận triết học Mác – Lênin một cách sáng tạo trong hoạt động nhận thức và thực tiễn, nhằm giải quyết những vấn đề

mà đời sống xã hội của đất nước, của thời đại đang đặt ra.

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Hiểu biết những lý luận cơ bản nhất của Chủ nghĩa Mác-Lênin	e (level 2)
L.O.2	Có thế giới quan, nhân sinh quan và phương pháp luận chung nhất làm nền tảng để tiếp thu các kiến thức chuyên ngành quản lý xây dựng	h (level 2)

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	Quiz, attendance	30
A2. Midterm assessment	Midterm exam	20
A3. Final assessment	Final exam	50

7. Course Outlines

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-5	Triết học và vai trò của triết học trong đời sống xã hội	L.O.1	Lecture Class discussion	Quiz
6-8	Chủ nghĩa duy vật biện chứng	L.O.1	Lecture Class discussion	Quiz
9	**MIDTERM EXAM**			Written exam
10-11	Chủ nghĩa duy vật biện chứng	L.O.1	Lecture Class discussion	Quiz
12-16	Chủ nghĩa duy vật lịch sử	L.O.1, L.O.2	Lecture Class discussion	Quiz

8. Course Policy

Class Participation: A minimum attendance of 80 % is compulsory for the class sessions and 100% is compulsory for the laboratory sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for

preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

02. POLITICAL ECONOMICS OF MARXISM AND LENINISM

1. General Information

- Course Title:	
Vietnamese: Kinh tế chính trị Mác-Lênin	
English: Political economics of Marxism and Leninism	
- Course ID: PE016IU	
- Course type ☑ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits: 2	
Lecture: 2	
Laboratory: 0	
- Prerequisites:	
- Parallel Course:	PE015IU: Philosophy of Marxism and Leninism

2. Course Description

Môn học trang bị cho sinh viên những nội dung cốt lõi của Kinh tế chính trị Mác – Lênin, bao gồm: Hàng hóa, thị trường và vai trò của các chủ thể trong nền kinh tế thị trường; sản xuất giá trị thặng dư trong nền kinh tế thị trường; cạnh tranh và độc quyền trong nền kinh tế thi trường; kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam; công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế ở Việt Nam.

3. Textbooks and References

Textbooks:

1. Bộ Giáo dục và Đào tạo (2019), Giáo trình Kinh tế chính trị Mác – Lênin dành cho bậc đại học không chuyên kinh tế chính trị. NXB. Chính trị quốc gia. Hà Nội.

References:

1. Robert, J.R. và Robert F. H. (2003), Lịch sử các học thuyết kinh tế, Bản tiếng Việt, NXB Thống kê.

4. Course Objectives

- Trang bị cho sinh viên những kiến thức cơ bản, cốt lõi của Kinh tế chính trị Mác – Lênin trong bối cảnh phát triển kinh tế của đất nước và thế giới ngày nay. Đảm bảo tính cơ bản, hệ thống, khoa học, cập nhật tri thức mới, gắn với thực tiễn, tính sáng tạo, kỹ năng, tư duy, phẩm chất người học.
- Hình thành tư duy, kỹ năng phân tích, đánh giá và nhận diện bản chất của các quan hệ lợi ích kinh tế trong phát triển kinh tế - xã hội của đất nước góp phần giúp sinh viên xây dựng trách nhiệm xã hội phù hợp, xây dựng lập trường, ý thức hệ tư tưởng Mác – Lênin đối với sinh viên.

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Hiểu biết những kiến thức cơ bản, cốt lõi của Kinh tế chính trị Mác – Lênin trong bối cảnh phát triển kinh tế của đất nước và thế giới ngày nay. Đảm bảo tính cơ bản, hệ thống, khoa học, cập nhật tri thức mới, gắn với thực tiễn, tính sáng tạo, kỹ năng, tư duy, phẩm chất người học	d (level 2)
L.O.2	Hình thành tư duy, kỹ năng phân tích, đánh giá và nhận diện bản chất của các quan hệ lợi ích kinh tế trong phát triển kinh tế - xã hội của đất nước góp phần giúp sinh viên xây dựng trách nhiệm xã hội phù hợp, xây dựng lập trường, ý thức hệ tư tưởng Mác – Lênin	e, h (level 2)

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	Quiz, attendance	30
A2. Midterm assessment	Midterm exam	20
A3. Final assessment	Final exam	50

7. Course Outlines

Theo quy định của Bộ Giáo dục và Đào tạo

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Đối tương, phương pháp nghiên cứu và chức năng của Kinh tế chính trị Mác - Lênin	L.O.1, L.O.2	Lecture Class discussion	Quiz
2-4	Hàng hóa, thị trường và vai trò của các chủ thể tham gia thị trường	L.O.1	Lecture Class discussion	Quiz
5-7	Giá trị thặng dư của nền kinh tế thị trường	L.O.1, L.O.2	Lecture Class discussion	Quiz
8	Cạnh tranh và độc quyền trong nền kinh tế thị trường	L.O.1, L.O.2	Lecture Class discussion	Quiz
9	**MIDTERM**			Written exam
10-11	Cạnh tranh và độc quyền trong nền kinh tế thị trường	L.O.1, L.O.2	Lecture Class discussion	Quiz
12-14	Kinh tế thị trường định hướng xã hội	L.O.1,	Lecture	Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam	L.O.2	Class discussion	
15-16	Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế của Việt Nam	L.O.1, L.O.2, L.O.3		

8. Course Policy

- Phải nghiên cứu giáo trình, chuẩn bị các ý kiến hỏi, đề xuất khi nghe giảng. Chuẩn bị thảo luận và đọc, sưu tầm các tư liệu có liên quan đến nội dung của chương.
- Dành thời gian cho việc nghiên cứu trước bài giảng dưới sự hướng dẫn của giảng viên.
- Tham dự các buổi thảo luận, các buổi lên lớp theo quy định.

03. HISTORY OF VIETNAMESE COMMUNIST PARTY

1. General Information

- Course Title:	
Vietnamese: Lịch sử Đảng Cộng Sản Việt Nam	
English: History of Vietnamese Communist Party	
- Course ID: PE018IU	
- Course type ☑ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits: 2	
Lecture: 2	
Laboratory: 0	
- Previous courses: PE015IU (Philosophy of Marxism and Leninism), PE016IU (Political economics of Marxism and Leninism), PE017IU (Scientific Socialism)	
- Parallel Course: - Course standing in curriculum: Year 2	

2. Course Description

Cung cấp những tri thức có tính hệ thống, cơ bản 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 (1930-1945), trong hai cuộc khánh 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 (1975-2018).

3. Textbooks and References

Textbooks:

1. Bộ Giáo dục và Đào tạo (2019), Chương trình môn học Lịch sử Đảng Cộng sản Việt Nam, ban hành 2019.
2. Hội đồng Trung ương chỉ đạo biên soạn giáo trình quốc gia các môn khoa học Mác-Lênin, tư tưởng Hồ Chí Minh (2018), Giáo trình Lịch sử Đảng Cộng sản Việt Nam, HXB. Chính trị quốc gia, Hà Nội.

4. Course Objectives

1. Cung cấp cho sinh viên hiểu biết về lịch sử của Đảng Cộng sản Việt Nam. Xây dựng cho sinh viên niềm tin vào sự lãnh đạo của Đảng, theo mục tiêu, lý tưởng của Đảng.
2. Giúp sinh viên vận dụng kiến thức chuyên ngành để chủ động, tích cực trong giải quyết những vấn đề kinh tế, chính trị, văn hoá, xã hội theo đường lối, chính sách, pháp luật của Đảng và Nhà nước.

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Hiểu rõ những nội dung cơ bản của đường lối cách mạng	h (level 2)

	của Đảng Cộng sản Việt Nam, trong đó chủ yếu tập trung vào đường lối của Đảng thời kỳ đổi mới trên một số lĩnh vực cơ bản của đời sống xã hội phục vụ cho cuộc sống và công tác.	
L.O.2	Vận dụng kiến thức chuyên ngành để chủ động, tích cực trong giải quyết những vấn đề kinh tế, chính trị, văn hoá, xã hội theo đường lối, chính sách, pháp luật của Đảng và Nhà nước.	d ((level 3)

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	Quiz, attendance	30
A2. Midterm assessment	Midterm exam	20
A3. Final assessment	Final exam	50

7. Course Outlines

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Đối tượng, chức năng, nhiệm vụ, nội dung và phương pháp nghiên cứu, học tập lịch sử Đảng Cộng sản Việt Nam	L.O.1, L.O.2	Lecture Class discussion	Quiz
2-6	Đảng Cộng sản Việt Nam ra đời và lãnh đạo đấu tranh giành chính quyền (1930-1945)	L.O.1	Lecture Class discussion	Quiz
7-11	Đảng lãnh đạo hai cuộc kháng chiến, hoàn thành giải phóng dân tộc, thống nhất đất nước (1945-1975)	L.O.1, L.O.2	Lecture Class discussion	Quiz
12-15	Đảng lãnh đạo cả nước quá độ lên Chủ nghĩa Xã hội và tiến hành công cuộc đổi mới (1975-2018)	L.O.1, L.O.2	Lecture Class discussion	Quiz

8. Course Policy

Class Participation: A minimum attendance of 80 % is compulsory for the class sessions and 100% is compulsory for the laboratory sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are

also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

04. COURSE NAME: HO CHI MINH'S THOUGHTS

1. General Information

- Course Title:	
Vietnamese: Tư tưởng Hồ Chí Minh	
English: Ho Chi Minh's Thoughts	
- Course ID: PE019IU	
- Course type ☑ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits: 2	
Lecture: 2	
Laboratory: 0	
- Prerequisites: PE015IU (Philosophy of Marxism and Leninism), PE016IU (Political economics of Marxism and Leninism), PE017IU (Scientific Socialism)	
- Parallel Course: - Course standing in curriculum: Year 2	

2. Course Description

Môn học 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.

3. Textbooks and References

Textbooks:

1. Bộ Giáo dục và Đào tạo (2019), Giáo trình Tư tưởng Hồ Chí Minh. NXB. Chính trị quốc gia. Hà Nội.
2. Khoa Chính trị - Hành chính, ĐHQG-HCM, Tài liệu hướng dẫn học tập Tư tưởng Hồ Chí Minh.
3. Hồ Chí Minh (2011), Toàn tập, NXB. Chính trị quốc gia Sự thật, Hà Nội.
4. Hồ Chí Minh (2016), Biên niên tiểu sử, NXB. Chính trị quốc gia Sự thật, Hà Nội.

4. Course Objectives

- Trang bị cho sinh viên những kiến thức cơ bản về khái niệm, nguồn gốc, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh; những nội dung cơ bản của tư tưởng Hồ Chí Minh; 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.

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Hiểu biết có tính hệ thống về tư tưởng, đạo đức,	h (level 3)

	giá trị văn hoá, Hồ Chí Minh.	
L.O.2	Hiểu biết về nền tảng tư tưởng, kim chỉ nam hành động của Đảng và của cách mạng nước ta.	h (level 3)
L.O.3	Thấm nhuần đạo đức con người mới.	d (level 3)

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	Quiz, attendance	30
A2. Midterm assessment	Midterm exam	20
A3. Final assessment	Final exam	50

7. Course Outlines

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Khái niệm, đối tương, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh	L.O.1, L.O.2	Lecture Class discussion	Quiz
2-4	Cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh	L.O.1	Lecture Class discussion	Quiz
5-7	Tư tưởng Hồ Chí Minh về độc lập dân tộc gắn liền với Chủ nghĩa xã hội	L.O.1, L.O.2	Lecture Class discussion	Quiz
8	Tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt Nam và nhà nước của nhân dân, do nhân dân và vì nhân dân	L.O.1, L.O.2	Lecture Class discussion	Quiz
9	**MIDTERM**			Written exam
10-11	Tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt Nam và nhà nước của nhân dân, do nhân dân và vì nhân dân	L.O.1, L.O.2	Lecture Class discussion	Quiz
12-14	Tư tưởng Hồ Chí Minh về đại đoàn kết dân tộc và đoàn kết quốc tế	L.O.1, L.O.2	Lecture Class discussion	Quiz
15-16	Tư tưởng Hồ Chí Minh về văn hóa, đạo đức, con người	L.O.1, L.O.2, L.O.3		

8. Course Policy

- Phải nghiên cứu giáo trình, chuẩn bị các ý kiến hỏi, đề xuất khi nghe giảng. Chuẩn bị thảo luận và đọc, sưu tầm các tư liệu có liên quan đến nội dung của chương.
- Dành thời gian cho việc nghiên cứu trước bài giảng dưới sự hướng dẫn của giảng viên.
- Tham dự các buổi thảo luận, các buổi lên lớp theo quy định.

9. Course Coordinator/ Lecturer

05. SCIENTIFIC SOCIALISM

1. General Information

- Course Title:	
Vietnamese: Chủ nghĩa xã hội khoa học	
English: Scientific Socialism	
- Course ID: PE017IU	
- Course type ☑ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits: 2	
Lecture: 2	
Laboratory: 0	
- Prerequisites: PE015IU (Philosophy of Marxism and Leninism), PE016IU (Political economics of Marxism and Leninism)	
- Parallel Course: - Course standing in curriculum: Year 2	

2. Course Description

Nội dung chủ yếu của môn học là cung cấp cho sinh viên những hiểu biết cơ bản có hệ thống cuả chủ nghĩa xã hội khoa học.

3. Textbooks and References

Textbooks:

1. Bộ Giáo dục và Đào tạo (2019), Giáo trình Chủ nghĩa xã hội khoa học, 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 Chủ nghĩa xã hội khoa học, NXB Chính trị quốc gia, Hà Nội

4. Course Objectives

- Môn học cung cấp những nội dung cơ bản của chủ nghĩa xã hội khoa học.
- Giúp sinh viên vận dụng những tri thức cơ bản của chủ nghĩa xã hội khoa học một cách sáng tạo trong hoạt động nhận thức và thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đặt ra.

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Hiểu biết những lý luận cơ bản nhất của chủ nghĩa xã hội khoa học	e (level 2)
L.O.2	Có thể vận dụng những tri thức cơ bản của chủ nghĩa xã hội khoa học một cách sáng tạo trong hoạt động nhận thức và	f, h (level 3)

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
	thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đặt ra.	

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	Quiz, attendance	30
A2. Midterm assessment	Midterm exam	20
A3. Final assessment	Final exam	50

7. Course Outlines

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Nhập môn chủ nghĩa xã hội khoa học	L.O.1	Lecture Class discussion	Quiz
2-4	Sứ mệnh lịch sử của giai cấp công nhân	L.O.1	Lecture Class discussion	Quiz
5-7	Chủ nghĩa xã hội và thời kỳ quá độ lên chủ nghĩa xã hội	L.O.1	Lecture Class discussion	Quiz
8	Dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa	L.O.1, L.O.2	Lecture Class discussion	Quiz
9	**MIDTERM EXAM**			Written exam
10	Dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa	L.O.1, L.O.2	Lecture Class discussion	Quiz
11-12	Cơ cấu xã hội – giai cấp và liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội	L.O.1, L.O.2	Lecture Class discussion	Quiz
13-14	Vấn đề dân tộc và tôn giáo trong thời kỳ quá độ lên chủ nghĩa xã hội	L.O.1, L.O.2	Lecture Class discussion	Quiz
15-16	Vấn đề gia đình trong thời kỳ quá độ lên chủ nghĩa xã hội	L.O.1, L.O.2	Lecture Class discussion	Quiz

8. Course Policy

Class Participation: A minimum attendance of 80 % is compulsory for the class sessions and 100% is compulsory for the laboratory sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another

person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

06. GENERAL LAW

Course ID: 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
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.

[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.

<table>
<tr><td>Course learning outcomes</td><td>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. 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.</td></tr>
<tr><td>Skill</td><td>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.</td></tr>
<tr><td>Attitude</td><td>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.</td></tr>
</table></td></tr>
<tr><td>Content</td><td>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.</td></tr>
<tr><td>Examination forms</td><td>Multiple choice questions
Case-based exams
Essay exams
Oral exams</td></tr>
<tr><td>Study and examination requirements</td><td>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:</td></tr>
</table>

Assignment	20%
Midterm examination	30%
Final examination	50%
Total	100%

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 *six* 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 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 *before* attendance in classes. **Required Course Texts and Materials** Legal Texts: 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 Books: • PGS.TS. Phan Trung Hien, *Giáo trình Pháp Luật Đại cương*, NXB Chính Trị Quốc Gia Sự Thật 2022. • Mai Hong Quy (Chief Editor) (2nd 2017), *Introduction to Vietnamese Law*, Hong Duc Publishing House. Additional materials provided in Blackboard 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** Recommended Internet sites 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) Other Resources, Support and Information 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. Books: ● Nguyen Phu Trong, *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*, NXB Chính Trị Quốc Gia Sự Thật 2023. ● University of Law Ho Chi Minh City, *Giáo trình luật Hiến pháp Việt nam*, NXB Hồng Đức 2023. ● University of Law Ho Chi Minh City, *Giáo trình Luật hành chính*, NXB Hồng Đức 2022. ● University of Law Ho Chi Minh City, *Giáo trình Luật hình sự Việt Nam*, NXB Hồng Đức 2022. ● University of Law Ho Chi Minh City, *Giáo trình Luật dân sự Việt Nam*, NXB Hồng Đức 2022. ● University of Law Ho Chi Minh City, *Giáo trình Luật lao động Việt Nam*, NXB Hồng Đức 2022. ● University of Law Ho Chi Minh City, *Giáo trình pháp luật về chủ thể kinh doanh*, 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	1-5 (level I - introduced)	Tests Peer evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard

	● Introduction to structure of Vietnamese state		Class-performance evaluations		
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	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

	● Liabilities for breach of administrative law, exemption from the liability				violations 2012, and Law on anti-corruption 2018 available on Blackboard
6	**Criminal Law** • Definition and nature of criminal law • Crimes • Punishments	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
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	Discussions Case studies	PPT– Civil law available on Blackboard

			Class-performance evaluations		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.) ● Employment contracts ● Labor disciplines ● Dispute settlements	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
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 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
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.

07. WRITING AE1 (ACADEMIC WRITING)

Course ID: **EN007IU**

1. General information

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.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[2]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must fulfil ONE of the following requirements to attend this course: hold TOEFL iBT certificate with score ≥ 61 hold IELTS certificate with score ≥ 5.5 have completed IE2 course

[2] 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.

<table>
<tr><td>Course objectives</td><td>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.</td></tr>
<tr><td>Course learning outcomes</td><td>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. Understand and follow different steps in the writing process to produce a complete essay
CLO2. Employ different methods to improve their writing such as peer feedback and teacher comments</td></tr>
<tr><td>Skill</td><td>CLO3. Read critically, analyze and annotate an academic text
CLO4. Use different functions of writing to successfully communicate their purposes to the audience (describe a process, discuss the causes and effects, compare and contrast, make arguments, paraphrase and summarize)</td></tr>
<tr><td>Attitude</td><td>CLO5. Reason around ethical issues in writing academic essays and avoid committing plagiarism</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>The process of Academic Writing</td><td>1</td><td>I, T, U</td></tr>
<tr><td>Using Outside Sources</td><td>3</td><td>T, U</td></tr>
<tr><td>From Paragraph to Essay</td><td>4</td><td>T, U</td></tr>
<tr><td>Process Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Cause/Effect Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Comparison/ Contrast Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Argumentative Essays</td><td>6</td><td>T, U</td></tr>
<tr><td>Summarizing</td><td>2</td><td>U</td></tr>
<tr><td>Review & Correction</td><td>2</td><td>U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>Essay writing</td></tr>
<tr><td>Study and examination requirements</td><td>

Attendance

Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination.

Missed Tests

Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (eg. certified paper from doctors), students may re-take the examination.

Class Behaviors

Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Writing AE1 course with approximately 8-10 hours per week (both in class and self-study). Accordingly, students are supposed to follow the obligations below:

Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor’s request.

Participate fully and constructively in all course activities and discussions (if any).

</td></tr>
</table>

	Display appropriate courtesy to all involved in the class. Provide constructive feedback to faculty members regarding their performance. *Plagiarism* Students are warned not to copy from other books or from their peers for all assessment tasks. Committing plagiarism will result in 0 point for the task. Students who plagiarize twice will be prohibited from sitting the final examination. *Writing Center (Room 509)* Students are encouraged to visit the Writing Center to schedule an appointment for additional help with essay writing.
Reading list	Oshima, A., & Hogue, A. (2017). *Longman Academic Writing Series, Level 4: Essays* (5th ed.). New Jersey, NJ: Pearson Longman. Oshima, A., & Hogue, A. (2006). *Longman Academic Writing Series, Level 4: Essays* (4th ed.). New Jersey, NJ: Pearson Longman.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

Week	**Coursebook**		**Homework**
	Chapter	**Pages**	
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	[2] pp. 265-279 [1] pp. 58-65	Do revising & editing exercises Read pp. [1] pp. 66-72
2	***Using Outside Sources (Cont'd)*** Strategies for writing a successful summary	[1] pp. 58 - 72	Do paraphrasing exercises ● Read [1] pp.74-100. Read, take notes and

			write the summary of ONE of the following articles: ○ The Challenge of Many Languages (p. 280) ○ Nice by Nature? (p. 281) ○ Marital Exchanges (pp. 283- 4) ○ Why We Should Send a Manned Mission to Mars (pp. 286-7) ○ Let's Not Go to Mars (pp. 288-9)
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	Read pp. 101-15 Do exercises on: ○ Writing thesis statements ○ Writing topic sentences from the thesis statement provided Writing restatements
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	Write a short essay (150-200 words) describing how hydroelectric power is generated (or a topic of the lecturer's choice)
6	**Process Essays (Cont'd) Review/ Correction**: Lecturer gives feedback to one or two students' writings in class. ***<u>In-class Assignment:</u>*** 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	[1] pp. 101 - 115	Read [1] pp. 116-132

	How to accomplish an academic task (register for classes, apply for a scholarship, pass an exam, etc.)		
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 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	Practice 4, 5,6 /pp. 127-9 Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice. The topic should be different from the one that has been used in class: ○ The cause of obesity ○ The effects of involvement in sports on young children ○ The causes of stress in college students o The effects of regular reading on students' lives
8	**Cause/ Effect Essays (Cont'd) Review/ Correction:** Lecturer gives feedback to one or two students' writings in class. ***<u>In-class Writing:</u>*** 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		Give peer-feedback using the rubric provided
MID-TERM EXAMINATION			
9	**Comparison/ Contrast Essays** 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	[1] pp. 133 - 151	Practice 3, 4, 6, 7/pp.142-6 Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice. The topic should be different from the one that has been used in class:

	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.		o Compare and contrast the relationship between parents and children in two different cultures. o Compare and contrast the university culture in two different countries. Compare and contrast the culture of a small town and a big city.
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: 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	[1] pp. 133 - 151	Read [1] pp. 152-168
11 & 12	**Argumentative Essays** Introduction Analyzing the model	[1] pp. 152-168	Write an argumentative essay (300 – 350 words) on ONE of the following topics or a topic
13	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		of the lecturer's choice: o Can same-sex parenting negatively influence a child's mentality? o Do famous artists have an innate talent, or do they put in great effort to improve their skills? Is homework helpful?

	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? **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?		
14	Review & Practice: Summarizing		**Sample final test**
15	**Review/Correction:** Lecturer gives feedback to one or two students' argumentative essays + sample final test in class. Lecturer has students check their own assignment scores.		
FINAL EXAMINATION			

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
Homework completion (10%)	80% Pass	80% Pass	80% Pass		
Week 6: In-class writing assignment: Process essay (10%)				80% Pass	
Week 10: In-class writing assignment: Compare & Contrast essay (10%)				80% Pass	
Midterm exam (30%)	80% Pass			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 (optional)

5.1. 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 *Cause-Effect Essay* 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 ***Introduction:*** The introduction ends with a thesis statement. (10) ***Body:*** 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) ***Conclusion:*** 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**	

5.2. 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
Content: (20) The essay fulfills the task requirements, and the topic is fully addressed. The content is originally created by the students.	20	16	12	CLO 1,4,5

Organization: (60) ***Introduction***: The introduction has a thesis statement. (10) ***Body***: At least one paragraph discusses the counter-arguments. (10) Each paragraph discusses a particular point and begins with a clear topic sentence. (10) Each paragraph has specific supporting details (fact, examples, etc.). There are no sentences that are off-topic. (10) Each paragraph has cohesion and coherence. There are transition signals to show the relationship among ideas and to link paragraphs. (10) ***Conclusion***: The conclusion summarizes the main points and paraphrases the thesis statement, begins with a conclusion signal, and leaves the readers with the writer's final thought on the topic. (10)	10 10 10 10 10 10	8 8 8 8 8 8	6 6 6 6 6 6	CLO 1,4
Total	**100**	**80**	**60**	

08. LISTENING AE1 (LISTENING & NOTE-TAKING)

Course ID: **EN008IU**

1. General information

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.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[3]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must fulfil ONE of the following requirements to attend this course: hold TOEFL iBT certificate with score ≥ 61 hold IELTS certificate with score ≥ 5.5 complete IE2 course

[3] 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.

<table>
<tr><td>Course objectives</td><td>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.</td></tr>
<tr><td>Course learning outcomes</td><td>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. Remember different strategies and techniques in listening to academic lectures and taking notes.

CLO2. Improve their specialized knowledge of academic lectures</td></tr>
<tr><td>Skill</td><td>CLO3. Respond to academic lectures with appropriate strategies

CLO4. Communicate effectively with their classmates and professors.</td></tr>
<tr><td>Attitude</td><td>CLO5. Respond to academic lectures with confidence</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Orientation & Introduction of strategies and techniques in note-taking</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 1: New Trends in Marketing Research</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 2: Business Ethics</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 3: Trends in Children’s Media Use</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 4: The Changing Music Industry</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 5: The Placebo Effect</td><td>2</td><td>T, U</td></tr>
<tr><td>Midterm Sample Test & Review</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 6: Intelligent Machines</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 7: Sibling Relationships</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 8: Multiple Intelligences</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 9: The Art of Graffiti</td><td>3</td><td>T, U</td></tr>
<tr><td>Final Sample Test & Review</td><td>2</td><td>T, U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>Paper and pen tests: Correct the mistakes, Fill in the blanks, Write short answers, Write a summary paragraph.</td></tr>
<tr><td>Study and examination requirements</td><td>

Attendance

Regular on-time attendance in this course is expected. It is compulsory that students attend at least 80% of the course to be eligible for the final examination.

Missed tests

Students are not allowed to miss any of the tests (both on-going assessment and final test). There are very few exceptions. (Only with extremely reasonable excuses, e.g. certified paper from doctors, may students re-take the tests.)

Class behavior

Students are supposed to:

prepare thoroughly for each class in accordance with the syllabus and complete all assignments upon the instructor’s request

participate fully and constructively in all class activities (and discussions if any)

display appropriate courtesy to all involved in the class

provide constructive feedback to faculty members regarding their performance

</td></tr>
</table>

Reading list	[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.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

WEEK	**P.**	**Chapter**	**Listening oriented activities**	**Speaking oriented activities**
WEEK 1	2	ORIENTATION		
WEEK 2	2	**<u>Chapter 1</u>** **New Trends in Marketing Research**	Recognizing topic introducing and lecture plan presenting expressions Organizing ideas by outlining	Expressing ideas during a discussion
WEEK 3	2	**<u>Chapter 2</u> Business Ethics**	Recognizing transition expressions Using symbols and abbreviations	Asking for clarification and elaboration during a discussion
WEEK 4	2	REVIEW		
WEEK 5	2	**<u>Chapter 3</u>** **Trends in Children's Media Use**	Recognizing generalization and support expressions	Giving opinions and asking for opinions during a discussion

WEEK 6	2	**<u>Chapter 4</u>** **The Changing Music Industry**	Recognizing expressions for clarification or emphasis Organizing notes by using a split-page format	Expressing interest and asking for elaboration during a discussion
WEEK 7	2	**<u>Chapter 5</u>** **The Placebo Effect**	Recognizing cause and effect expressions Noting causes and effects	Agreeing and disagreeing during a discussion
WEEK 8	2	**Sample test correction** WRAP-UP AND REVIEW		
MID-TERM EXAMINATION				
WEEK 9	2	**<u>Chapter 6</u> Intelligent Machines**	Recognizing expressions used to predict causes and effects Using arrows to show the relationship between causes and effects	Learning to compromise and reach a consensus during a discussion
WEEK 10	2	REVIEW		
WEEK 11	2	**<u>Chapter 7</u> Sibling Relationships**	Recognizing expressions of comparison and contrast Noting comparison and contrast	Expanding on ideas during a discussion
WEEK 12	2	**<u>Chapter 8</u> Multiple Intelligences**	Recognizing non-verbal signals indicating important information Representing information in list form	Keeping the discussion on topic
WEEK 13	2	REVIEW		
WEEK 14	2	**<u>Chapter 9</u>** **The Art of Graffiti**	Recognizing expressions of definition Reviewing and practicing all note taking strategies	Indicating to other when preparing to speak or pausing to collect thoughts

WEEK 15	2	WRAP-UP AND REVIEW		
FINAL EXAMINATION				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO 3**	**CLO 4**	**CLO 5**
On-going assessment (30%) (participation, individual work, group work, assignments, etc.)	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 (optional)

09. WRITING AE2 (RESEARCH PAPER WRITING)

Course ID**: EN011IU**

1. General information

Person responsible for the course	Lecturers of Department of English
Language	English
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.*
Semester(s) in which the course is taught	1, 2, 3
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[4]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must complete Writing AE1 course

[4] 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.

<table>
<tr><td>Course objectives</td><td>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.</td></tr>
<tr><td>Course learning outcomes</td><td>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. Understand the structure of a research paper and employ appropriate academic language in writing a research paper</td></tr>
<tr><td>Skill</td><td>CLO2. Read critically, analyze, and annotate academic articles and journals

CLO3. Employ the research writing skills obtained to work on their own paper in their major study.</td></tr>
<tr><td>Attitude</td><td>CLO4. Reason around ethical issues in writing research paper and avoid committing plagiarism</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (2 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>Unit 1: The Academic Writing Process Introduction</td><td>4</td><td>I, T, U</td></tr>
<tr><td>Unit 2: Researching and Writing</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 3: Fundamentals & Feedback</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 4: Definitions, Vocabulary & Clarity</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 5: Generalizations, Facts and Honesty</td><td>4</td><td>T, U</td></tr>
<tr><td>Unit 6: Seeing Ideas and Sharing Texts</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 7: Description, Methods & Reality</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 8: Results, Discussion & Relevance</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 9: The Whole Academic Text</td><td>2</td><td>T, U</td></tr>
<tr><td>Unit 10: Creating the Whole Text</td><td>4</td><td>T, U</td></tr>
<tr><td>Course Review</td><td>2</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Essay writing</td></tr>
</table>

Study and examination requirements	*Attendance* Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination. *Assignment (Literature review)* Purpose: Students will use the knowledge of paraphrasing, summarising, developing arguments, and APA styles to write a 1,000-word literature review on a research scope of their choice. Task: Follow guidelines on how to write a literature review. Use relevant academic writing skills such as paraphrasing, summarising, developing arguments, and APA 7th Style Guidelines – see https://www.apastyle.org/ Develop arguments in relation to the research scope and identify the research gap

<table>
<tr>
<td>Study and examination requirements</td>
<td>
Notes: All papers should be typed, double-spaced, in 13-pt font, and with 1-inch margins. All papers must be original for this class. Criterion-referenced grading is used in this course.
Missed Tests
Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (eg. certified paper from doctors), students may re- take the examination.
Class Behaviors
Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Writing AE2 course with approximately 8-10 hours per week (both in class and self- study). Accordingly, students are supposed to follow the obligations below:
Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor’s request.
Participate fully and constructively in all course activities and discussions (if any).
Display appropriate courtesy to all involved in the class.
Provide constructive feedback to faculty members regarding their performance.
Plagiarism
All forms of plagiarism and unauthorised collusion are seriously regarded and could result in penalties.
Plagiarism occurs when students copy or reproduce people’s words or ideas and then present them as students’ own work without proper acknowledgement, including when students copy the work of their fellow students.
Plagiarism in student submissions can be detected by:
some web-based programs such as SafeAssign or Turnitin, or
examiner's judgments with evidence of originals

The rater will review the paper to check if citations or references are provided properly. Penalties due to improper citations or references include:
<table>
<tr><th>Degree of magnitude</th><th>Description</th></tr>
<tr><td>Below 15%</td><td>Marked as it is.</td></tr>
<tr><td>15% - 25%</td><td>The score is deducted by 25%.</td></tr>
<tr><td>25% - 40%</td><td>The score is deducted by 50%</td></tr>
<tr><td>Over 40%</td><td>The score is 0.</td></tr>
</table>
Notes: Part of the test is marked as it is if no plagiarism is detected. Students who plagiarize over 40% <u>twice</u> will be prohibited from sitting the final examination.
</td>
</tr>
</table>

	Writing Center (Room 509) Students are encouraged to visit the Writing Center or to schedule an appointment for additional help.
Reading list	[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

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

WEEK	CONTENT—SUGGESTED TASKS	ASSIGNMENT/ HOMEWORK
1	**Orientation of the Course** **Unit 1: The Academic Writing Process Introduction**	
2	**Unit 1: The Academic Writing Process (Cont.)** Thinking about writing processes Distinguishing between academic and personal styles of writing Grammar of academic discourse	HW: Task 10
3	**Unit 2: Researching and Writing** Recognizing categories and classification The language of classification The structure of a research paper	HW: Task 17

4	**<u>Unit 3:</u> Fundamentals & Feedback** Exploring comparison and contrast structures The language of comparison and contrast Using comparisons and contrasts to evaluate and recommend	HW: Task 12
5	**<u>Unit 3:</u> Fundamentals & Feedback (Cont.)** The research paper Identifying a research gap The writing process	**Assignment 1: Task 20**
6	**<u>Unit 4:</u> Definitions, Vocabulary & Clarity** The clarity principle The language of definition The place of definition The writing process	HW: Task 15
7	**<u>Unit 5:</u> Generalizations, Facts and Honesty** Honesty principle The language of generalization	HW: Task 13
8	**<u>Unit 5:</u> Generalizations, Facts and Honesty (Cont.)** Writing a literature review The writing process Brainstorming and clustering APA 7th Style Guidelines – see https://www.apastyle.org/	**Assignment 2: Writing Literature review**
MID-TERM EXAMINATION		
9	**<u>Unit 6:</u> Seeing Ideas and Sharing Texts** Writing about events in time Connecting events Learning about peer reviews	HW: Tasks 12 & 13
10	**<u>Unit 7:</u> Description, Methods & Reality** Describing processes and products The language for writing about processes Writing the Methods section Giving and getting formal peer feedback	HW: Tasks 9 & 11
11	**<u>Unit 8:</u> Results, Discussion & Relevance** What is an argument? The language of argument The Results and Discussion sections Finding an academic voice	HW: Task 9
12	**<u>Unit 9:</u> 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	HW: Task 9
13	**<u>Unit 10:</u> Creating the Whole Text** Structure of the research paper Creating your own research	

14	**<u>Unit 10:</u> Creating the Whole Text** Plagiarism Creating citations Paraphrase and summary Authorial identity	
15	**Course Review**	**Submitting Literature review**
FINAL EXAM		

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Class participation and Assignments (30%)	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. Rubric

5.1. 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 Those learning tasks experience an increase in heart rate (when facing same situation). 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	**7.5**	CLO 1,2

	b. go for the place where they were released from quickly.		
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**	

5.2. 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: *use vocabulary and grammatical structures*		**20**	CLO 1,3,4
Total		**100**	

10. SPEAKING AE2 (EFFECTIVE PRESENTATIONS)

Course ID: **EN012IU**

1. General information

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).*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, mini presentations
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[5]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must complete AE1 courses

[5] 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.

<table>
<tr><td>Course objectives</td><td>Speaking AE2 aims at introducing an training students 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.</td></tr>
<tr><td>Course learning outcomes</td><td>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 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</td></tr>
<tr><td>Skill</td><td>CLO2. Prepare and deliver effective, formal, structured presentations that are appropriate to the specific environment and audience.</td></tr>
<tr><td>Attitude</td><td>CLO3. Deliver both informative and persuasive speech with confidence</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (2 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>Orientation & Introduction
Needs analysis</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Building up confidence</td><td>2</td><td>T, U</td></tr>
<tr><td>The first few minutes</td><td>2</td><td>T, U</td></tr>
<tr><td>Organizing what you want to say</td><td>2</td><td>T, U</td></tr>
<tr><td>Summarizing and concluding</td><td>2</td><td>T, U</td></tr>
<tr><td>Using equipment</td><td>2</td><td>T, U</td></tr>
<tr><td>Delivery techniques: Putting it all together</td><td>2</td><td>T, U</td></tr>
<tr><td>Group presentations for the instructor’s evaluation and advice</td><td>2</td><td>U</td></tr>
<tr><td>Introduction to persuasive speeches</td><td>2</td><td>T, U</td></tr>
<tr><td>Methods of persuasion</td><td>2</td><td>T, U</td></tr>
<tr><td>Maintaining interest</td><td>2</td><td>T, U</td></tr>
<tr><td>Dealing with problems and questions</td><td>2</td><td>T, U</td></tr>
<tr><td>Body language</td><td>2</td><td>T, U</td></tr>
<tr><td>Individual presentations for the instructor’s evaluation and advice</td><td>4</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Oral Presentations</td></tr>
</table>

Study and examination requirements	*Attendance* Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination. *Missed Tests* Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (e.g. certified paper from doctors), students may re-take the examination.
Study and examination requirements	*Class Behaviors* Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Speaking AE2 course with approximately 8-10 hours per week (both in class and self-study). Accordingly, students are supposed to follow the obligations below: Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request. Participate fully and constructively in all course activities and discussions (if any). Display appropriate courtesy to all involved in the class. Provide constructive feedback to faculty members regarding their performance. *Plagiarism* Students are warned not to copy from other books or from their peers for all assessment tasks. Committing plagiarism will result in 0 point for the task. Students who plagiarize twice will be prohibited from sitting the final examination.
Reading list	[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

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

WEEK	Content	MATERIAL(S) COVERED	ACTIVITIES
WEEK 1	· **Orientation & Introduction** · **Needs analysis**	[1] *Presenting*, p. 5	Students will: ● receive an introduction to effective presentation ● think about their strength and weaknesses in presenting in English ● identify and prioritize their immediate and future needs for presenting share tips on improving weaknesses
WEEK 2	**Building up confidence**		Student will: - give a short speech about themselves to help them overcome initial shyness of standing up and speaking in public
WEEK 3	**Unit 1: The first few minutes**	*Presenting*, pp. 8-13 ● *Effective Presentations*: p.7 + video clip; p.13+ video clip	Students will: ● learn the importance of making a good first impression ● learn useful phrases for greeting the audience, introducing themselves and others, and giving the purpose of their presentation

WEEK 4	**Unit 3: Organizing what you want to say**	● *Presenting*, pp. 22- 27) ● *Effective Presentations*: p.19 + video clip	Students will: ● look at the importance of structuring their presentation ● learn the useful phrases for outlining their presentation, organizing ideas and moving between different sections of their presentation
WEEK 5	**Unit 6: Summarizing and concluding**	● *Presenting*, pp. 40- 45 ● *Effective Presentations*: p.41 + video clip	Students will: ● look at ways of finishing a presentation effectively ● learn useful phrases for ending their presentation, summarizing, handing over and thanking
WEEK 6	**Unit 2: Using equipment**	● *Presenting*, pp. 14- 21) ● *Effective Presentations*: p.31 + video clip	Students will: ● use equipment and visuals to support their presentation ● learn useful phrases for referring to visuals, ensuring their audience can see and expanding on notes
WEEK 7	**Delivery techniques: Putting it all together**	[2] *Effective Presentations*: p.50 + video clip Assignment: Topic(s) for group presentation)	Students will: ● watch a model presentation and discuss do's and don'ts for effective delivery pick group members and plan their presentations for Week 8
WEEK 8	Group presentations for the instructor's evaluation and advice		Students will: ● take turn to deliver a presentation on the topic(s) assigned by the instructor consult the instructor for advice on the mid-term exam preparation
MIDTERM EXAMINATION Students will give a five-to-six minute informative presentation on a topic to be determined.			

WEEK 9	**Introduction to persuasive speeches**	[3] *The art of public speaking*, Chapter 15 (Handout given by the instructor)	Students will: know types of persuasive speeches ● know typical organizations of a persuasive speech
WEEK 10	**Methods of persuasion**	[3] *The art of public speaking*, Chapter 16 (Handout given by the instructor)	Students will learn to persuade the audience by: building credibility using evidence reasoning appealing to emotions
WEEK 11	**Unit 4: Maintaining interest**	● *Presenting*: pp. 28- 33) ● *Effective Presentations*: p.25 + video clip)	Students will: ● look at maintaining interest through effective delivery ● learn useful phrases for clarifying what you mean, checking if the audience is following and involving the audience
WEEK 12	**Unit 5: Dealing with problems and questions**	○ *Presenting*: pp. 34- 39) ○ *Effective Presentations*: p.44 (Question time)	Students will: ● learn strategies for coping in unexpected situations ● learn useful phrases for dealing with problems and questions
WEEK 13	**Unit 6: Body language**	[2] *Effective Presentations* : pp.36-39	Students will: ● practise using language and body language to communicate the message clearly and persuasively ● watch video clips about body language learn how to control posture, eye contact, gestures and voice inflection
WEEK 14	**Practice**	(to be determined by the instructor)	Students will: - deliver individual or group presentations (assigned by the instructor)

WEEK 15	**Wrap-up and advice**	(to be determined by the instructor)	Students will: ● consult the instructor for advice on the final exam preparation ● continue to deliver individual or group presentations (if any)
FINAL EXAMINATION Students will deliver a seven-to-eight-minute persuasive presentation on a topic to be determined			

5. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
On-going Assessment (30%) (discussion, group presentation, individual presentation, and so on) *(It is requested that lecturers collect students' scripts or any type of evidence of their participation for possible fact check).*	80% Pass	80% Pass	80% Pass
Midterm exam (30%) (Students will give a five-to-six-minute informative presentation on a topic to be determined)	80% Pass	80% Pass	80% Pass
Final exam (40%) (Students will deliver a seven-to-eight-minute persuasive presentation on a topic to be determined.)	80% Pass	80% Pass	80% Pass

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

5. Rubrics & Marksheets

5.1.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

INTERNATIONAL UNIVERSITY
DEPARTMENT OF ENGLISH

SPEAKING AE2 - **MIDTERM** EXAMINATION
RATING CHECKLIST

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)*	
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: *-15pts* 3m - 3m29: *-10pts* 3m30 - 3m59: *-5pts* 4m - 6m: OK >6m: *-5pts*

Organization: ***Yes*** ***No***

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)* ☐ ☐

Examiner : ……

5.2.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

INTERNATIONAL UNIVERSITY
DEPARTMENT OF ENGLISH

SPEAKING AE2 - **FINAL EXAMINATION**
RATING CHECKLIST

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 - 5m29: *-10pts* 5m30 - 5m59: *-5pts* > 8m: *-5pts*

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

Organization:	***Yes***	***No***
A. Introduction		
a. Greeting, name, position *(Good morning, ladies and gentlemen. My name is___. I'm a___)*	☐	☐
b. Connect with the audience *(I can see that all of you love to___)*	☐	☐
c. Purpose/ Objective *(The purpose of this talk is to ____)*	☐	☐
d. Time length *(My presentation should last for ___)*	☐	☐
e. Outline/ Main part *(I've divided my presentation into ___ parts)*	☐	☐
f. 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)*	☐	☐

Examiner : _____

11. ANALYSIS I

General Information

Course Title	
Vietnamese:	Giải tích I
English:	Analysis I
Course ID:	MAFE101IU
Course type x☐ General Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	4
Lecture:	4
Laboratory:	0
Prerequisites:	None
Parallel Course:	None
Course standing in curriculum:	Year 1

Course Description

Analysis I is a foundational course for students of the Department of Mathematics. This introductory calculus course covers Mathematical logic, sequences of real numbers, limits, continuity and differentiation of functions of one variable, with applications.

Textbooks and References

Textbooks:

J. Stewart, *Calculus. Concepts and Contexts*, Thomson Learning, 4th edition, 2012.
R. G. Bartle, D. R. Sherbert, *Introduction to Real Analysis*, 4th edition, John Wiley & Sons, 2011
R.A. Adam, C. Essex, Calculus: A complete course, 7th edition, Person Canada, 2010
W. Rudin, *Principles of Mathematical Analysis*, McGraw-Hill, Inc, 3rd edition, 1964.

Course Objectives

The purpose of this course is to provide students with an in-depth knowledge of Mathematical logic, sequences of real numbers, limits, continuity and differentiation of functions of one variable, with applications. The topics covered include

- Logic, Sets and Functions.

- Proof Methods: Direct and Indirect proof, Mathematical Induction.

- The Algebraic and Order Properties of R, Absolute Value and the Real Line, Supremum, infimum, and the Completeness Property of R.

- Concepts of Function.

- Sequences and their Limits: Limits of sequences, Limit theorems, Monotone sequences and convergence, The number e, sub-sequences and the Bolzano-Weierstrass theorem. Limit superior and Limit inferior, The Cauchy criterion, Infinite limits.

- Continuous Functions: Limits of functions, Limit theorems, One-sided limits, Infinite limits, and limits at infinity, Continuous functions, Combinations of continuous functions, Continuous functions on intervals, Monotone and inverse functions.

- Differentiation: The derivative, Geometric meaning of the derivative, Differentiation rules. Derivatives of inverse Functions, Rates of change in the Natural and Social Sciences, Linear approximations and differentials, The mean value theorem and applications, L' Hospital's rules, Taylor's theorem, Optimization problems.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Students are able to utilize logic laws, effectively proof techniques such as direct proof, indirect proof, Mathematical induction, contrapositive proof.	L.O.1	Knowledge, Skill Attitude
G2	After completing this course, students should have developed a clear understanding of the fundamental concepts of single variable calculus and a range of skills allowing them to work effectively with the concepts. The basic concepts are Sequences, Functions, Limits, Continuity, Derivatives, Optimization problems, related rates problems, etc.	L.O.2 L.O.3	Knowledge, Skill Attitude
G3	Students are able to apply the knowledge to real world problems	L.O.4	Skill Attitude

Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Students will be able to conclude the validity of propositions; to distinguish mathematical implications; using effective proof techniques such as direct proof, indirect proof, Mathematical induction, contrapositive proof.	a	I,T
L.O.2	Students will be able to formulate and apply the concept of a function to a contextual (real-world) situation, to demonstrate understanding of the basic concepts of the limit of a function, asymptotes and continuity, to demonstrate understanding of the meaning of derivatives and compute the derivative of algebraic, exponential and logarithmic functions of one variable. □	c	I, T,U
L.O.3	Students will be able to use derivatives to solve problems involving rates of change, tangent lines and velocity (speed), acceleration and optimization. □ Investigate the graph of a function with the aid of its first and second derivatives: asymptotes, continuity, tangency, monotonicity, concavity, extreme, inflection points, etc, , using L'Hospital's rule to evaluate certain indefinite forms.	b	T, U
L.O.4	Students will be able to apply differentiation to solving applied max/min problems, related rates problems, optimization problems	g	I, T, U

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (PLO) (a-h) is shown in the following table. The below levels of the CLO are based on the Bloom taxonomy (levels from 1-6):

	PLO							
CLO	a	b	c	d	e	f	g	h
1	4							
2			4					
3		3						
4							3	

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-3	**Chapter 1. Primiraries** - Logic, Sets and Functions. - Proof methods: Direct and indirect proof, Mathematical induction. - The algebraic and order properties of R, absolute value and the real line, supremum, infimum, and the completeness property of the real line. - Sequences and their limits: Limits of sequences, Limit theorems, Monotone sequences and convergence, The number e. -Sub-sequences and the Bolzano Weierstrass theorem. Limit superior and Limit inferior, The Cauchy criterion, infinite Limits.	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
4-6	**Chapter 2. Limits of functions, Continuous functions** -Limits of functions, Limit theorems, One-sided limits. -Infinite limits and Limits at infinity. - Continuous functions -Combinations of continuous Functions -Properties of continuous functions	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	-Applications			
7-9	**Chapter 3.** Differentiation - The derivative, Rate of change - Differentiation rules. - Implicit differentiation - Derivatives of inverse functions - Rates of change in the natural and social sciences.	L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
10-13	**Chapter 4. Mean value theorems and applications** - The mean value Theorems and applications -L' Hospital's Rules -Taylor's Theorem	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework
14-15	**Chapter 5. Applications of differentiation.** - Related rates problems - Optimization Problems	L.O.3 L.O.4	Lecture Class discussion	Homework Project
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified

causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Prof. Pham Huu Anh Ngoc, Lecturers of Mathematics department.
- Email: phangoc@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

12. INTRODUCTION TO PYTHON

1. General Information

- Course Title	
+ Vietnamese:	**Nhập môn Python**
+ English:	**Introduction to Python**
- Course ID:	MAFE109IU
- Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	4
+ Lecture:	3
+ Laboratory:	1
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 1

2. Course Description

This subject will provide a broad introduction to four key aspects of Python: programming; data structure; introduction to Numpy, Pandas, MatPlotlib; and object – oriented programming

3. Textbooks and References

Textbooks:

[1] Guttag, John. *Introduction to Computation and Programming Using Python: With Application to Understanding Data. Second Edition.* MIT Press, 2016. ISBN: 9780262529624.

[2] Yves Hilpisch. *Python for Finance: Analyze Big Financial Data.* Second edition, Oreilly, 2015

[3] C. Horstmann and R. Necaise. *Python for everyone.* Second edition, Wiley 2016.

4. Course Objectives

Students will be provided with skills of programming in Python and understanding the role of programming in solving problem.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Achieve basics of programming including variable, function, control flow, data structures such as lists, dictionaries	L.O.1	Knowledge

G2	Able to write small/moderate programs to accomplish useful goals	L.O.2	Skill
G3	Reason around ethical and privacy issues in programming conduct and apply ethical practices.	L.O.3	Attitude

5. Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Achieve basics of programming including variable, function, control flow, data structures such as lists, dictionaries	a	T, U
L.O.2	Able to write small/moderate programs to accomplish useful goals	b	T, U
L.O.3	Reason around ethical and privacy issues in programming conduct and apply ethical practices.	h	I, U

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (PLO) (a-h) is shown in the following table. The below levels of the CLO are based on the Bloom taxonomy (levels from 1-6):

	PLO							
CLO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**
1	**4**							
2		**4**						
3				**4**				

6. Course Assessment

Assessment Component	**Assessment form**	**Assessment form**
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	Topic	Learning Outcomes	Assessments	Learning activities
1	Introduction to Python	1	Quiz1	Lecture, Discussion
2	Number, String and Boolean	3	HW1	Lecture, Inclass-Quiz, HW
3 - 4	Control Statements	3	Quiz4	Lecture, HW Inclass-Quiz
5 - 6	Functions	2	HW2, Quiz6	Lecture, Group work HW
7 - 8	Structure types		HW2	Lecture, Group work, HW
9	Midterm			
10	Recursive		HW3	Lecture, Group work, HW
11	Sorting and searching		HW4	Lecture, Group work, HW
12-13	Numpy and Matplotlib	3	HW5	Lecture, Group work, HW
14-15	Pandas	3	HW6	Lecture, Group work
16	Object oriented programming	3	HW7	Lecture, Discussion, HW
17	Final exam			

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

13. ANALYSIS 2

1. General Information

Course Title	
Vietnamese:	Giải tích 2
English:	Analysis 2
Course ID:	MAFE103IU
Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	4
Lecture:	4
Laboratory:	0
Pre-course:	Analysis 1
Parallel Course:	None
Course standing in curriculum:	Year 1

2. Course Description

This course is a continuation of Analysis 1. Its aim is to equip students with basic concepts of sequences, series and integrals together with their applications.

3. Textbooks and References

1. J. Stewart, Calculus - Early Transcendentals, 9th Edition - Cengage Learning, 2021
2. S. Abbott - Understanding Analysis-Springer-Verlag New York, 2015
3. W. Rudin, Principles of Mathematical Analysis, McGraw-Hill, Inc, 3rd edition, 1964.

4. Course Objectives

The purpose of this course is to provide students with an in-depth knowledge of sequences, series and integrals. Applications of these concepts from a major part of the course. The topics covered include integration, fundamental theorem of calculus, techniques of integration, improper integrals, applications of integration, sequences, series, power series.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with the fundamentals of sequences, series and integrals.	L.O.1 L.O.2	Knowledge
G2	Introduce students to some practical applications of sequences, series and integrals.	L.O.3 L.O.4	Skill
G3	Help students to be confident to use sequences, series and integrals efficiently and correctly.	L.O.5	Attitude

5. Learning Outcomes

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Have basic knowledge of integrals	a	I, T
L.O.2	Have basic knowledge of sequences and series	a	I, T
L.O.3	Can compute standard types of integrals. Use integrals in practical situations	b	T, U
L.O.4	Can prove the convergence of a sequence and a series. Use power series to simplify computation	b	T, U
L.O.5	Confident when dealing with integration and series. Comfortable with applying integrals and series when required.	c	T, U

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Expected Learning Outcomes (PLO) (a-h) is shown in the following table:

	PLO

CLO	a	b	c	d	e	f	g	h
1	4							
2	4							
3		4						
4		4						
5			4					

The levels of the CLO are based on the Bloom taxonomy (levels from 1-6).

6. Course Assessment

Assessment Component	**Assessment form**	**Percentage %**
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Midterm exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	**Content**	**Learning Outcome**	**Teaching and learning activities**	**Assessment**
1	Indefinite Integrals, Riemann Sums	1,3	Lecture	
2	Integrable Functions. The Fundamental Theorem of Calculus	1,3	Lecture	Quiz
3	Substitution rules, Integration by Parts.	3, 5	Lecture	Quiz
4	Trigonometric Substitution, Partial Fractions	3, 5	Lecture	HW

5	Partial Fractions (cont.), Improper Integrals	3, 5	Lecture	Quiz
6	Approximate Integrals	3, 5	Lecture	HW
7	Areas between curves and Volumes	3, 5	Lecture	Quiz
8	Arc Length and Surface of revolution	3, 5	Lecture	HW
Midterm Exam				Written Exam
9	Sequences and Convergence	2, 4	Lecture	Quiz
10	Series	2, 4	Lecture	Quiz
11	Tests for Convergence	4, 5	Lecture	HW
12	Power series	2, 4	Lecture	Quiz
13	Representations of Functions as Power series	4, 5	Lecture	Quiz
14	Taylor and Maclaurin series	2, 4, 5	Lecture	HW
15	Review	1, 2, 3, 4, 5	Exercises	
Final Exam		1, 2, 3, 4, 5		Written Exam

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on this course. This time include attending lectures, reading assigned materials and doing homeworks. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment.

Academic Honesty and Plagiarism: Academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. All assignments are to be completed individually, unless explicitly indicated otherwise.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Nguyen Anh Tu
- Email: natu@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

14. LINEAR ALGEBRA

1. General Information

Course Title	
Vietnamese:	**Đại số tuyến tính**
English:	**Linear Algebra**
Course ID:	MAFE104IU
Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	4
Lecture:	4
Laboratory:	0
Prerequisites:	None
Parallel Course:	None
Course standing in curriculum:	Year 1

2. Course Description

The aim of this course is to provide students with the concepts and techniques to solve linear systems of equations, matrices, determinants, vector spaces, linear transformation, eigenvalues and eigenvectors.

3. Textbooks and References

1) B. Kolman and David R. Hill, Elementary Linear Algebra with Applications, 9th edition, Prentice Hall, 2008
2) E. Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, 2011.
3) B. Kolman and David R. Hill, Introductory Linear Algebra: An Applied First Course 8th edition, Prentice Hall, 2004
4) T.S. Shores, Applied Linear Algebra and Matrix Analysis, Springer, 2007

4. Course Objectives

The purpose of this course is to provide students with basic knowledge of linear algebra, ability to analyze the axiomatic structure of a modern mathematical subject and learn to construct simple proofs, as well as to form life-long learning attitude.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide student with basic knowledge in linear algebra	L.O.1	Knowledge
G2	Analyze the axiomatic structure of a modern mathematical subject and learn to construct simple proofs	L.O.2	Skill
G3	Form life-long learning attitude	L.O.3	Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Have basic knowledge in linear algebra	a	I,T
L.O.2	Analyze the axiomatic structure of a modern mathematical subject and learn to construct simple proofs	b	I, T,U
L.O.3	Form life-long learning attitude	h	T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Class Assignments	10
	A1.2 Homework	10
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-3	**Chapter 1: Systems of Linear Equations and Matrices** 1.1 Introduction to Systems of Linear Equations 1.2 Gaussian Elimination and Gauss-Jordan Elimination 1.3 Operations with Matrices 1.4 Properties of Matrix Operations 1.5 The Inverse of a Matrix 1.6 Elementary Matrices	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
4-5	**Chapter 2. Determinants** 2.1 The Determinant of a Matrix 2.2 Evaluation of a Determinant using Elementary Row Operations 2.3 Properties of Determinants 2.4 Cofactor Expansion; Cramer's Rule	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
6-8	**Chapter 3. Vector Spaces** 3.1 Vectors in R^n 3.2 Vector Spaces 3.3 Subspaces of Vector Spaces 3.4 Spanning Sets and Linear Independence 3.5 Basis and Dimension 3.6 Basic Spaces and Rank of a Matrix 3.7 Coordinates and Change of Basis	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
9-11	**Chapter 4. Inner Product Spaces** 4.1 Length and Dot Product in R^n	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	4.2 Inner Product Spaces 4.3 Orthonormal Bases and Gram-Schmidt Process 4.4 Orthogonal complements 4.5 Projections and Least Squares			
12-13	**Chapter 5. Linear Transformations** 5.1 Introduction to Linear Transformations 5.2 The Kernel and Range of a Linear Transformation 5.3 Matrices for Linear Transformations 5.4 Transition Matrices and Similarity	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
14-15	**Chapter 6. Eigenvalues and Eigenvectors** 6.1 Eigenvalues and Eigenvectors 6.2 Diagonalization 6.3 Symmetric Matrices and Orthogonal Diagonalization 6.4 Application of Eigenvalues and Eigenvectors	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
Final examination				**Written exam**

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all

assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc.Prof. Mai Duc Thanh
- Email: mdthanh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

15. FINANCIAL ACCOUNTING

Course ID: **MAFE212IU**

1. General information

Course designation	This course develops a basic understanding on the theories, principles, and applications of accounting and financial reporting, essentials in the US standard, including topics such as the theory of debit and credit, accounts, special journals, the accounting cycle, notes and interest, accruals and deferrals, cash, receivables, inventory, fixed assets, and the preparation of financial statements. In general, its primary aim is to provide the basic knowledge in preparing and processing accounting transactions in order to present financial details in a relevant and effective manner, as well as interpreting the accounting information for different types of external and internal investors, management and other accounting information users.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Ms. Nguyen Thi Thu Trang or Ms. Nguyen Canh Tien
Language	English
Relation to curriculum	Requirement
Teaching methods	Lecture, project presentation, discussion, exercises/quizzes
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (lecture, exercise, project presentation, discussion): 60 Private study including examination preparation, specified in hours[6]: 60
Credit points	4

[6] 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.

<table>
<tr><td>Required and recommended prerequisites for joining the course</td><td>None</td></tr>
<tr><td>Course objectives</td><td>Upon the successful completion of this course students will be able to (1) Identify the importance of accounting information in decision making and the role it plays within the business environment, (2) Appreciate, understand and demonstrate the relevant procedures of the accounting information life cycle and transformation of accounting information during this process, (3) Comprehend the development of accounting principles and policies through accounting theories and undertakings of the accounting professions</td></tr>
<tr><td>Course Learning Outcomes</td><td>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. Identify the importance of accounting information in decision making and the role it plays within the business environment (Program outcome: b)</td></tr>
<tr><td>Skill</td><td>CLO2. Appreciate, understand and demonstrate the relevant procedures of the accounting information life cycle and transformation of accounting information during this process (Program outcome: e, h)

CLO3. Comprehend the development of accounting principles and policies through accounting theories and undertakings of the accounting professions (Program outcome: e, h)</td></tr>
<tr><td>Attitude</td><td>CLO4. Display effective work and communication within a team in a responsible environment (Program outcome: e, i)

CLO5. Develop a lifelong learning attitude (Program outcome: i, k)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>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)</td></tr>
<tr><td></td><td>
<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>Introduction to Accounting and Business</td><td>1</td><td>I, T</td></tr>
<tr><td>Analyzing Transactions</td><td>1</td><td>T, U</td></tr>
<tr><td>The Adjusting Process</td><td>1</td><td>I, T, U</td></tr>
<tr><td>Completing the Accounting Cycle</td><td>1</td><td>T, U</td></tr>
<tr><td>Accounting for Mechandising Businesses</td><td>1</td><td>I, T</td></tr>
<tr><td>Inventories</td><td>1</td><td>I, T</td></tr>
<tr><td>Cash and Receivables</td><td>1</td><td>I, T</td></tr>
<tr><td>Fixed assets</td><td>1</td><td>I, T</td></tr>
<tr><td>Liabilities</td><td>1</td><td>I, T</td></tr>
<tr><td>Owners’ Equity</td><td>1</td><td>I, T</td></tr>
<tr><td>Bonds Payable and Investment in Bonds</td><td>1</td><td>T, U</td></tr>
<tr><td>Cash Flow Statement and Financial Statements Analysis</td><td>1</td><td>T, U</td></tr>
</table>
</td></tr>
<tr><td>Examination forms</td><td>Written examination</td></tr>
<tr><td>Study and examination requirements</td><td>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.</td></tr>
</table>

Reading list	Textbook: Warren, Reeve, Fess, Accounting, 23rd Edition (Chapters 1-17); Thomson South-Western Publishing Co., 2009 Reference Books: Weygandt, Kieso and Kimmel, Financial Accounting, 5th Ed, John Wiley & Sons, Inc. 2005

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Expected Learning Outcomes (PLO) (a-k) is shown in the following table:

	PLO							
CLO	a	b	c	d	e	f	g	h
1		x						
2					x			x
3					x			x
4					x			
5								

3. Planned learning activities and teaching methods

Week	**Topics**	**CLO**	**Assessment**	**Teaching and Learning activities**
1	Lecture: Introduction to Accounting and Business - The nature of accounting - Accounting Equation - Accounting framework for conventional model	1,2	Quiz	Lecture
2	Lecture: Analyzing Transactions - Transaction analysis - Double – entry accounting	1,2,3,5	Quiz, HW	Lecture

	- Unadjusted trial balances			
3	Lecture: The Adjusting Process - Entries for accounts requiring adjusting - Preparing an adjusted Trial Balance	1,2,3,5	Quiz, HW	Lecture and lab session
4	In-class quiz			
5	Lecture: Completing the Accounting Cycle - Preparing financial statements from adjusted account balances - Preparing closing entries Describing the accounting cycle	1,2,3,4,5	Quiz, HW	Lecture and lab session
6	Lecture: Accounting for Merchandising Businesses - Describe and illustrate the financial statements of a merchandising business. - Sales and Purchase Transactions	1,2,5	Quiz, HW	Lecture and exercises
7	Lecture: Inventories - Perpetual vs. Periodic inventory system - Accounting for sales and purchases of merchandising company	1,2,3,4,5, 6	Group presentation	Discussion
8	Revision session and tutorials			
	Mid-term exam			
9	Lecture: Cash and Receivables - Internal control for cash and Bank reconciliation procedure - Credit control and credit collection - Accounting for trade			

	receivable and notes receivable - Treatment of uncollectible receivables and its estimation: Allowance method vs. Direct write-off method			
10	Lecture: Fixed assets - Conditions for fixed asset recognitions - Depreciation methods: SL, DDB and SYD - Treatment for disposal of fixed assets (discard, sale and exchange)			
11	Lecture: Liabilities - Accounting for payroll and other deductions - Accounting for note payables - Non – current liabilities (bonds) - Contingent liabilities			
12	In-class quiz Lecture: Owners' Equity - Share capital - Dividends, bonus issues and share splits			
13	Lecture: Bonds Payable and Investment in Bonds			
14	Lecture: Cash Flows Statement and Financial Statements Analysis			
15	Revision session and tutorials			
Final Exam		1,2,3,4,6		

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
Participation/ Attendance/ Project/ Homework/ Quiz (30%)	Quiz/ HW 80% Pass	Quiz/ HW 80% Pass	HW/ Project 80% Pass	HW/ Project 80% Pass	Project/ Homework 80% Pass
Midterm exam (30%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass	Q5 50% Pass
Final exam (40%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass	Q5 60% Pass

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

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

16. REAL ANALYSIS

1. General Information

- Course Title	
+ Vietnamese:	Giải tích thực
+ English:	Real Analysis
- Course ID:	MAFE201IU
- Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	4
+ Lecture:	4
+ Laboratory:	0
- Pre-course:	Analysis 2
- Parallel Course:	None
- Course standing in curriculum:	Year 2

2. Course Description

This course is a continuation of Analysis 2. After a short introduction to the theory of metric spaces, it concentrates on the fundamentals of measures and integrations.

3. Textbooks and References

1. H. L. Royden and P. M. Fitzpatrick (2010) Real Analysis, 4th Edition, Pearson Education
2. G. B. Folland (1999) *Real Analysis. Modern Techniques and Their Applications*, 2nd Edition, John Wiley & Sons
3. E. Kopp, J. Malczak, T. Zastawniak (2014) *Probability for Finance*, Cambridge University Press.

4. Course Objectives

The course will help students master 4 main topics of real analysis:

1. Basic theory of metric spaces: convergence, compactness, completeness, continuous mappings.

2. Lebesgue measure theory: σ-algebras, outer measures, measures, Lebesgue measure on R^n, Borel measure on the real line.

3. Lebesgue integration theory: measurable functions, converge almost everywhere and convergence in measure, integration of nonnegative and general measurable functions, convergence theorems, the Riemann Integral as a Lebesgue Integral, product measures and

Fubini's theorem.

4. Signed measures: Hahn and Jordan Decompositions, Radon-Nikodym Theorem.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Provide students with the fundamentals of metric spaces and measure thėoy	L.O.1 L.O.2	Knowledge
G2	Introduce students to some applications of the concepts in this course to other fields such as Probability, Decision Making	L.O.3 L.O.4	Skill
G3	Help students to recognize the use of metric spaces and measure theory in practical applications.	L.O.5	Attitude

5. Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Apply basic concepts in the theory of metric spaces in specific problems	a	I, T
L.O.2	Analyze and compute measures and Lebesgue integration and demonstrate the applications	a	I, T
L.O.3	Demonstrate ability to apply and explain basic concepts from real analysis.	b	T, U
L.O.4	Show the ability to utilize the knowledge from this course in studying other subjects such as Probability, Decision Making	b	T, U
L.O.5	Form a scientific thinking and integrate the professional development for long-life learning on applying measure theory and integrals in real life and graduate programs.	h	T, U

6. Course Assessment

Assessment Component	**Assessment form**	**Percentage %**
A1. Process assessment	A1.1 Attendance, attitude	5

	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	**Content**	**Learning Outcome**	**Teaching and learning activities**	**Assessment**
1	Sets, mappings, and sequences	1,3	Lecture	
2	Countable and uncountable sets. The extended real number system	1,3	Lectures and Quiz	Quiz
3	Metric spaces, open sets, closed sets, interior and closure of a set Open and closed sets in subspaces; open sets in R	1,3, 5	Lectures and Quiz	Quiz
4	Convergent sequences. Convergence in R^n. Continuous mappings between metric spaces. Uniform continuity and Lipschitz continuity	1, 3, 5	Lectures and HW	HW1
5	Complete and separable metric spaces. Baire category theorem and Banach contraction principle.	1, 3, 5	Lectures and Quiz	Quiz
6	Compact metric spaces, Heine-Borel theorem and Bolzano-Weierstrass theorem	1, 3, 5	Lectures and HW	HW2

7	Algebras and σ-algebras. Borel σ-algebra. Measures	2	Lectures and Quiz	Quiz
8	Outer measures, Caratheodory's theorem. Extension of a premeasure to a measure	2	Lectures and HW	HW3
Midterm Exam				Written Exam
9	Lebesgue measures on R^n. Monotonic functions, Borel measures on the real line	2, 4, 5	Lectures and Quiz	Quiz
10	Measurable functions. Convergence almost everywhere and convergence in measure	2, 4	Lectures and Quiz	Quiz
11	Integrals of nonnegative measurable functions. Monotone convergence theorem. Integrals of measurable functions.	2, 4	Lectures and HW	HW4
12	Properties of Lebesgue integral, Convergence theorems: Fatou's lemma and the dominated convergence theorem.	2, 4	Lectures and Quiz	Quiz
13	Riemann and Lebesgue integrability. Product measures and Fubini's theorem.	2, 4, 5	Lectures and Quiz	Quiz
14	Signed measures: Hahn and Jordan decompositions, Radon-Nikodym theorem	2, 4	Lectures and HW	HW5
15	Review	1, 2, 3, 4, 5	Exercises	Exercises
Final Exam		1, 2, 3, 4, 5		Written Exam

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on this course. This time include attending lectures, reading assigned materials and doing homeworks. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment.

Academic Honesty and Plagiarism: Academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. All assignments are to be completed individually, unless explicitly indicated otherwise.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc. Prof. Dr. Nguyen Ngoc Hai
- Email: nnhai@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

17. ANALYSIS 3

1. General Information

- Course Title	
+ Vietnamese:	Giải tích 3
+ English:	Analysis 3
- Course ID:	MAFE203IU
- Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Pre-course:	Analysis 2
- Parallel Course:	None
- Course standing in curriculum:	Year 1

2. Course Description

The purpose of this course is to provide students with an in-depth knowledge of vector functions and functions of several variables. Applications of these concepts form a major part of the course. The topics covered includes: Vector Functions: Space curves, Limit and Continuity, Derivative, Integral of vector functions, Length of space curves; Functions of Several Variables: Limits, Continuity, Partial Derivatives; Maximum, Minimum, and Optimizations; Lagrange multiplier; Multiple Integrals: Double Integrals, Triple Integrals, Techniques of Integration; Vector Fields; Line Integrals; Green theorem; Surface Integrals; Curl and Divergence; Surface integrals; Divergence theorem; Stokes' Theorem.

3. Textbooks and References

1. J. Stewart, Calculus. Concepts and Contexts, Thomson Learning, 4th edition, 2012.

2. R. G. Bartle, D. R. Sherbert, Introduction to Real Analysis, 4th edition, John Wiley & Sons, 2011

3. R.A. Adam, C. Essex, Calculus: A complete course, 7th edition, Person Canada, 2010

4. W. Rudin, Principles of Mathematical Analysis, McGraw-Hill, Inc, 3rd edition, 1964.

4. Course Objectives

The purpose of this course is to provide students with an in-depth knowledge of sequences, series and integrals. Applications of these concepts form a major part of the course. The topics covered

include integration, fundamental theorem of calculus, techniques of integration, improper integrals, applications of integration, sequences, series, power series.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Provide students with basic knowledge of vector functions, functions of several variables, partial derivatives and multiple integrals	L.O.1 L.O.2	Knowledge
G2	Introduce students to solving optimal problems using partial derivatives and evaluating lengths, areas and volumes.	L.O.3 L.O.4	Skill
G3	Help students to be confident and efficient when dealing with derivatives and integrals of vector functions and functions of several variables.	L.O.5	Attitude

5. Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Comprehend basic knowledge of vector functions and functions of several variables	a	I, T
L.O.2	Analyze basic knowledge of partial derivatives and multiple integrals	a	I, T
L.O.3	Solve optimal problems by using partial derivatives. Use partial derivatives in practical situations	b	T, U
L.O.4	Evaluate the length, area, volume of an object in a higher dimension	b	T, U
L.O.5	Demonstrate confidence when dealing with derivatives and integrals of vector functions and functions of several variables. Comfortable with applying derivatives and integrals when required	g	T, U

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (PLO) (a-h) is shown in the following table. The below levels of the CLO are based on the Bloom taxonomy (levels from 1-6):

	PLO							
CLO	a	b	c	d	e	f	g	h
1	4							
2	4							
3		4						
4		4						
5							4	

6. **Course Assessment**

Assessment Component	**Assessment form**	**Percentage %**
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. **Course Outlines**

Week	**Content**	**Learning Outcome**	**Teaching and learning activities**	**Assessment**
1	Vector Functions and Space Curves, Limit and continuity of vector functions	1, 3	Lecture	
2	Derivatives and Integrals of vector functions, Length of space curves	1, 3	Lecture	HW

3	Functions of Several Variables, Limits and Continuity	3, 5	Lecture	HW
4	Partial Derivatives, Tangent Plane and Linear Approximations	3, 5	Lecture	HW
5	Chain Rules, Directional Derivatives and Gradient	3, 5	Lecture	Quiz
6	Maximum and Minimum Values of Functions of two variables	3, 5	Lecture	HW
7	Lagrange Multipliers and Applications	3, 5	Lecture	HW
8	Double Integrals in Rectangles, Iterated Integrals	3, 5	Lecture	Quiz
Midterm Exam				Midterm Exam
9	Double Integrals in General regions and Applications	2, 4	Lecture	HW
10	Triple Integrals and Applications	2, 4	Lecture	HW
11	Change of Variables in Multiple Integrals	4, 5	Lecture	HW
12	Vector Fields, Line Integrals,	2, 4	Lecture	Quiz
13	Line Integrals of Vector Fields, Fundamental Theorem, Green's Theorem	4, 5	Lecture	HW
14	Surface integrals and Applications	2, 4, 5	Lecture	HW
15	Stokes' Theorem, Divergence Theorem.	1, 2, 3, 4, 5	Lecture	Quiz
Final Exam				Written Exam

8. **Course Policy**

Class Participation: 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. Students must have more than 50/100 points overall to pass this course.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc. Prof. Tran Vu Khanh
- Email: tvkhanh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

18. PROBABILITY

1. General Information

- Course Title	
+ Vietnamese:	**Xác suất**
+ English:	**Probability**
- Course ID:	MAFE206IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Precourse:	Analysis 2
- Parallel Course:	Analysis 3, Real Analysis
- Course standing in curriculum:	Year 2

2. Course Description

Probability theory is one of the central cores of applied mathematics. The students will learn about basic and advanced topics of Probability with a mixed perspective (both classical and measure-based Probability theories). This is a theoretical foundation for many courses such as Statistics, Regression Methods, Stochastics Modeling …

3. Textbooks and References

Textbooks:

[1] S. Ross, A First Course in Probability, Prentice Hall (Eighth Edition), New Jersey, 2010

[2] M. DeGroot, M. Schervish, Probability and Statistics, Addison-Wesley (Fourth edition), 2012

[3]. D. P. Bertsekas, J. N. Tsitsiklis, Introduction to Probability, Athena Scientific, Belmont, Massachusetts (Second edition), 2008

4. Course Objectives

Goals	Goal description	Program Learning Outcomes	Competency level
G1	Analyze the basic concepts and results of Probability such as Probability measure, Random variables, Moments, Limit Theorems	L.O.1	Knowledge
G2	Calculate probability and moments of complicated events of various models	L.O.2	Skill
G3	Apply probability models to solve real world problems	L.O.3	

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Be able to analyze the basic concepts and results of Probability such as Probability measure, Random variables, Moments, Limit Theorems	a	T, U
L.O.2	Be able to calculate probability and moments of complicated events of various models	b	T, U
L.O.3	Be able to apply probability models to solve real world problems	b	I, U

6. Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	**Topic**	**Learning Outcome**	**Assessments**	**Learning activities**
1	Basics elements of probability	1, 2	HW1	Lecture, Discussion
2	Counting techniques	3	HW2	Lecture, HW
3	Axioms of probability in general space	1, 2	HW3 Quiz1	Lecture, HW Inclass-Quiz
4	Conditional probability	1, 3	HW4	Lecture, Group work, HW
5	Law of total probability and Bayes's theorem	1, 3	HW5 Quiz2	Lecture, HW Inclass-Quiz
6 - 7	Random variables	1, 3	HW6	Lecture, HW
8	Expectation, variance	2, 3	HW7	Lecture, HW
9	Midterm			
10 -11	Special random variables	2, 3	HW8 Quiz3	Lecture, HW Inclass-Quiz
12 – 13	Joint distribution	1, 3	HW9	Lecture, HW
14	Conditional distribution	1, 3	HW10	Lecture, HW
15	Conditional expectation	2, 3	HW11	Lecture, HW, Inclass-Quiz
16	Weak law of large number, central limit theorem	1	HW12	Lecture, HW,
17	Final exam			

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular

attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha, Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

19. DATABASE MANAGEMENT SYSTEM

1. General Information

- Course Title	
+ Vietnamese:	Hệ Quản trị Dữ liệu
+ English:	Database Management System
- Course ID:	MAFE204IU
- Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 2

2. Course Description

The course introduces an overview of database management systems. This course focuses on database design, development, and applications in practice with relational database management systems.

3. Textbooks and References

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th edition, McGraw-Hill, 2011

- Ramez Elmasri, Fundamentals of Database Systems, 6th Edition, Addison Wesley, 2011

4. Course Objectives

Upon successful completion of this course, students will be able to (1) gain insights into and assess database management systems (DBMS), (2) Develop DBMS-based applications..

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide the students with the fundamentals of database management systems	L.O.1	Knowledge
G2	Show how to design and develop DBMS applications	L.O.2	Skill
G3	Develop life-long learning attitude	L.O.3	Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Can access and gain insights of database management systems (DBMS).	a	I, T
L.O.2	Can design and develop DBMS-based applications	c	I, T
L.O.3	Can learn new tools and techniques by themselves	h	T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude A1.2 Homework A1.3 Quizzes, projects	20
A2. Midterm assessment	A2.1 Midterm exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Introduction to database	1	Lecture	
2	Relational database	1,2	Lectures and practice	Quiz
3,4	Structured Query Language: Basics	1,2	Lectures and practice	Quiz
5	Entity Relationship Model	2,3	Lectures and practice	HW
6	Relational Database Design		Lectures and practice	
7	Review			
Midterm Exam				
8	Structured Query Language: Intermediate Level	2, 3	Lectures and practice	Quiz
9	Application Design and Development	2,3	Lectures and practice	
10	Data Warehousing and Mining	1,2	Lectures and practice	Quiz, HW
11	Database normalization	2, 3	Lectures and practice	HW
12	Specialty Databases: Object-based Databases and XML	2, 3	Lectures and practice	
13	Review			

Final Exam		1, 2, 3		

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on this course. This time include attending lectures, reading assigned materials and doing homeworks. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment.

Academic Honesty and Plagiarism: Academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. All assignments are to be completed individually, unless explicitly indicated otherwise.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer:
- Email:

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

20. INTRODUCTION TO STATISTICS

General Information

Course Title	
Vietnamese:	Giới thiệu về Thống kê
English:	Introduction to Statistics
Course ID:	MAAS220IU
Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	2
Lecture:	2
Laboratory:	0
Prerequisites:	None
Parallel Course:	None
Course standing in the curriculum:	Year 2

Course Description

The aim of this course is to introduce students to conceptual understanding, basic tools, language, and interpretation of statistics for applications in social and applied sciences such as economics, business, and actuaries. The course is designed to acquaint students with the terms and basic techniques in statistics and data analysis. Topics include descriptive statistics; graphical and numerical representation of information; data visualization; measures of location, dispersion, position, outliers, and dependence; exploratory data analysis; sampling methods, and index.

Textbooks and References

Textbooks:

G. Keller (2018), *Statistics for Management and Economics*. 11th e, Cengage.
M. Triola (2018), *Elementary Statistics.* Pearson
K.Black (2020), *Business Statistics for Contemporary Decision-Making.* 10th e, Wiley.
K. Healy (2019). *Data Visualization.* Princeton University Press.

Course Objectives

On completion of the course, students should be able to: identify and utilize different terms used in statistics, and different methods used to sample data; organize and visualize data in different ways including charts and graphs; identify shapes of distribution and define measures of Central Tendency, Dispersion, Position, and Outliers.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with a conceptual understanding of statistics and identify and utilize different terms used in statistics, and different methods used to sample data.	L.O.1	Knowledge
G2	Introduce students how to use basic techniques in statistics to explore real datasets.	L.O.2 L.O.3	Skill
G3	Help students understand the parts of the process in statistical analysis to answer questions including how to obtain and generate data; how to visualize and analyze data; how to interpret numerical summaries of data.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify and utilize different terms used in statistics, and different methods used to sample data	a	I,T
L.O.2	Learn how to obtain and generate data, and then utilize basic statistical methods to explore statistical data properly	b	I, T, U
L.O.3	Understand the applicability of statistical analysis and use R or Python programming for analyzing the real dataset and interpret statistical results in context. Develop a life-long learning attitude	c, h	I, T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude, Quizzes	10
	A1.2 Homework	10
A2. Midterm assessment	A2 Mid-term exam	30
A3. Final assessment	A3 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-2	**Chapter 1. Statistics and the Scientific Method** Introduction Why study Statistics Key Statistical Concepts Some current applications of Statistics Large real dataset	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
3-6	**Chapter 2. Organizing and Visualizing data** 2.1. Ty of data information 2.2. Measurement scales 2.3 Organizing categorical data 2.4. Organizing numerical data 2.5. Visualizing categorical data 2.6. Visualizing numerical data 2.7. Visualizing two numerical variables 2.8 Visualizing multidimensional data	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework
7-8	**Chapter 3. Numerical Descriptive Measures** 3.1. Central Tendency 3.2. Variation and Shape 3.3. Exploring numerical data 3.4. Numerical Descriptive measures for a population 3.5. The covariance and coefficient of correlation	L.O.2 L.O.4	Lecture Class discussion	Homework
Midterm Examination				**Written exam**
9-11	**Chapter 4. Data collection and Sampling** Method of collection data Sampling design for surveys Sampling plan Sampling and Nonsampling errors	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
12-14	**Chapter 5. Index Numbers** 5.1. Price relatives 5.2. Aggregage price indexes 5.3. Computing an Aggregate Price Index from Price Relatives 5.4. Deflating a Series by Price Indexes 5.5. Quantity Indexes	L.O.3 L.O.4	Lecture	Homework Quiz
15	**Review**			
Final examination				**Written exam**

Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Ta Quoc Bao
- Email: baotq@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

21. NUMERICAL ANALYSIS

1. General Information

- Course Title	
+ Vietnamese:	**Giải tích số**
+ English:	**Numerical Analysis**
- Course ID:	MAFE208IU
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	4
+ Lecture:	4
+ Laboratory:	0
- Prerequisites:	None
- Previous courses (pre-take):	Analysis 3
- Parallel Course:	None
- Course standing in curriculum:	Year 2

2. Course Description

The aim of this course is to provide students with basic concepts and problem solving skills in numerical analysis. The course include the following topics: Accuracy and precision, errors, roots of nonlinear equations, solving systems of linear equations, curve fitting and interpolation, spline interpolation, numerical differentiation and integration, numerical methods for differential equations, numerical methods for partial differential equations.

3. Textbooks and References

Textbooks:

R.L. Burden and J.D. Faires, Numerical Analysis, 7th edition, Brooks/Cole, Pacific Grove, CA, 2001.

S. Chapra & R.P. Canale, Numerical Methods for Engineers: with software and Programming Appl, McGraw-Hill, 7th ed., 2015

References:

1) G. Allaire, Numerical Analysis and Optimization, Oxford University Press, 2007.
2) S.S. Rao, Applied Numerical methods for Engineers and Scientists, Prentice Hall, 2001

4. Course Objectives

Upon the successful completion of this course students will be able to:

1. Have basic knowledge in numerical analysis
2. Be equipped with skills and to derive algorithms to solve problems numerically
3. Analyze an algorithm's accuracy, efficiency and convergence properties

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Provide student with basic knowledge in numerical analysis	L.O.1	Knowledge
G2	Students are equipped with skills and derive algorithms to solve problems numerically	L.O.2	Skill
G3	Analyze an algorithm's accuracy, efficiency and convergence properties.	L.O.3	Attitude

5. Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Have basic knowledge in numerical analysis	a	I,T
L.O.2	Be equipped with skills and to derive algorithms to solve problems numerically.	b	I, T,U
L.O.3	Analyze an algorithm's accuracy, efficiency and convergence properties	c	T, U

6. Course Assessment

Assessment Component	**Assessment form**	**Percentage %**
A1. Process assessment	A1.1 Class Assignments	10
	A1.2 Homework	10
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-3	**Chapter 1. Errors and Solutions of nonlinear equations** 1.1 Errors 1.2 Bracketing methods for nonlinear equations 1.3 Open methods for nonlinear equations 1.4 Multiple roots 1.5 Systems of nonlinear equations	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
4-5	**Chapter 2. Linear Systems of Equations** 2.1 Gauss elimination method 2.2 LU decomposition methods 2.3 Iterative methods	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
6-8	**Chapter 3. Curve Fitting and Interpolation** 3.1. Least squares regression models 3.2 Multidimensional least-square models 3.3 Polynomial regression 3.4 Linearized models 3.5 Interpolation: Newton and Lagrange interpolating polynomials 3.6 Inverse Interpolation 3.7 Spline interpolation	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
9-10	**Chapter 4. Numerical Differentiation and Integration** 4.1. Numerical Differentiation 4.2 Higher-order formulas 4.3 Approximations of Partial derivatives 4.4 Trapezoidal rule 4.5 Simpson's rule 4.6 Multiple integrals	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
11-13	**Chapter 5. Numerical methods for differential equations** 5.1. One-step methods	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	5.2 Euler's method 5.3 Improvements of Euler's methods 5.4 Runge-Kutta methods 5.5 Systems of differential equations and higher-order differential equations 5.6 Multi-step methods			
14-15	**Chapter 6. Numerical methods for partial differential equations** 6.1 Finite difference methods for elliptic equations 6.2. Finite difference methods for parabolic differential equations 6.3. Finite difference methods for hyperbolic partial differential equations	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
Final examination				**Written exam**

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc.Prof. Mai Duc Thanh
- Email: mdthanh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

22. DIFFERENTIAL EQUATIONS

1. General Information

Course Title	
Vietnamese:	Phương trình vi phân
English:	Differential Equations
Course ID:	MAFE202IU
Course type x☐ General Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	4
Lecture:	4
Laboratory:	0
Pre-course (pre-take)	Analysis 2
Parallel Course:	None
Course standing in curriculum:	Year 2

Course Description

This course introduces fundamental mathematical methods and analysis in ordinary differential equations and their applications and a short introduction to partial differential equations.

Textbooks and References

Textbooks: W.E. Boyce, R.C. DiPrime, Elementary Differential Equations and Boudnary Value problems, 8th Edition, John Wiley & Sons.

References:

P. Hartman, Ordinary differential equations, SIAM Classics in applied mathematics 38, 2nd edition, Birkhauser, 1982

J.K. Hale, Ordinary differential equations, 2nd ed., Robert E. Krieger Publishing Co., Inc., Huntington, New York, 1980.

Course Objectives

This course provides an introduction to the theory, solution, and application of ordinary differential equations. Topics discussed in the course include methods of solving first-order differential equations, existence and uniqueness theorems, second-order linear equations, higher-order linear equations, systems of equations, non-linear equations. The relationship between differential equations and linear algebra is emphasized in this course. Applications of differential equations in physics, engineering, biology, and economics are presented. This course covers a very brief introduction to partial differential equations including the method separation variables, Heat

equations, Wave equations, Laplace equations.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	To provide an introduction to the nature and significance of differential equations for students of engineering, mathematics, and science.	L.O.1	Knowledge, Skill Attitude
G2	To provide methods for solving differential equations that have proved useful in a wide variety of applications. To present an exposition of differential equations that incorporates algebraic, numerical and graphical analysis, without undue emphasis on theoretical abstraction or routine mechanical manipulation. To use technology to graph solutions of ordinary differential equations (ODEs) and to do explorations and projects involving ODEs.	L.O.2 L.O.3	Knowledge, Skill Attitude
G3	To demonstrate various applications of differential equations to problems from the physical sciences, engineering and Finance.	L.O.4	Skill Attitude

Learning Outcomes

Learning Outcome Codes	**Course Learning Outcomes**	**Program Learning Outcomes**	**Teaching Level**
L.O.1	Students demonstrate the ability to: Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and	a	I,T

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	selected higher order ordinary differential equations. Evaluate first order differential equations including separable, homogeneous, exact, and linear. □ Show existence and uniqueness of solutions. Create and analyze mathematical models using first order differential equations to solve application problems such as circuits, mixture problems, population modeling, orthogonal trajectories, and slope fields. □ Solve second order and higher order linear differential equations. □ Determine fundamental solutions and independence using the Wronskian. □ Solve nonhomogeneous equations. □ Create and analyze mathematical models using higher order differential equations to solve application problems such as harmonic oscillator and circuits. □ Solve differential equations using variation of parameters □ Evaluate Laplace Transforms. □ Find series solutions. □ Solve linear systems of ordinary differential equations.		
L.O.2	Students demonstrate the ability to: Effectively write mathematical solutions in a clear and concise manner. This may be assessed through class assignments, quizzes and tests, and a final exam. Locate and use information to solve first and second order ordinary differential equations. This may be assessed through homework, class quizzes and tests and a final exam.	a, b	I, T,U

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	Demonstrate ability to think critically by determining and using appropriate techniques for solving a variety of differential equations. This may be assessed through tests and a final exam.		
L.O.3	Students will be able to : Demonstrate an intuitive and computational understanding of differential equations by solving a variety of application problems arising from biology, chemistry, physics, engineering and mathematics. This may be assessed through homework, class quizzes and tests, and a final exam. Demonstrate the ability to integrate knowledge and ideas of differential equations in a coherent and meaningful manner for solving real world problems. This may be assessed through homework, class quizzes and tests, and a final exam. Demonstrate the ability to integrate knowledge and ideas of differential equations by analyzing their solution to explain the underlying physical processes. This may be assessed through tests and a final exam.	c	T, U
L.O.4	Students demonstrate the ability to: Demonstrate the ability to think critically by developing appropriate mathematical models of physical systems. This may be assessed through assignments, tests and a final exam.	e, f, h	I, T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitute	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	**Chapter 1. Introduction** Some Basic Mathematical Models; Direction Fields Solutions of Differential Equations Classification of Differential Equations Modelling with First Order Differential Equations	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
2-4	**Chapter 2. First-order differential equations** Linear Equations Method of Integrating Factors Separable Equations Differences Between Linear and Nonlinear Equations Autonomous Equations and Population Dynamics Exact Equations and Integrating Factors Numerical Approximations: Euler's Method The Existence and Uniqueness Theorem	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	Modeling with First Order Differential Equations (Further discussion)			
5-8	**Chapter 3.** **Linear second-order differential equations** Fundamental solution set of homogeneous equations Linear independence and Wronskian Homogeneous linear second-order differential equations with constant coefficients Reduction of order Non-homogeneous equations Method of undermined coefficients Method of variation of Parameters Mechanical and Electrical Vibrations Forced Vibrations	L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
9-11	**Chapter 4.** **Higher Order Linear Equations** General Theory of nth Order Linear Equations Homogeneous Equations with Constant Coefficients	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	The Method of Undetermined Coefficients The Method of Variation of Parameters			
12-14	**Chapter 5.** **Linear systems of first-order differential equations** Basic Theory of Systems of First Order Linear Equations Homogeneous Linear Systems with Constant Coefficients Non-homogeneous systems: Method of undetermined coefficients Method of variation of parameters	L.O.3 L.O.4	Lecture Class discussion	Homework Project
15	**Chapter 6.** **Partial differential equations** Method of separation of variables Heat conduction in a bar Wave equation Laplace equation			
Final examination				**Written exam**

Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular

attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Prof. Pham Huu Anh Ngoc, Lecturers of Mathematics department.
- Email: phangoc@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

23. INTRODUCTION TO MACHINE LEARNING

General Information

Course Title	
Vietnamese:	**Giới thiệu về Học Máy**
English:	**Introduction to Machine Learning**
Course ID:	MAAS221IU
Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☒ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	2
Laboratory:	1
Prerequisites:	Introduction to Python, Linear Algebra, Analysis 3
Parallel Course:	None
Course standing in the curriculum:	Year 2

Course Description

This course will provide an overview of the fundamentals of machine learning. Students will learn about the type of problems that can be solved, the building blocks and the fundamentals of building models in machine learning. A number of key algorithms will be explored.

Textbooks and References

-Bishop, Christopher. *Neural Networks for Pattern Recognition*. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.
-MacKay, David. *Information Theory, Inference, and Learning Algorithms*. Cambridge, UK: Cambridge University Press, 2003. ISBN: 9780521642989. Available on-line here.
-Mitchell, Tom. *Machine Learning*. New York, NY: McGraw-Hill, 1997. ISBN: 9780070428072.
- Goodfellow, Bengio and Courville. *Deep Learning.* MIT Press 2016

Course Objectives

By the end of this course, students will leave with practical knowledge in a number of supervised and unsupervised learning algorithms along with an understanding of key concepts like under and overfitting, regularization, and cross validation. Students will be able to identify the type of problem they're trying to solve, choose the right algorithm, tune parameters, and validate a model.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Understand machine learning concepts and algorithms. Understand testing and validating the machine learning models	L.O.1	Knowledge
G2	Develop and write a substantial machine learning models/funtions in Python. Use Scikit Learn to solve machine learning problems	L.O.2 L.O.3	Skill
G3	Help students choose the right machie learning algorithms for real-world problem solving.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	a	I,T
L.O.2	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.	b	I, T, U
L.O.3	Have an understanding of the strengths and weaknesses of many popular machine learning approaches	b	I, T, U
L.O.4	Be able to design and implement various machine learning algorithms in a range of real-world applications.	c, h	I, T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude, Quizzes	10
	A1.2 Homework	10
A2. Midterm assessment	A2 Mid-term exam	30
A3. Final assessment	A3 Final exam	50

Course Outlines

Week	Topics	Learning Outcome	Teaching and learning activities	Assessment
1	Course overview; Machine Learning basic toolsets: Numpy, Pandas, Scipy, Matplotlib, Scikit Learn, Tensflow, Keras…	L.O.1. L.O.2	Lecture Class discussion	Homework
2	Introduction to Superviesed Learning; Linear Regression with One Variable	L.O.1 L.O.2	Lecture Class discussion	Homework
3	Linear Algrebra Review; Calculus Review and Gradient Descent	L.O.1 L.O.2	Lecture Class discussion	Homework
4	Linear Regression with Multiple Variables	L.O.3 L.O.4	Lecture Class discussion	Homework project
5	Logistic Regression	L.O.3 L.O.4	Lecture Class discussion	Homework project
6	Validation, Regularization, Tuning Hyper-parameters	L.O.3 L.O.4	Lecture Class discussion	Quiz
7	Neural Networks	L.O.3 L.O.4	Lecture Class discussion	Homework project
8	Neural Networks (cont.)	L.O.3 L.O.4	Lecture Class discussion	Homework project
Midterm exam				
9	K-NN and Naive Bayes	L.O.3 L.O.4	Lecture Class discussion	Homework
10	Support Vector Machines	L.O.3 L.O.4	Lecture Class discussion	Homework project

11	Decision Tree	L.O.3 L.O.4	Lecture Class discussion	Homework project
12	Introduction to Unsupervised Learning; K-Mean Clustering	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework project
13	Dimensionality Reduction	L.O.3 L.O.4	Lecture Class discussion	Homework project
	PCA	L.O.3 L.O.4	Lecture Class discussion	Homework project
15	Wrap-up			

Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc. Prof. Tran Vu Khanh
- Email: tvkhanh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

24. DECISION MAKING

1. General Information

- Course Title	
+ Vietnamese:	**Lý thuyết ra quyết định**
+ English:	**Decision making**
- Course ID:	**MAFE207IU**
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory (exercises):	0
- Pre-courses:	Probability, Optimization 1
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

Decision making is one of the important parts in operations research or management science. Decision making techniques help managers to choose the best alternative based on quantitative criteria. This course provides students with basic knowledge about decision model formulation so that they can make decisions based on the models. This course also provides students with basic knowledge on decision making in the relation to game theory. Concretely, students are supplied with the structure of decision making problems, with or without uncertainty, game theory and decision making, and Project management PERT/CPM.

3. Textbooks and References

Main textbooks

[1] F.S. Hillier, G.J. Lieberman, Introduction to Operations Research, 10th Edition, McGraw-Hill, 2015.

[2] H.A. Taha, Operations research: An introduction (Eight Edition), Pearson Prentice Hall, 2007.

Other references

[3] E. Jonathan, Jr. Ingersoll, *Theory of financial decision making*. Rowman & Littlefield Publisher, 1987.

[4] R.T. Clemen, T. Reilly, *Making hard decision with decision tools.* South-Western, Mason USA, 2013.

4. Course Objectives

Master mathematical models and solution methods of decision-making problems, game theory, group decisions, and multi-criteria decision making.

Realize problems in management having the mentioned models in decision making and have the ability to model using such models.

This course examines the decision-making processes in various contexts of deterministic or stochastic. To complete this course, students would be able to analyze alternatives, formulate decision models, and make decisions based on the results of the decision models.

Realize mathematical models when applying the knowledge studied to real-world problems (even in case the models are not exactly as the models in the course) and possess the ability to modify the algorithm, theory to deal with the new situation. To develop abilities to think reasonably, of realizing new problems/questions and answer/solve/prove them under some new conditions arising in practice.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Provide students with basic knowledge of mathematical models and solution methods of decision-making problems, game theory, group decisions, and multi-criteria decision making.	L.O.1	Knowledge
G2	How to model real problems in management as models in decision making and have the ability to find the right/good decision in such concrete situations.	L.O.2 L.O.3	Skill
G3	Help students realize decision-making processes in various contexts of deterministic or stochastic situations. Students would be able to analyze variant alternatives and to make suitable/good decisions.	L.O.3 L.O.4	Skill Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Comprehend and demonstrate the ability to make decisions in the theory of decision analysis, game theory, and project management.	a	I
L.O.2	Build mathematical models problems from real-world problems, in various contexts of deterministic or stochastic (even not in textbooks) and probably not in the same conditions as students have learned …. and modify/judge the known algorithms/methods to solve these new problems.	a, b	T, U
L.O.3	Display the ability to realize "problems" arising (i.e., realize factors/things that are not the same as) when applying the knowledge (from lecture notes/textbook) and also the ability to think reasonably to find the way to solve such problems.	c, e	T, U
L.O.4	Build independent thinking, require for independent research, on some content in the uncertain real world, beyond the confines of the textbook, through projects, presentations, seminar, assignments, and exercises. Develop a life-long learning attitude	e, f, h	T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	**Chapter 1. Introduction to Decision making – steps to effective decision making**	L.O.1	Lecture Class discussion	Homework Quiz
2-5	**Chapter 2. Decision analysis** 2.1 Decision making under certainty 2.2 Decision making under risk 2.3 Decision making under uncertainty	L.O.1 L.O.2 L.O.3	Lecture Presentation (students)	Homework Project
6-7	**Chapter 3. Game theory: two-person zero-sum games** 3.1 Solving simple games 3.2 Stable and unstable solutions	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
9	**Chapter 3. Game theory: two-person zero-sum games (cont'd)** 3.3 Game with mixed strategies – graphical solution procedure		Lecture Class discussion	Homework
10-12	**Chapter 4. More on games** 4.1 4.1. Non zero-sum games 4.2 Cooperative games 4.3 Finite two-person zero-sum games 4.4 Finite two person games	L.O.1 L.O.3 L.O.4	Lecture Class discussion Presentation	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
13-15	**Chapter 5. Project management with PERT/CPM** 5.1 Project management with PERT/CPM 5.2 Project management with uncertain activity duration	L.O.1 L.O.2 L.O.3 L.O.4	Lecture Presentation	Quiz Project
Final examination				**Written exam**

8. Course Policy

Class Participation: Student is expected that you will spend at least **10 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Prof. DrSc, Nguyen Dinh
- Email: ndinh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

25. MAAS ELECTIVE #1

25.1 PRINCIPLES OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

1. General Information

- Course Title	
+ Vietnamese:	**Các nguyên lý Logistics và Quản lý chuỗi cung ứng**
+ English:	**Principles of Logistics and Supply Chain Management**
- Course ID:	IS055IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

This is an introductory course to Logistics and supply chain management (SCM). It provides an overview of fundamental concepts, business processes and models/tools. This course combines SCM business knowledge with analytical thinking and pinpoints the role of SCM relative to other business disciplines. It serves as a roadmap to more in-depth courses on related topics.

3. Textbooks and References

Textbooks:

1. "Management of Business Logistics, 8th edition", Coyle, Bardi, and Langley, South-Western Publishing Company, 2008
2. "Business Logistics / Supply Chain Management: planning, organizing, and controlling the supply chain, 5th ed", Ronald H. Ballou, Prentice Hall, 2004
3. "Supply chain management: strategy, planning, and operation, 4th ed.", S. Chopra and P. Meindl, Prentice Hall, 2010.

4. Course Objectives

The purpose of this course is to provide students with an understanding of the role of logistics management in operations and supply chain management including the contribution of logistics to creating and adding value through domestic and global supply chains.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Able to identify problems, issues and strategies in today's supply chain operations via real-world cases.	L.O.1 L.O.2	Knowledge
G2	Apply analytical models in supply chain management.	L.O.3 L.O.4	Skill
G3	Able to use technical tools to solve supply chain problems.	L.O.5	Skill

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Understanding new concepts of logistics and supply chain management.	a	I,T
L.O.2	Comparing the differences between in-bound supply chain, and out-bound supply chain.	a, b	T
L.O.3	Apply the models, processes and tools used to analyze, design and implement operations and supply chain management solutions.	c	T
L.O.4	Able to complete an engineering project related to supply chain management	e, f, h	T
L.O.5	Identify and apply a range of operations management initiatives and techniques that can be considered in the development of an operations strategy.	c	T

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Quiz	5
	A1.2 Homework	5
	A1.3 Projects	20
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	40

7. Course Outlines

Week	Content	CLOs	Teaching and Learning activities		Assessment Activities
			Lecturer	Student	

1	Lecture 1: Logistics, the Supply Chain & Competitive Strategy	L.O.1	- Lecture presentation	- Group forming. - Class discussion - Read book & lecture 2.	
2 & 3	Lecture 2: Locating facilities	L.O.1	- Lecture presentation	- Class discussion - Read book & lecture 3.	- Quiz /HW **A1.1, A1.2**
4 & 5	Lecture 3: Resources Planning	L.O.1	- Lecture presentation	- Class discussion - Read book & lecture 4.	- Quiz /HW **A1.1, A1.2**
6	Lecture 4: Controlling Materials Flow	L.O.1	- Lecture presentation	- Class discussion - Read book & lecture 5.	- Homework **A1.2**
7	Review for Midterm	L.O.1 L.O.2 L.O.3	- Problems solving	- Class discussion	
Midterm exam					**A2**
9 & 10	Lecture 5: Inventory Management	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book & lecture 6.	- Quiz /HW **A1.1, A1.2**
11&12	Lecture 6: Warehousing & material handling	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book & lecture 7.	- Quiz /HW **A1.1, A1.2**
13	Lecture 7: Procurement	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book & lecture 8.	- HW **A1.2**
14	Lecture 8: Transportation in Logistics & Supply chain	L.O.2 L.O.4	- Lecture presentation	- Class discussion	- Quiz /HW **A1.1, A1.2**
15	Project presentation Review for Final Exam	L.O.2 L.O.3 L.O.4	- Problems solving	- Class discussion	- Project **A1.3**
FINAL EXAMINATION					**A3**

8. Course Policy

Class Participation: 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.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are

also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Nguyen Hoang Huy
- Email: nhhuy@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

25.2 FINANCIAL MATHEMATICS 1

1. General information

- Course Title	
+ Vietnamese:	Toán tài chính 1
+ English:	**Financial Mathematics 1**
- Course ID:	MAFE306IU
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
Course designation	This course provides students fundamental tools in Mathematics corresponding to the ones in finance: profit, interest, money/cash flow, bonds, portfolios, asset pricing, and fundamental principles of finance.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Le Nhat Tan
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 70 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 Private study including examination preparation, specified in hours[7]: 25
Credit points	3

[7] 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.

<table>
<tr><td>Pre-course</td><td>MAFE206IU - Probability</td></tr>
<tr><td>Course objectives</td><td>The purpose of this course is to provide students with basic knowledge on simple and compounded interest rates, and then evaluate fixed - income securities. Provide tools to build optimal portolios based on Markowitz mean-variance theory. Student will be able to use to hedge and speculate, and can apply binomial trees to evaluate options</td></tr>
<tr><td>Course learning outcomes</td><td>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. Evaluate simple and compounded interest, and then evaluate fixed-income securities (Program outcomes: a, level 5)</td></tr>
<tr><td>Skill</td><td>CLO2. Apply to build optimal portfolios based on Markovitz mean-variance theory (Program outcome: c)
CLO3. Construct financial derivatives to hedge and speculate, (Program outcome: b)
CLO4. Employ binomial trees to evaluate options (Program outcome: i)</td></tr>
<tr><td>Attitude</td><td>CLO5. Articulate applicability of conduct tools in financial mathematics in investment funds, stock market. Integrate a life-long learning attitude (Program outcome: h, j)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>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)
<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>Theory of interest, Fixed income securities</td><td>1</td><td>I, T</td></tr>
<tr><td>Capital allocation (Part A, B, C,D)</td><td>2</td><td>T, U</td></tr>
<tr><td>Mean-variance portfolio theorem</td><td>1</td><td>I, T</td></tr>
<tr><td>Forward contract, Futures contracts</td><td>2</td><td>T, U</td></tr>
<tr><td>Options contracts</td><td>3</td><td>T, U</td></tr>
<tr><td>Binomial pricing methods (Part A, B)</td><td>3</td><td>T, U</td></tr>
<tr><td>Binomial pricing methods (Part C,D)</td><td>2</td><td>T, U</td></tr>
<tr><td>Binomial pricing methods (Part E,F)</td><td>4</td><td>T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Written examination</td></tr>
<tr><td>Study and examination requirements</td><td>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.</td></tr>
<tr><td>Reading list</td><td>1. David Luenberger, Investment Science, David, Oxford University Press, 1998,
2. Bill Dalton, Financial products- an introduction using mathematics and Excel, Cambridge University Press (2008)
3. John-C.-Hull, Options, Futures and other derivatives, Prentice Hall 2014.
4. Mondher Bellalah, Derivatives, Risk management and value, World Scientific Publishing Co. Pte. Ltd., 2010.</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	x										
2			x								
3		x									
4									x		
5								x		x	

The levels of the CLO are based on the Bloom taxonomy (levels from 1-6).

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	5										
2			5								
3		4									
4									5		
5								4		4	

3. Planned learning activities and teaching methods

Week	**Topics**	**CLO**	**Assessment**	**Teaching and Learning activities**
1	Theory of interest	1,2		discussions
2	Fixed income securities	1,2	HW1	Lectures and HW/ discussions
3	Capital allocation (Part A, B)	1,2	exercises	Lectures and exercises
4	Capital allocation (Part C, D)	1,2,3	HW2	Lectures and HW

5	Mean-variance portfolio theorem (Part A, B)	1,2,3,4	HW3/Quiz	Lectures and Quiz /homework
6	Mean-variance portfolio theorem (Part C, D)	1,2,3	exercises	Lecture/exercise
7	Mean-variance portfolio theorem (Part E, F)	1,2,3,4	HW4/Group presentation	Lectures and exercises /homework
8	Forward contract (Part A, B)	1,2	Exercises/	Lectures and exercises /homework
Midterm Exam				
9	Forward contracts (Part C, D)	1,2,3	HW5	Lectures and exercises /homework
10	Futures contracts	1,2,3,4	In class exercises	Lectures and exercises /homework
11	Options contract (Part A, B)	1,2,3,4, 5	HW6	Lectures and exercises /homework
12	Options contract (Part C, D)	1,2	HW7	Lectures and exercises /homework
13	Binomial pricing methods (Part A, B)	1,2,3	Quiz/ Group presentation	Lectures and exercises /homework
14	Binomial pricing methods (Part C,D)	1,2,3,4, 5	HW8/Quiz	Lectures and exercises

				/homework
15	Binomial pricing methods (Part E,F)	1,2,3,4, 5		Discussions/ presentations
Final Exam		1,2,3,4, 5		

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
In-class exercises/ quizzes (10%)	Qz1/Group presentation 80%Pass	Exercises/Qz 2 80%Pass	Exercises/Qz 3 80%Pass	Exercises/ Group presentation 80%Pass	Exercises/ Group presentation 80%Pass
Homework exercises (20%)	HW1 75%Pass	HW2 70%	H3 70%Pass	HW4 70%Pass	HW5 60%Pass
Midterm exam (30%)	Q1 80%Pass	Q2 80%Pass	Q3 70%Pass	Q4 70%Pass	Q5 60%
Final exam (40%)	Q1 80%Pass	Q2 80%Pass	Q3 70%Pass	Q4 70% Pass	Q5 60%

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

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

25.3 FINANCIAL MARKETS

1. General information

- Course Title	
+ Vietnamese:	Thị trường Tài chính
+ English:	**Financial Markets**
- Course ID:	MAFE209IU
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
Course designation	This course provides students with the knowledge and understanding of the roles of the intermediary financial institutions in the financial markets. It helps students to differentiate between financial institutions with deposits and ones without deposits, understand and analyze the operational structure of the financial markets. Distinguish the types of securities such as stocks, currencies, bonds and other financial instruments.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, project presentation, discussion
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 70 Contact hours (lecture, laboratory session, exercise, project presentation, discussion): 45 Private study including examination preparation, specified in hours[8]: 25

[8] 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.

<table>
<tr><td>Credit points</td><td>3</td></tr>
<tr><td>Required and recommended prerequisites for joining the course</td><td>None</td></tr>
<tr><td>Course objectives</td><td>The course aims to provide students with knowledge and skills to (1) Apply concepts relevant to financial markets and financial institutions, such as the flow of funds, levels of interest rates to current events or topical issues (2) Evaluate empirical evidence of market performance and contrast it with theories of market performance (3) Research and analyze specific problems or issues related to financial markets and institutions</td></tr>
<tr><td>Course Learning Outcomes</td><td>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 structure and operation of the financial markets as a whole and different individual financial market such as stock markets, bond markets, etc. (Program outcome: a, b)</td></tr>
<tr><td>Skill</td><td>CLO2. Apply and analyze the industry and characteristics of each different financial sector such as banking, insurance, and securities (Program outcome: a, b, d)

CLO3. Research and analyze macroeconomic policies and impact on the financial system (Program outcomes: c, h)

CLO3. Research and analyze macroeconomic policies and impact on the financial system (Program outcomes: h, j)</td></tr>
<tr><td>Attitude</td><td>CLO5. Display the effective work and communication within a team in a responsible environment (Program outcome: e, f, g)

CLO6. Articulate applicability of portfolio management concepts and techniques to their specific business problems, develop a life-long learning attitude (Program outcome: i, k)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>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)
<table>
<tr><td>Topic</td><td>Weight</td><td>Level</td></tr>
<tr><td>Introduction</td><td>1</td><td>T, U</td></tr>
<tr><td>Interest rate</td><td>1</td><td>T,U</td></tr>
<tr><td>Interest rate and Macroeconomic policies</td><td>2</td><td>T, U</td></tr>
<tr><td>Risk and Interest rate</td><td>2</td><td>T, U</td></tr>
<tr><td>Financial Market Efficiency</td><td>2</td><td>I, T</td></tr>
<tr><td>Central bank and Federal reserve system</td><td>1</td><td>I, T</td></tr>
<tr><td>Monetary Policy and Central Bank</td><td>2</td><td>I, T</td></tr>
<tr><td>Money Market</td><td>1</td><td>T, U</td></tr>
<tr><td>Bond Market</td><td>2</td><td>T, U</td></tr>
<tr><td>Stock Market</td><td>2</td><td>I, T</td></tr>
<tr><td>Banking operation and Financial management</td><td>1</td><td>T, U</td></tr>
<tr><td>Insurance Industry</td><td>2</td><td>T, U</td></tr>
<tr><td>Securities brokerage and Investment banking</td><td>2</td><td>T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Written examination</td></tr>
<tr><td>Study and examination requirements</td><td>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.</td></tr>
<tr><td>Reading list</td><td>1. Frederic S. Mishkin, Stanley G. Eakins, Financial Markets and Institutions, Addison Wesley, 2009</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Expected Learning Outcomes (PLO) (a-k) is shown in the following table:

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	x	x									
2	x	x		x							
3			x					x			
4								x		x	
5					x	x	x				
6									x		x

More specifically, the levels of the CLO are based on the Bloom taxonomy (levels from 1-6):

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	2	2									
2	3	3		3							
3			4					4			
4								4		4	
5					4	4	4				
6									5		5

3. Planned learning activities and teaching methods

Week	**Topics**	**CLO**	**Assessment**	**Teaching and Learning activities**
1	Introduction 1. Why study Financial Markets 2. Overview of the financial system 3. The functions of financial markets	1,2	Quiz	Lecture
2	Interest Rate 1. Overview of interest rate 2. Determination of interest rate	1,2	HW	Lecture

	3. Types of interest rates			
3	Interest rate and Macroeconomic policy 1. Factors that affect interest rate 2. Bond market and interest rate 3. Change in market equilibrium of interest	1,2,3, 5	Quiz, HW	Lectures
4	Risk and Interest Rate 1. The structure of interest rate risk 2. The relationship between risk and interest rate 3. Case analysis	1,2,4	HW	Lecture
5	Financial Market Efficiency 1. General definitions 2. Theory of financial market efficiency 3. The evident of market efficiency 4. Behavioral finance	1,2,3, 5	Quiz, HW	Lecture
6	Central bank and Federal reserve system 1. Overview 2. Formation of federal reserve system 3. Activities of central bank	1,2,4	HW	Lecture
7	Monetary Policy and Central Bank 1. The objectives of monetary policy 2. Practice 3. Analysis of the current world events	1,2,3, 5	Quiz, HW	Lecture
8	Money Market 1. Overview 2. Objectives of monetary market 3. Money market instruments	1,2,4	HW	Lectures
Midterm Exam				
9	Bond Market 1. Types of bonds 2. Calculation of bond income 3. Bond investment activity	1,2,3, 5	Quiz, HW	Lecture and discussion
10	Stock Market 1. Stock investment 2. Share valuation 3. Participants in the stock market 4. Stock market management	1,2,5	Quiz, HW	Lecture and discussion
11	Banking operation and Financial management	1,2,4, 5	HW	Lecture and discussion

	1. Basic knowledge of banks 2. Measuring effectiveness of banks 3. Bank management 4. Competition in the banking sector			
12	Insurance industry 1. Basic knowledge of insurance industry 2. Insurance management system 3. Competition and management in the insurance industry	1,2,3, 4,5	Quiz, HW	Lecture and discussion
13	Securities brokerage and Investment banking 1. Overview 2. Investment bank 3. Brokerage company	4,5,6		Lectures and discussion
14,15	Revision	1,2,4, 6		Lecture and discussion
Final Exam		1,2,3, 4,6		

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
Participation/ Attendance/ Project/ Homework/ Quiz (30%)	Quiz/ HW 80% Pass	Quiz/ HW 80% Pass	HW/ Project 80% Pass	HW/ Project 80% Pass	Project/ Homework 80% Pass	HW/ Project 80% Pass
Midterm exam (30%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass		Q5 50% Pass
Final exam (40%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass		Q5 50% Pass

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

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

25.4 CRITICAL THINKING

1. General Information

- Course Title	
+ Vietnamese:	**Tư duy biện luận**
+ English:	**Critical thinking**
- Course ID:	**PE008IU**
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory (exercises):	0
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 1 or 2

2. Course Description

This course provides the nature and techniques of thought as a basis for our claims, beliefs, and attitudes about the world. The course also explores the process in which people develop their claims and support their beliefs.

Specifically, the course includes the theory and practice of presenting arguments in oral and written forms, making deductive and inductive arguments, evaluating the validity or strength of arguments, detecting fallacies in arguments, and refuting fallacious arguments.

Resources for the reasoning process include hypothetical and real-life situations in various fields of natural sciences, social sciences, and humanities.

3. Textbooks and References

Main textbooks

[1] Bassham, Irwin, Nardone, and Wallace, *Critical Thinking: A Student's Introduction*, 6th edition, McGraw-Hill Education, 2020.

[2] Moore, B.N. et al. (2009). *Critical Thinking*, 9th ed. McGraw-Hill

[3] Patrick J. Hurley (2012). *A Concise Introduction to Logic* (11th ed.), Wadsworth, Cengage Learning

Other references

Relevant web resources

4. Course Objectives

This course will enable students to

- develop the habits of assessing and defending the reasonableness of their beliefs and values as well as those of others
- appreciate the importance of looking at an issue from a variety of perspectives
- apply critical thinking skills in both public and personal settings

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with basic knowledge of critical thinking, including fallacies, ways of reasoning, evaluate and refuse an argument.	L.O.1 L.O.2	Knowledge
G2	Develop the habits of assessing and defending the reasonableness of their beliefs	L.O.3- L.O.7	Skill
G3	Emphasize the importance of looking at an issue from a variety of perspectives	L.O.3 L.O.4	Skill Attitude
G4	Apply critical thinking skills in both public and personal settings	L.O.5 - L.O.9	Skill Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	CLO1. Know the general concepts and standards of critical thinking; and comprehend the disadvantages of barriers to critical thinking in various contexts	e	I
L.O.2	Know the elements of an argument and two patterns of reasoning	e	I, T
L.O.3	Know the fallacies of relevance and insufficient evidence in arguments	e	I, T
L.O.4	Construct and evaluate deductive and inductive arguments in spoken and written forms	e	I, T, U

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O. 5	Test the validity of deductive arguments using Venn diagram and truth tables	e	I, T, U
L.O. 6	Analyze and standardize arguments	h	T, U
L.O. 7	Evaluate truth claims and refute arguments		T, U
L.O. 8	Analyze weaknesses in inductive arguments to strengthen them	h	T, U
L.O. 9	Defend personal/group beliefs with good arguments and in appropriate manners (project presentations)	h	T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	15
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	40

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	Introduction to Critical thinking (Chapter 1 in [1])	L.O.1	Lecture Class discussion	Homework Quiz
2	Recognizing arguments (Chapter 2 in [1])	L.O.1 L.O.2	Lecture Presentation (students)	Homework Project
3	Basic logical concepts (Chapter 3 in [1])	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
4	A little categorical logic (Chapter 9 in [1])	L.O.3 L.O.4 L.O.5	Lecture Class discussion	Quiz Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
5	A little propositional logic (Chapter 10 in [1])	L.O.3 L.O.4 L.O.5	Lecture Class discussion	Quiz Homework
6	Logical fallacies I (Chapter 5 in [1])	L.O.3 L.O.5 L.O.7	Lecture Class discussion	Quiz Homework
7	Logical fallacies II (Chapter 6 in [1])	L.O.3 L.O.5 L.O.7	Lecture Class discussion	Quiz Homework
8	**Review for midterm exam + sample test**			
9 + 10	**Midterm Examination (Chapters 1, 2, 3, 9, 10 in [1])**			**Written exam**
11	Analyzing arguments	L.O. 1 L.O. 2 L.O.8 L.O. 9	Lecture Class discussion	Homework
12	Evaluating arguments and truth claims	L.O. 3 L.O.4 L.O.5 L.O.8 L.O. 9	Lecture Class discussion Presentation	Homework Project
13	Inductive reasoning	L.O.3 L.O.4 L.O.8 L.O. 9	Lecture Presentation	Quiz Project
14	Project: Group presentation	L.O.1- L.O. 9	Group work	Presentation, Discussion
15	Project: Group presentation	L.O.1- L.O. 9	Group work	Presentation, Discussion
16	Project: Group presentation	L.O.1-	Group work	Presentation,

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
		L.O. 9		Discussion
17	**Review for final exam + sample test**			
18	Reserved week			
19 + 20 - Final examination: Chapters 5, 6, 7, 8, 11 in [1]				

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of English
- Course Coordinator: Do Thi Dieu Ngoc
- Email: dtdngoc@hcmiu.edu.vn

Mobile: 0904361717

26. STOCHASTIC MODELING

1. General Information

- Course Title	
+ Vietnamese:	Mô hình ngẫu nhiên
+ English:	Stochastic Modeling
- Course ID:	MAAS318IU
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	Probability
- Parallel Course:	
- Course standing in curriculum:	Year 2

2. Course Description

The aim of this course is to provide solid foundations in random processes. This includes basic concepts in stochastic processes, such as the Markov property, and focuses on building a framework to formulate and analyze probabilistic system to understand potential outcomes and inform decision – making

3. Textbooks and References

Textbooks:

[1] N. Privault, *Understanding Markov Chains – Examples and Applications*, , Springer (2nd Edition), 2018

[2] N. Privault, *Lecture note Topics in Discrete Stochastic Processes*, 2022

4. Course Objectives

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Basic understanding of stochastic processes and their characterization	L.O.1	Knowledge

G2	Be able to formulate and analyze probabilistic system	L.O.2	Skill
G3	Apply stochastics models to solve real world problems	L.O.3	

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Be able to understanding basic concept of stochastic processes and their characterization	a	T, U
L.O.2	Be able to formulate and analyze probabilistic system	b	T, U
L.O.3	Be able to apply stochastics models to solve real world problems	g	I, U

6. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	Topic	Learning Outcomes	Assessments	Learning activities
1-2	Markov Chain	1, 2	HW1	Lecture, Discussion
3	Probabilistic Automata	3	HW2	Lecture, HW

4-5	Random Walk	1, 2	HW3 Quiz1	Lecture, HW Inclass-Quiz
6	Convergence to Equilibrium	1, 3	HW4	Lecture, HW
7- 8	Ising Model	1, 3	HW5 Quiz2	Lecture, HW Inclass-Quiz
9	Midterm			
10 -11	Search Engines	2, 3	HW8 Quiz3	Lecture, HW Inclass-Quiz
12 – 13	Hidden Markov Model	1, 3	HW9	Lecture, HW
14 -16	Markov Decision Processes	1, 3	HW10	Lecture, HW
17	Final exam			

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

27. STATISTICS

General information

- Course Title	
+ Vietnamese:	Thống kê
+ English:	**Statistics**
- Course ID:	MAFE316IU
- Number of credits:	4
+ Lecture:	4
+ Laboratory:	0
- Course Title	
Course designation	Statistics is the art of learning from data and forecasting future outcomes. This course provides the students following contents at the undergraduate level: Introduction to Statistics, Descriptive statistics, Distributions of Sampling Statistics, Parameter Estimation, Hypothesis Testing, Compare two normal populations, Regression, Analysis of Variance (ANOVA), Introduction to R, and Python, practice Statistics in R and Python.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Nguyễn Minh Quân
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment, seminar.

Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 Private study including examination preparation, specified in hours[9]: 60
Credit points	4
Pre-course	MAFE206IU-Probability
Course objectives	The purpose of this course is to provide students with basic concepts and techniques of Statistics, including descriptive statistics and inferential statistics with applying in data analysis in finance. More specifically, the course concentrates on the common distributions: normal distribution, chi-square distribution, T-distribution, F-distribution, the central limit theorem, parameter estimation, hypothesis testing, regression techniques, and ANOVA. After learning this course, students are able to develop and conduct statistical experiments or test hypotheses, analyze and interpret data and draw conclusions, to apply regression models to predict and forecast future outcomes.

[9] 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.

<table>
<tr><td>Course learning outcomes</td><td>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. Apply the concepts and techniques of descriptive statistics and common distributions (Program outcomes: a; level 3).

CLO2. Evaluate the statistical parameters: population means, population standard deviation, and sample mean (Program outcomes: b; level 5).</td></tr>
<tr><td>Skill</td><td>CLO3. Measure statistical quantities and organize the processes in solving the problem, analyzing the results, and drawing conclusions (Program outcomes: j; level 4).

CLO4. Construct statistical experiments or test hypotheses, analyze and interpret data and recommend conclusions (Program outcomes: c; level 4).</td></tr>
<tr><td>Attitude</td><td>CLO5. Demonstrate the type of independent thinking requiring research beyond the confines of the statistics textbook, through projects, interdisciplinary examples, and exercises (Program outcomes: k; level 3).</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

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)

<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Descriptive Statistics: Describe and summarizing data sets</td><td>2</td><td>I, T</td></tr>
<tr><td>Distributions: Normal distribution, Gamma distribution, T-T-distribution, chi-square distribution, F-distribution.</td><td>2</td><td>I, U</td></tr>
<tr><td>Sampling and Distributions of Sampling Statistics: The sample mean, The central limit theorem. Lab section with R and Python.</td><td>3</td><td>T, U</td></tr>
<tr><td>Parameter estimations: Maximum likelihood Estimators. Lab section: R and Python.</td><td>2</td><td>T, U</td></tr>
<tr><td>Hypothesis Testing: z-test and t-test</td><td>2</td><td>T, U</td></tr>
<tr><td>Compare Two Normal Populations. Project: released and team discussions.</td><td>2</td><td>T, U</td></tr>
<tr><td>Regression, OLS, inferential concerning beta. Lab section: Python.</td><td>1</td><td>T, U</td></tr>
<tr><td>Analysis of Variance: One factor and two factors. Lab section: Python.</td><td>1</td><td>I, U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>Written examination</td></tr>
<tr><td>Study and examination requirements</td><td>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.</td></tr>
</table>

Reading list	[1] S. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Elsevier (6th edition), 2020. [2] D. Wackerly, W. Mendenhall, R. Scheaffer, Mathematical Statistics with Applications (7th edition), Thomson Brooks/Cole, 2008. [3] D. Ruppert, D. Matteson, Statistics and Data Analysis for Financial Engineering: With R Examples, Springer, 2015. [4] Allen B. Downey, Think Stats: Exploratory Data Analysis, 2nd Edition, O'Reilly Media, 2015.

Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Expected Learning Outcomes (PLO) (a-k) is shown in the following table:

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	3										
2		5									
3										4	
4			4								
5											3

The levels of the CLO are based on the Bloom taxonomy (levels from 1-6).

Planned learning activities and teaching methods

Week	**Topics**	**CLO**	**Assessment**	**Teaching and Learning activities**
1	Descriptive Statistics (1): Population and sample, describe	1,2	Quiz 1	Lecture, quiz, discussions

	data sets, Summarizing data sets, Mean, Median, Mode, Percentiles			
2	Descriptive Statistics (2): Sample Percentiles, Chebyshev's inequality, Sample correlation coefficient. Lab section with R-programming.	1,2	Quiz 2	Lectures, Exercises, Lab, and Quiz
3	Distributions (1): Normal distribution, Exponential distribution, Gamma distribution	1,2	HW1	Lectures, exercises homework
4	Distributions (2): The Chi-square distribution, T-distribution, F-distribution. Lab section with R.	1,2, 3	Quiz 3	Lectures, Lab, and Quiz
5	Sampling and Distributions of Sampling Statistics (1): The sample mean, The central limit theorem. Lab section with R.	1,2,3,	Quiz 4	Lectures, Lab and Quiz
6	Sampling and Distributions of Sampling Statistics (2): Approximate distribution of the sample mean, The sample variance. Lab section: Python.	1,2,3	Exercises	Lecture/exercise Python Colab
7	Sampling and Distributions of Sampling Statistics (3): Sampling distribution from a normal distribution, Sampling from a finite population. Lab section: Python.	1,2,3	Exercises, HW2	Lectures, Python Colab, /homework
8	Parameter estimations: Maximum likelihood Estimators. Lab section: Python.	1,2,4	Quiz 5	Lectures, Quiz, Python Colab
Midterm Exam				

9	Parameter estimations: Confidence interval for the population mean and variance. Lab section: Python.	1,2,4	Exercises/ Quiz 6	Lectures, exercises, and quiz, Colab
10	Hypothesis Testing: z-test, case of the variance is known.	4, 5	Exercises, Quiz 7	Lectures, exercises, And quiz
11	Hypothesis Testing: t-test, Hypothesis Testing for a proportion. Lab section: Python.	4,5	Exercises HW3	Lectures, Colab /homework
12	Compare Two Normal Populations. Project: released and team discussions.	4,5	Quiz 8	Lectures and exercises Discussions on the proposal for project
13	Regression, OLS, conference concerning beta. Lab section: Python.	3,5	Quiz 9	Lectures and exercises, Python Colab
14	Analysis of Variance (ANOVA) Lab section: Python.	5	Quiz 10	Lectures and exercises /homework
15	Project presentations. Exercises. Revisions.	1,2,3,4, 5	HW4, Project presentation	Presentations, Discussions, Revisions
Final Exam		1,2,3,4, 5		

Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
In-class exercises/ quizzes (10%)	Qz1->Qz6 Exercises 80%Pass	Qz1->Qz6 Exercises/Qz2 60%Pass	Qz3->Qz4 Exercises/Qz3 80%Pass	Qz5->Qz7 Exercises/ Group presentation 70%Pass	Qz8-> Qz10 Exercises / Group present 70%Pass
Homework exercises (10%)	HW1, HW2 70%Pass	HW1, HW2 60% Pass	HW2 65%Pass	HW3, HW4 65%Pass	HW4 60%Pass
Project(10%)	X 80% Pass	X 60% Pass	X 80% Pass	X 70% Pass	X 80% Pass
Midterm exam (30%)	Q1 80%Pass	Q2 60%Pass	Q3 70%Pass	Q4 70%Pass	Q5 60%
Final exam (40%)	Q1 80%Pass	Q2 60%Pass	Q3 70%Pass	Q4 60% Pass	Q5 50%

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

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

28. REGRESSION MODELS

General Information

Course Title	
Vietnamese:	**Mô hình hồi quy**
English:	**Regression Models**
Course ID:	MAAS320IU
Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Probability, Statistics
Parallel Course:	None
Course standing in curriculum:	Year 3

Course Description

The aim of this course is to provide students with foundations and practical examples of regression models, and also to address specific economics and business problems. The course introduces to students the methods for building and interpreting regression models. Topics include: simple, multiple linear and nonlinear regression models, ordinary least squares, inference for the normal regression model, collinearity, interpretations of main effects, regression models for quantitative and qualitative predictors, model selection and validation.

Textbooks and References

Textbooks:

M. Kutner, C. Nachtsheim, J. Neter, and W. Li (2005), *Applied Linear Statistical Models*. McGraw-Hill.

L.Fahrmeir, T.Kneib, S.Lang, and B.Marx (2013), *Regression Models, Methods, and Application.* Springer.

S.Weisberg (2014). *Applied Linear Regression.* 4th ed, Wiley.

Course Objectives

The purpose of this course is to provide students with an in-depth knowledge in building and analyzing regression models that are mostly used in a variety of fields such as economics, finance and business. The course concentrates on learning to build basic mathematical theory and theoretical assumptions behind the linear regression model. The course also focuses on some applications of regression models to real problems in economics and business.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students knowledge of simple, multiple and nonlinear regression models, ordinary least square methods	L.O.1	Knowledge
G2	Introduce students how to make inference regarding linear regression models, perform validation and select important variables of regression model.	L.O.2 L.O.3	Skill
G3	Help students how to apply the above knowledge and tools of regression analysis to real world problems. Be able to interpret the results in practical problems.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify different types of regression models and formulate simple, multiple and nonlinear regression models.	a	I,T
L.O.2	Describe the principle of least squares, carry out tests of linear hypothesis and interprete main effects.	a, b	I, T,U
L.O.3	Able to perform validation and select important variables	c	T, U
L.O.4	Articulate the applicability of regression analysis and use R or Python programing for analyzing the real dataset and interpret empirical results. Develop a life-long learning attitude	e, f, h	I, T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitute	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30

A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-2	**Chapter 1. Linear regression with one predictor variable** Relations between variables Regression models and their uses Simple linear regression model Ordinary least squares estimation Estimating variance and parameters Confidence interval and t-test The coefficience of determination Residuals	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
3-5	**Chapter 2. Multiple regression** 2.1. Adding a regressor to a simple linear regression model 2.2. The multiple linear regression model 2.3. Predictors and regressors 2.4. Estimation of regression coefficients 2.5. Analysis of variance results 2.6. Inference about regression 2.7. P-value 2.8. Estimation of mean response and prediction of new observation	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework Project
6-8	**Chapter 3. Interpretations of main effects** 3.1. Rate of change 3.2. Sign of estimate 3.3. Interpretation Depends on Other terms in the Mean Function 3.4. Collinearity 3.5. Regressor in logarithm scale 3.6. Response in logarithm scale 3.7. Dropping regressors 3.8. More on coefficient of determination	L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
9-10	**Chapter 4. Regression models for quantitative and qualitative predictors** 4.1. Polynomial regression models 4.2. Interaction regression models 4.3. Qualitative predictors 4.4. Indicator variables 4.4 Modeling interaction between quantitative and qualitative predictors	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework
11-13	**Chapter 5. Building regression model** 5.1. Overview of Model-Building process 5.2. Criteria for model selection 5.3. Model validation 5.4. Regression diagnostics 5.5. Remedial measures	L.O.3 L.O.4	Class discussion	Homework Project
14-15	**Chapter 6. Nonlinear regression models** 6.1. Introduction to nonlinear regression 6.2. Logistic regression 6.2. Poisson regression	L.O.1 L.O.2 L.O.3 L.O.4		Homework
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified

causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Ta Quoc Bao
- Email: baotq@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

29. STATISTICAL COMPUTING

General Information

Course Title	
Vietnamese:	Thống kê tính toán
English:	Statistical Computing
Course ID:	MAAS322IU
Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Statistics; Stochastic Modeling
Parallel Course:	None
Course standing in the curriculum:	Year 3

Course Description

The aim of this course is to provide students the tools and techniques to explore random systems and statistical computing using R or Python. It covers the topics: methods for generating random variables, visualization of multivariate data, Monte Carlo (MC) integration, variance and inference, bootstrap and jackknife, and Markov Chain Monte Carlo (MCMC).

Textbooks and References

Textbooks:

[1] Rizzo ML. Statistical Computing with R, 2nd ed, 2019, CRC Press
[2] An Introduction to Statistical Computing: A Simulation-based Approach, Jochen Voss, Wiley, 2013

Course Objectives

On completion of the course, students should be able to simulate random variables in the R statistical package using complex algorithms and graphical checks for correctness. They can use R to effectively visualize real multivariate datasets, as well as develop appropriate statistical inference procedures based on bootstrap and jackknife and permutation methods. They can perform Bayesian inference using MCMC algorithms to fit posterior distributions.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with the fundamental methods for generating random variables, bootstrap, and Markov Chain Monte Carlo	L.O.1	Knowledge
G2	Be able to implement the visualizations of multivariate data and simulate the statistical models by using R and/or Python	L.O.2	Skill
G3	Be able to develop lifelong learning beyond Monte Carlo simulation and further applications such as multilevel Monte Carlo techniques	L.O.3	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Demonstrate understanding of the fundamental methods for generating random variables, bootstrap, and Markov Chain Monte Carlo	a	I,T
L.O.2	Implement the visualizations of multivariate data and simulate the statistical models by using R and/or Python	b	T, U
L.O.3	Develop lifelong learning beyond Monte Carlo simulation and further applications such as multilevel Monte Carlo techniques	c, h	T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude, Quizzes	10
	A1.2 Homework	10
	A1.3 Project	10
A2. Midterm assessment	A2 Mid-term exam	30
A3. Final assessment	A3 Final exam	40

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	**Chapter 1. Introduction** 1.1 Introduction to statistical computing with R/Python 1.2 Distribution and statistical tests 1.3 Probability and Statistics review	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
2-3	**Chapter 2. Methods for Generating Random Variables** 2.1. Introduction 2.2. The Inverse Transform Method 2.3 The Acceptance-Rejection Method 2.4. Transformation Methods 2.5. Sums and Mixtures 2.6. Multivariate Distributions 2.7. Multivariate Normal Distribution variables 2.8 Mixtures of Multivariate Normals	L.O.1 L.O.2	Lecture Class discussion	Homework, Quiz
4	**Chapter 3. Generating Stochastic Processes** 3.1. Stochastic Processes 3.2. Poisson Processes 3.3. Renewal Processes 3.4. Symmetric Random Walk 3.5. Brownian Motion	L.O.1 L.O.2	Lecture Class discussion	Homework, Quiz
5-6	**Chapter 4. Visualization of Multivariate Data** 4.1 Panel Displays 4.2 Correlation Plots 4.3 Surface Plots and 3D Scatter Plots 4.4 Surface Plots 4.5 Three-dimensional Scatterplot 4.6 Contour Plots 4.7 Other 2D Representations of Data 4.8 Principal Components Analysis	L.O.1 L.O.2	Lecture Class discussion	Homework, Quiz
7-8	**Chapter 5. Monte Carlo Integration and Variance Reduction** 5.1 Monte Carlo Integration 5.2 Simple Monte Carlo 5.3 Variance and Efficiency 5.4 Variance Reduction 5.5 Antithetic Variables and Control Variates 5.6 Importance Sampling	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework, Quiz, Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	5.7 Stratified Sampling 5.8 Stratified Importance Sampling			
Midterm Examination				**Written exam**
9	**Chapter 6. Monte Carlo Methods in Inference** 6.1. Monte Carlo Methods for Estimation 6.2 Monte Carlo Methods for Hypothesis Tests	L.O.1 L.O.2 L.O.3	Lecture	Homework Quiz, Project
10-11	**Chapter 7. Bootstrap and Jackknife** 7.1 The Bootstrap 7.2 The Jackknife 7.3 Bootstrap Confidence Intervals 7.4 Resampling Applications 7.5 Jackknife-after-Bootstrap 7.6 Resampling for Regression Models	L.O.1 L.O.2 L.O.3	Lecture	Homework Quiz, Project
12-14	**Chapter 8. Markov Chain Monte Carlo Methods** 8.1 Integration Problems in Bayesian Inference 8.2 Markov Chain Monte Carlo Integration 8.3 The Metropolis-Hastings Algorithm 8.4 The Gibbs Sampler 8.5 Application: Change Point Analysis	L.O.1 L.O.2 L.O.3	Lecture	Homework Quiz, Project
15	**Review**			
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view

of the interactive teaching and learning approach adopted.

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Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Nguyen Minh Quan
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Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

30. APPLIED TIME SERIES ANALYSIS

General Information

- Course Title	
+ Vietnamese:	Phân tích chuỗi thời gian ứng dụng
+ English:	Applied Time Series Analysis
- Course ID:	MAAS324IU
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	Probability, Regression Methods
- Parallel Course:	
- Course standing in curriculum:	Year 3

1. Course Description

This course introduces students to the theory and application of time series methods for data that are collected over time. Topics include exploratory data analysis tools, methods for detrending, and seasonal adjustment of data, smoothing techniques including exponential smoothing, modeling and forecasting based on the ARIMA class of models, and ARCH/GARCH models. Students gain hands-on experience of applied time series methods for real data sets using the statistical software.

2. Textbooks and References

Textbooks:

[1] Jonathan D. Cryer, Kung-Sik Chan, *Time Series Analysis with Application in R*, Springer, 2nd edition, 2008

[2] Robert H. Shumway David S. Stoffer, *Time Series Analysis and Its Applications With R Examples*, Springer, 2nd edition, 2017

[3] James D. Hamilton, *Time Series Analysis*, Princeton University Press, 1994

3. Course Objectives

As a result of taking the course, students should:

1. understand basic time series concepts and terminology
2. be able to select time series methods appropriate to goals
3. be able to critically evaluate scientific literature applying the time series methods covered

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Understand basic concepts and terminology of time series	L.O.1	Knowledge
G2	Be able to apply time series methods for real data	L.O.2	Skill
G3	Be able to handle statistical software to analyze time series data	L.O.3	Skill

4. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Understand basic concepts and terminology of time series	c	T, U
L.O.2	Be able to apply time series methods for real data	b	T, U
L.O.3	Be able to handle statistical software to analyze time series data	g	I, U

5. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

6. Course Outlines

Theory

Week	Topic	Learning outcome	Assessments	Learning activities
1	Fundamental concept	1, 2	HW1	Lecture, Discussion
2	Trends	1, 3	HW2	Lecture, HW
3	Models for stationary time series	1, 2	HW3 Quiz1	Lecture, HW Inclass-Quiz
4	Models for nonstationary time series	1, 3	HW4	Lecture, Group work, HW
5	Model specification	1, 3	HW5 Quiz2	Lecture, HW Inclass-Quiz
6 – 7	Parameter estimation	1, 3	HW6	Lecture, HW
8	Model diagnostics	2, 3	HW7	Lecture, HW
9	Midterm			
10	Forecasting	2, 3	HW8 Quiz 3	Lecture, HW Inclass-Quiz
11	Seasonal models	1, 3	HW9	Lecture, HW
12	Time series regression models	1, 3	HW10 Quiz 4	Lecture, HW Inclass-Quiz
13	Time series models of heteroscedasticity	2, 3	HW11	Lecture, HW, Inclass-Quiz
14 - 15	Spectral analysis	1	HW12	Lecture, HW
16	Threshold models	1, 2	HW13	Lecture, HW
17	Final exam			

7. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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8. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

31. MAAS ELECTIVE #2

31.1 PREDICTIVE ANALYTICS

General Information

Course Title	
Vietnamese:	**Phân tích dự đoán**
English:	**Predictive Analytics**
Course ID:	MAAS325IU
Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Regression models, Machine learning
Parallel Course:	None
Course standing in the curriculum:	Year 3

Course Description

The course is designed to provide students with advanced statistical techniques for predictive modeling with applications in business analytics. The course covers the fundamental concepts of statistical learning and the uses of R programming language. It also provides the transition from the theory of mathematical statistics to predictive analytics and applications in, e.g., business and actuarial science.

Textbooks and References

Textbooks:

Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr.(2017) Data Mining for Business Analytics: Concepts, Techniques, and Applications in R. Wiley
Max Kuhn and Kjell (2018). Applied Predictive Modeling. Springer.
Daniel T. Larose (2015). Data Mining and Predictive Analytics. Wiley.

Course Objectives

The course is devoted to applied predictive modeling to economics, business, and insurance. Upon completion of the course, students are able to articulate the types of problems that can be addressed by predictive analytics. Furthermore, students are also able to use R or Python programming to practice predictive models.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students knowledge of business problems, types of models, and process of predictive modeling	L.O.1	Knowledge
G2	Students are able to work with various types of datasets, are able to create graphs of data with R or Python programming, and use performance measures to evaluate predictive modeling.	L.O.2 L.O.3	Skill
G3	Students are able to utilize statistical and machine learning models to model business problems. Furthermore, students will be able to effectively communicate the results of applying predictive analytics to solve a business problem.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify and understand different types of problems, in predictive analytics. Translate questions into ones that can be analyzed with statistical and predictive models.	a	I,T
L.O.2	Demonstrate important principles of constructing grapes. Identify structured, unstructured, and semi-structured data, types of variables, and terminology used in predictive modeling.	a, b	I, T,U
L.O.3	Demonstrate the foundations of predictive models and assumptions of the models	c	I, T, U
L.O.4	Articulate the applicability of predictive modeling and use R or Python programming for analyzing the real dataset in business and interpreting empirical results. Develop a life-long learning attitude	e, f, h	T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance,	5

	attitude	
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	35
A3. Final assessment	A3.1 Final exam	45

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-2	**Chapter 1. Introduction** What is predictive and business analytics What is data mining Big data and Data Science Prediction versus Interpretation Key ingredients of Predictive models Type of Models The process of Predictive modeling	L.O. L.O.	Lecture Class discussion	Homework Quiz
3-6	**Chapter 2. Data exploration and Dimension deduction** 2.1. Uses of data visualization 2.2. Data examples and basic charts 2.3. Multidimensional visualization 2.4. Specialized visualization 2.5. Correlation analysis 2.6. Reducing the Number of Categories in Categorical Variables 2.7. Converting a Categorical Variable to a Numerical Variable 2.8. Principal Components Analysis 2.9. Dimension Reduction Using Regression Models 2.10 Dimension Reduction Using Classification and Regression Trees	L.O. L.O. L.O.	Lecture Class discussion	Homework
7-8	**Chapter 3. Evaluating Predictive Performance** Evaluating Predictive Performance Judging Classifier Performance Judging Ranking Performance Oversampling	L.O. L.O.	Lecture Class discussion	Homework project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
Midterm Examination				**Written exam**
9-10	**Chapter 4. Multiple Linear Regression** 4.1. Explanatory and Predictive 4.2. Modeling Estimating the Regression Equation and Prediction 4.3. Variable Selection in Linear Regression, Reducing the Number of Predictors, How to Reduce the Number of Predictors	L.O. L.O. L.O.	Lecture Class discussion	Homework
11-13	**Chapter 5. Classification Models** 5.1. K-Nearest Neighbors (KNN) 5.2. The Naive Bayes Classifier 5.3. Support Vector Machines 5.4. Logistic regression	L.O. L.O.	Lecture Class discussion	Homework Project
14-15	**Chapter 6. Forecasting time series** 6.1. Handling Time Series 6.2. Regression-Based Forecasting 6.3. Smoothing Methods	L.O. L.O. L.O. L.O.	Lecture Class discussion	Homework
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Ta Quoc Bao
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Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

31.2 SUPPLY CHAIN SECURITY AND RISK MANAGEMENT

1. General Information

- Course Title	
+ Vietnamese:	**Quản lý rủi ro và an toàn chuỗi cung ứng**
+ English:	**Supply Chain Security and Risk Management**
- Course ID:	IS065IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

This course aims to provide students basic understanding of supply chain risk management, from strategic to operations probabilistic modeling and analytics. The course also equips students with tools and techniques to qualify and quantify strategic risk, financial risk, and operational risks.

3. Textbooks and References

Textbooks:

[1] Schlegel, G.L, Trent R.J., Supply Chain Risk Management: An emerging discipline, 1st ed. CRC Press: 2014.

4. Course Objectives

The purpose of this course is to provide students with an understand the complexities and impact of supply chain risk and be able to plan accordingly. By completing this course, students should be able to (1) Implement a robust disaster recovery plan, (2) Utilize relevant technology or software for risk modelling and identification, (3) Recognize, assess and mitigate various types of risk throughout the supply chain, and (4) Prepare in advance for external or political events that may impact supply chain management

Goals	Goal description	Course Learning Outcomes	Competency level

G1	Identify risk types, analyze risk sources and approaches to tackle risks in a supply chain with the support of several risk management frameworks	L.O.1 L.O.2 L.O.3	Knowledge
G2	Apply business and management knowledge to qualify risk impacts in a supply chain	L.O.4	
G3	Apply statistics and stochastic processes to quantify the impacts of risks to business and to the supply chain.	L.O.5 L.O.6	Skill
G4	Work in a team to address real risk-related projects	L.O.7 L.O.8	Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Design Logistics and Supply Chain Management systems	a, b	I,T
L.O.2	Redesin Logistics and Supply Chain Management systems	a, b	I, T
L.O.3	Support to decision making in Logistics and Supply Chain Management	c, h	I, T
L.O.4	Political and health qualities and soft skills Logistics and Supply Chain Management	d, e, f	I, T
L.O.5	Well-disciplined and efficient teamwork skills	e, f	I, T
L.O.6	Well-disciplined and professional communication skills	e, f	I, T, U
L.O.7	Operate Logistics and Supply Chain Management Systems	b, c	I, T, U
L.O.8	Improve Logistics and Supply Chain Management Systems	b, c	I, T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Assignments, quiz and attendance	15
	A1.2Semester projects	20

A2. Midterm assessment	A2.1 Mid-term exam	25
A3. Final assessment	A3.1 Final exam	40

7. Course Outlines

Week	Content	CLOs	Teaching and Learning activities		Assessment Activities
			Lecturer	Student	
1, 2	**Chapter 1:** Supply Chain Risk Management: Setting the stage	L.O.1	- Lecture presentation	- Class discussion - Read book	- Quiz **A1.1**
3	**Chapter 2:** Building the Risk Management Foundation	L.O.1 L.O.2	- Lecture presentation	- Class discussion - Read book	- Quiz **A1.1**
4	**Chapter 3:** Strategic Risk	L.O.1 L.O.2	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
5	**Chapter 4:** Financial Risk	L.O.1 L.O.2	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
6	**Chapter 5:** Operational Risk	L.O.1 L.O.2	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
7	**Review**	L.O.1 L.O.2	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
Midterm exam					**A2**
9	**Chapter 6:** Emerging Risk Management Framework for Success	L.O.1 L.O.2 L.O.3	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.2** **A3.1**
10, 11	**Chapter 7:** Using Probabilistic Models to understand risk	L.O.1 L.O.2 L.O.3	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.2** **A3.1**
12, 13	**Chapter 8:** Emerging Risk Management Tools, Techniques, and Approaches	L.O.1 L.O.2 L.O.3	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.2** **A3.1**
14	**Group presentation & Review**	L.O.5 L.O.6	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.2** **A3.1**
FINAL EXAMINATION					**A3**

8. Course Policy

Class Participation: 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.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Nguyen Van Hop
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Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

31.3 FINANCIAL RISK MANAGEMENT 1

1. General Information

- Course Title	
+ Vietnamese:	Quản trị rủi ro Tài chính 1
+ English:	Financial Risk Management 1
- Course ID:	MAFE308IU
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	MAFE206IU-Probability
- Parallel Course:	None
- Course standing in curriculum:	Year 2

2. Course Description

This course provides students basic concepts, and mathematical tools for quantitative risk management at banking, financial institutions, and insurance. The course focuses mainly on financial market risk, the risk arising from unexpected changes in prices and interest rates. The course also provides toolkits for measuring risk quantifying. Quantitative risk measures, e.g., Value-at-Risk, expected shortfall, interest risk are introduced and studied.

3. Textbooks and References

1. McNeil, Frey and Embrecht, Quantitative Risk Management. Princeton University Press, 2ed, 2015.

2. Peter Christoffersen, Elements of Financial Risk Management. Academic Press, 2003.

3. Fabozzi, F., Bond Markets, Analysis and Strategies, 7th edition, Prentice Hall, 2010.

4. Allan M. Malz, Financial Risk Management: Models, History, and Institutions, Willey, 20011.

5. J. Hull, Risk Management and Financial Institutions, 5th ed, Wiley, 2018.

4. Course Objectives

The purpose of this course is to provide students with an in-depth knowledge of financial risk

management techniques and fixed income securities tools that are mostly used in banking and financial institutions. The course concentrates on learning to build mathematical models aiming to help a bank, insurance and other financial institution from losses, insolvency or uncertainty resulting from market risk and interest risk.

Goals	**Goal description**	**Course Learning Outcomes**	**Competency level**
G1	Provide students with the fundamentals of risk management, and how to distinguish different types of financial risks, fixed income securities and financial institutions risks.	L.O.1 L.O.2	Knowledge
G2	Help students acquire proficiency in measuring risks of single assets, portfolios, and interest rates, and in employing these techniques for hedging.	L.O.3 L.O.4	Skill
G3	Help students gain confidence in assessing risks in financial institutions, its drivers and mitigation techniques. and develop a life-long learning attitude.	L.O.5	Attitude

4. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Analyze the overall process of risk management.	a	I, T
L.O.2	Illustrate general concepts of risk management, distinguish types of financial risks, different types of fixed income securities and different sources of risk faced by financial institutions.	a	I, T
L.O.3	Demonstrate quantitative tools for measuring risks of single assets, portfolios, and interest rates, and learn how to employ these techniques for hedging.	c	T, U
L.O.4	Manipulate Value at Risk and other risk measures for single assets and portfolios. Analyze decompose risk	d	T, U

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	components of the portfolio. Apply analytic tools in pricing bonds and illustrate the effects of interest rate risk		
L.O.5	Organize the processes of conduct risks in financial institutions, its drivers and mitigation techniques. develop a life-long learning attitude	h	T, U

5. Course Assessment

Assessment Component	**Assessment form**	**Percentage %**
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

6. Course Outlines

Week	**Content**	**Learning Outcome**	**Teaching and learning activities**	**Assessment**
1	Introduction to risk management (1)	1,2	Discussion	
2	Introduction to risk management (2) Basic concepts in risk management	1,2	Lectures and exercises	HW1
3	Fundamentals of Probability theory	1,2	Lectures and exercises	exercises

4	Value-at-Risk (1)	1,2,3	Lectures and exercises	HW2
5	Value-at-Risk (2),	1,2,3,4	Lectures and exercises	HW3/Quiz
6	Coherent measures of Risk Expected Shortfall (1)	1,2,3	Lectures and exercises	exercises
7	Expected Shortfall (2)	1,2,3,4	Lectures and exercises	HW4/Group presentation
8	Portfolio Risk: Analytic methods (1)	1,2	Lectures and exercises	Exercises/ HW5
Midterm Exam				Midterm Exam
9	Portfolio Risk: Analytic methods (2)	1,2,3	Lectures and exercises	HW6
10	Risk Budgeting Approach (1)	1,2,3,4	Lectures and exercises	HW7
11	Risk Budgeting Approach (2)	1,2,3,4,5	Lectures and exercises	HW8
12	Fixed Income Securities (1)	1,2	Lectures and exercises	HW9
13	Fixed Income Securities (2)	1,2,3	Lectures and exercises	Quiz/ Group presentation
14	Fixed Income Securities (3)	1,2,3,4,5	Lectures and exercises	HW10/Quiz
15	Course revision	1,2,3,4,5	Lectures and exercises	

Final Exam			Written Exam

7. Course Policy

Class Participation: 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. Students must have more than 50/100 points overall to pass this course.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Tạ Quốc Bảo
- Email: baotq@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024
HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

31.4 ACTUARIAL MATHEMATICS FOR LIFE CONTINGENT

1. General Information

- Course Title	
+ Vietnamese:	**Toán bảo hiểm cho cuộc sống**
+ English:	**Actuarial Mathematics for Life Contingent**
- Course ID:	MAAS326IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	Probability
- Parallel Course:	
- Course standing in curriculum:	Year 3

2. Course Description

Mathematical foundations of actuarial science emphasize probability models for life contingencies as the basis for analyzing life insurance and life annuities and determining premiums

3. Textbooks and References

Textbooks:

[1] D. C. M. Dickson, M. R. Hardy, Howard R. Waters, *Actuarial Mathematics for Life Contingent Risks*, Cambridge University press, Third Edition (2009)

[2] Bowers, Gerber, Hickman, Jones & Nesbitt, *Actuarial Mathematics*, Cambridge University , 2nd Edition (1997)

4. Course Objectives

Student will be able to

a) Identify the future loss random variables associated with whole life, term life, and endowment insurance, and with term and whole life annuities, on single lives.

b) Calculate premiums based on the equivalence principle, the portfolio percentile principle, and for a given expected present value of profit

c) Calculate and interpret gross premium, net premium and modified net premium policy values for the policies.

d) Calculate the effect of changes in underlying assumptions (e.g., mortality and interest).

e) Apply the following methods for modelling extra risk: age rating; constant addition to the force of mortality, constant multiple of the rate of mortality.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Be familiar with basic concept in life insurance	L.O.1	Knowledge
G2	Be able to identify the future loss random variables; to calculate premium and effect of changes in underlying assumptions	L.O.2	Skill
G3	Be able to apply some special methods for modeling extra risk	L.O.3	Knowledge

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Be able to understanding basic concept in life insurance	c	T, U
L.O.2	Be able to identify the future loss random variables; to calculate premium and effect of changes in underlying assumptions	b	T, U
L.O.3	Be able to apply some special methods for modelling extra risk	e	I, U

6. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
	A2.1	*15%*

A2. Midterm assessment	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	Topic	Learning Outcome	Assessments	Learning activities
1	Introduction to life insurance	1, 2	HW1	Lecture, Discussion
2	Survival model		HW2	Lecture, HW
3-4	Life tables and selection		HW3 Quiz1	Lecture, HW Inclass-Quiz
5-6	Insurance Benefit	1, 3	HW4 Quiz2	Lecture, HW Inclass-Quiz
7-8	Annuities	1, 2	HW4 Quiz2	Lecture, HW Inclass-Quiz
9	Midterm			
10 - 11	Premiums Calculation	2, 3	HW5	Lecture, HW Inclass-Quiz
12	Policy value	1,3	HW7	Lecture, HW Inclass-Quiz
13-14	Multiple State Models	1, 2	HW8	Lecture
15-16	Emerging Costs for Traditional Life Insurance	1, 3	HW9	Lecture, HW
17	Final exam			

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view

of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

32. DEEP LEARNING

1. General information

- Course Title	
+ Vietnamese:	Học sâu
+ English:	**Deep Learning**
- Course ID:	IT157IU
- Number of credits:	4
+ Lecture:	4
+ Laboratory:	0

Course designation	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Mai Hoang Bao An
Language	English
Relation to curriculum	Elective (CS, DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	C/C++ Programming Calculus 3 or Linear Algebra
Course objectives	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology. In this course, students will build and train neural network architectures such as Convolutional Neural Networks, Recurrent Neural Networks, Transformers, and learn how to make them better with strategies such as Dropout, BatchNorm, and more. Get ready to master

<table>
<tr><td></td><td>theoretical concepts and their industry applications using Python and PyTorch and tackle real-world cases.</td></tr>
<tr><td>Course learning outcomes</td><td>CLO 1. Understand fundamental concepts of Deep Learning. Get familiar with some popular algorithms used in deep learning models. Understand and be able to use popular libraries such as NumPy, PyTorch.
CLO 2. Neural Networks for regression and classification. The concept of Multilayer Perceptrons. The essential networks: Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN).
CLO 3. Build, train, and deploy different types of Deep Architectures from traditional to modern Architectures.
CLO 4. Understand and be able to apply deep learning techniques to real-world scenarios: Computer Vision, Natural Language Processing.
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO 1, CLO 2, CLO 3, CLO 4</td></tr>
<tr><td>Skill</td><td>CLO 3, CLO 4</td></tr>
<tr><td>Attitude</td><td>CLO 3, CLO 4</td></tr>
</table></td></tr>
<tr><td>Content</td><td>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)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Deep Learning
Some demos on the applications of Deep Learning</td><td>1</td><td>I, U</td></tr>
<tr><td>Linear Classifiers, Optimization and Gradient Descent
Backpropagation Algorithm
Introduction to PyTorch library</td><td>1</td><td>I, T</td></tr>
<tr><td>Linear Neural Networks for Regression
Linear Neural Networks for Classification</td><td>1</td><td>T, U</td></tr>
<tr><td>Multilayer Perceptrons</td><td>1</td><td>T, U</td></tr>
<tr><td>Advances in PyTorch library</td><td>1</td><td>T, U</td></tr>
<tr><td>Convolutional Neural Networks (CNN)</td><td>1</td><td>T, U</td></tr>
<tr><td>Recurrent Neural Networks (RNN)</td><td>1</td><td>T, U</td></tr>
<tr><td>Modern CNN:
- Networks Using Blocks (VGG)
- Multi-Branch Networks (GoogLeNet)
- Residual Neural Network (Resnet)
- MobileNet</td><td>2</td><td>T, U</td></tr>
<tr><td>Modern RNN:
Gated Recurrent Units (GRU)</td><td>2</td><td>T, U</td></tr>
</table></td></tr>
</table>

		Long Short-Term Memory (LSTM) Bidirectional RNN Encoder-Decoder Architecture		
		Optimization Algorithms used in Deep Learning	1	I, T
		Generative Adversarial Network (GAN) & Deep Convolution GAN	1	T, U
		Deep Learning in Computer Vision	1	T, U
		Deep Learning in Natural Language Processing	1	T, U
Examination forms	Short-answer questions, Long-answer questions, programming 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] Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, The MIT Press 2021, ISBN: 978-0262035613. [2] Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola., Dive Into Deep Learning.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-8) is shown in the following table:

	a	b	c	d	e	f	g	h
1	x							
2		x	x					
3			x	x		x		
4				x		x		

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Deep Learning Some demos on the applications of Deep Learning	1		Lecture, Discussion	[1, 2] Chapter 1
2	Linear Classifiers, Optimization and Gradient Descent Backpropagation Algorithm Introduction to PyTorch library	1	Exercises	Lecture, In-class exercises	[1, 2] Chapter 2

3	Linear Neural Networks for Regression Linear Neural Networks for Classification	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 3, 4
4	Multilayer Perceptrons	2	Exercises	Lecture, In-class exercises	[2] Chapter 5
5	Advances in PyTorch library	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 6
6	Convolutional Neural Networks (CNN)	2	Exercises	Lecture, In-class exercises	[2] Chapter 7
7	Recurrent Neural Networks (RNN)	2	Quiz	Lecture, In-class quiz	[2] Chapter 9
8-9	Modern CNN: - Networks Using Blocks (VGG) - Multi-Branch Networks (GoogLeNet) - Residual Neural Network (Resnet) - MobileNet	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 8
10	**Midterm**				
11-12	Modern RNN: Gated Recurrent Units (GRU) Long Short-Term Memory (LSTM) Bidirectional RNN Encoder-Decoder Architecture	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 10
13	Optimization Algorithms used in Deep Learning	1, 4	Seminar	Lecture, Discussion	[2] Chapter 12
14	Generative Adversarial Network (GAN) & Deep Convolution GAN	3, 4	Seminar	Lecture, Discussion	[2] Chapter 18
15	Deep Learning in Computer Vision	4	Seminar	Lecture, Student presentaion	[2] Chapter 14
16	Deep Learning in Natural Language Processing	4	Seminar	Lecture, Student presentaion	[2] Chapter 15
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Quiz (5%)	10%		20%	20%

Labs (10%)	30%	30%		
Midterm examination (30%)	50%	40%		
Projects/Presentations/ Report (15%)	10%		30%	30%
Final examination (40%)		30%	50%	50%

5. Rubrics (optional)

5.1. 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		

5.2. 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.

5.3. 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 *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

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.
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: February 15, 2022

33. BAYESIAN STATISTICS

General Information

Course Title	
Vietnamese:	**Thống kê Bayes**
English:	**Bayesian statistics**
Course ID:	MAAS410IU
Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Probability, Statistics
Parallel Course:	None
Course standing in curriculum:	Year 4

Course Description

This course provides students an introduction to Bayesian statistical inference, adressing both fundamental and practical aspects of Bayesian methods. Specific problems in economics and business will be considered. The students will start by understanding the difference between classical and Bayesian methods, the treatment of simple models. Topics include: Bayes rule, Bayesian inference for single and multi-parameters models, hierchachical models, hypothesis testing, linear regression and Bayesian computation methods (Markov Chain Monte Carlo, Metropolis-Hastings, and Gibbs Sampling).

Textbooks and References

Textbooks:

Hoff, Peter D. (2009). *A first course in Bayesian statistical methods*. New York: Springer.
Gelman, A., Carlin, J., Stern, H., Dunson, D. B., Vehtari, A. and Rubin, D. (2013). *Bayesian Data Analysis (3rd edition)*. CRC Press.
Marin, J-M and Robert, C. (2014). *Bayesian Essentials with R (2nd edition)*. Springer.

Course Objectives

The purpose of this course is to provide students with an in-dept knowledge in applying Bayesian inferential techniques and building models for data. The course also focuses on some applications of Bayesian inference to real problems in economics and business.

Goals	Goal description	Course Learning Outcomes	Competency level

G1	Provide students knowledge of conjugate and non informative priors, posteriors distributions, simple, multiple-parameter models of Bayesian inference.	L.O.1	Knowledge
G2	Provide students knowledge of hierarchical models, Bayesian credible interval and hypothesis testing, linear regression models.	L.O.2	Knowledge
G3	Introduce students how to make inference regarding to Bayesian models and models comparisons.	L.O.1, L.O.2, L.O.4	Skill
G4	Introduce students how to implement Bayesian computational methods.	L.O.3, L.O.4	Skill
G5	Help students how to apply the above knowledge and tools of Bayesian statistical inference to the real-world problems. Be able to interpret the results in practical problems.	L.O.5	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify the essenstial difference between classical and Bayesian methods, formulate simple, multi-parameters.	a	I, T
L.O.2	Be able to derive prior distributions, including non informative priors, carry out Bayesian credible interval and hypothesis testing, linear regression models and interpret the results.	a, b	I, T, U
L.O.3	Implement simualtion and computational methdos, including MCMC, Gibbs and Metropolis-Hasting algorithms.	a, b	I, T, U
L.O.4	Be able to evaluate the adequacy of the dervied models.	d	T, U

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.5	Articulate the applicability of Bayesian statistical inference and use R or Python programing for analyzing to the real dataset and interprete empirical results. Develop a life-long learning attitude	d, e	I, T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitute	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	**Chapter 1. Introduction to Bayesian Statistical Inference**	L.O.1	Lecture Class discussion	Homework Quiz
2-3	**Chapter 2. Single and Multi-parameter Models**	L.O.1, L.O.2	Lecture Class discussion	Homework Quiz
4-5	**Chapter 3. Introduction to Bayesian Computation**	L.O.3	Lecture Class discussion	Homework
6	**Chapter 4. The Gaussian Model**	L.O.1, L.O.2, L.O.3	Lecture Class discussion	Homework
7-8	**Chapter 5. Markov chain Monte – Carlo Methods**	L.O.1, L.O.2, L.O.3	Lecture Class discussion	Homework Project
Midterm Examination				**Written exam**
9-10	**Chapter 6. Hierarchical Models**	L.O.1,	Lecture	Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
		L.O.2, L.O.3	Class discussion	
11-12	**Chapter 7. Bayesian Regression**	L.O.1, L.O.2, L.O.3, L.O.4	Lecture Class discussion	Homework Quiz Project
13-14	**Chapter 8. Bayesian Credible Interval and Hypothesis Testing**	L.O.1, L.O.2, L.O.3, L.O.4	Lecture Class discussion	Homework Quiz Project
15	**Chapter 9. Application. Examples from economics, business, and other fields.**	L.O.1, L.O.2, L.O.3, L.O.4, L.O.5	Class discussion	Project
Final examination				**Written exam**

Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610

- Course Coordinator/ Lecturers: Dr. Ta Quoc Bao, and Dr. Hoang Van Ha
- Email: baotq@hcmiu.edu.vn;
  hvha@hcmus.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

34. MAAS ELECTIVE #3

34.1 STATISTICAL MODELS FOR ACTUARIAL SCIENCE

1. General Information

- Course Title	
+ Vietnamese:	**Mô hình thống kê cho khoa học bảo hiểm**
+ English:	**Statistical Models for Actuarial Science**
- Course ID:	MAAS411IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	Regression Methods
- Parallel Course:	
- Course standing in curriculum:	Year 4

2. Course Description

This course aims to present theoretical and conceptual framework for statistical modelling such as generalized linear models, non – linear models, Poisson regression … with applications in actuary science.

3. Textbooks and References

Textbooks:

[1] J. Dobson, *Introduction to Generalized Linear Models*. Chapman and Hall/CRC Press. 2001..
[2] E. Ohlsson and B. Johansson. *Non-life Insurance Pricing with Generalized Linear Models.* Springer, EEA Series Textbook. 2010.

[3] P. de Jong and G.Z. Heller, *Generalized Linear Models for Insurance Data*. Cambridge University Press. 200
[4] Arthur Charpentier, *Computational Actuarial Science with R*, CRC Press, 2015

Course Objectives

Goals	Goal description	Course Learning Outcomes	Competency level
G1	be able to specify and estimate statistical models for different kind of data	L.O.1	Knowledge
G2	be able to choose the most appropriate statistical model for a specific problem, estimate the parameters and make inference	L.O.2	Skill
G3	be able to use statistical software designed for actuarial models.	L.O.3	

4. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	be able to specify and estimate statistical models for different kind of data	e	T, U
L.O.2	be able to choose the most appropriate statistical model for a specific problem, estimate the parameters and make inference	f	T, U
L.O.3	be able to use statistical software designed for actuarial models.	b	I, U

5. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*

	A3.2	*25%*

6. Course Outlines

Theory

Week	Topic	Learning Outcomes	Assessments	Learning activities
1	Non – life Insurance Pricing	1, 2	HW	Lecture, Discussion
2	Generalized Linear Model (GLM)			
3	Basics of Pricing with GLM			
4-5	Estimation of the Generalized Linear Model	1, 3	HW	Lecture, Discussion HW
6-7	Hypothesis Testing, Model and Variable Selection. Interactions	1, 2	HW Quiz	Lecture, HW Inclass-Quiz
8	Nonlinear Model	2, 3	HW	Lecture, Discussion, HW
9	Midterm			
10-12	Count Data, Poisson Regression and Log – linear Models	1, 2	HW Quiz	Lecture, Discussion
13-14	Survival Analysis	1, 3	HW	Lecture, Discussion HW
15-16	Clustering and Longitudinal Data	2, 3	HW	Lecture, Discussion, HW
17	Final exam			

7. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated.

Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

8. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

34.2 STATISTICAL METHODS FOR FINANCE

General Information

Course Title	
Vietnamese:	**Phương pháp Thống kê trong Tài chính**
English:	**Statistical Methods for Finance**
Course ID:	MAAS412IU
Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Probability, Statistics, Stochastic modeling
Parallel Course:	None
Course standing in curriculum:	Year 3

Course Description

The course is designed for students with emphasizing the understanding of significant quantitative methods and statistical techniques for finance and economics. Furthermore, the course also provides the uses of R or Python programming in the financial analysis of financial data.

Textbooks and References

Textbooks:

E. Lindstrom, H. Madsen, and J.N. Nielsen (2015). Statistics for Finance. Taylor and Francis.
J. Franke, W. K. Hardle, and C.M. Hafner (2019). Statistics of Financial Markets. 5th ed. Springer
J. Danielsson (2011). Financial Risk Forecasting. Wiley

Course Objectives

The course is devoted to statistical methods for financial markets. Upon completion of the course, students are expected to understand the underlying theory of important statistical methods used in financial data analysis. Students are also able to utilize statistical programming to analyze financial datasets, interpret empirical results, and make forecasts.

Goals	Goal description	Course Learning Outcomes	Competency level

G1	Students are able to manage important models and techniques focused on finance and economics.	L.O.1	Knowledge
G2	Students are able to work with various types of statistical models for finance and economics, able to create graphs of data and present empirical results with R or Python programming, and use performance measures to evaluate the effectiveness of statistical models	L.O.2 L.O.3	Skill
G3	Students are able to utilize statistical models to modeling financial problems. Furthermore, students will be able to effectively communicate the results of applying statistical methods to solve a financial problem.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Demonstrate an understanding of statistical inferential procedures in analyzing financial and economic data	a	I,T
L.O.2	Formulate models to solve some empirical financial and economic problems, also actuarial problems	c	I, T,U
L.O.3	Utilize appropriate statistical methods, techniques and statistical computing programs to understand relationships between variables used in finance and economics.	d	I, T, U
L.O.4	Demonstrate an understanding of the power and limitations of applied statistical analysis for financial engineering, economics, and business. Demonstrate comprehensive knowledge beyond the content in the syllabus from a personal exploration of the subject. Develop a life-long learning attitude	f, g, h	T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5

A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-3	**Chapter 1. Stock prices and Rates of Return** Introduction Rates of return Ratios of Mean and Standard deviation Distributions for RORs Review of Covariance and Correlation Stylized facts	L.O.1	Lecture Class discussion	Homework Quiz
4-5	**Chapter 2. Discrete-time finance** 2.1. Fundamentals 2.2. The binomial one-period model 2.3. Multiperiod model	L.O.1 L.O.2	Lecture Class discussion	Homework
6-7	**Chapter 3. Linear time series models** Linear system in time domain Linear Stochastic processes Linear processes with rational transfer function Prediction in linear processes	L.O.2	Lecture Class discussion	Homework project
Midterm Examination				**Written exam**
8-10	**Chapter 4. Nonlinear time series models** 4.1. Aim of model building 4.2. Parameter estimation 4.3. Parametric models 4.4. Models with conditional heteroskedasticity 4.5. Model identification 4.6 Prediction in nonlinear models	L.O.3 L.O.4	Lecture Class discussion	Homework Quiz
11-13	**Chapter 5. Multivariate volatility models** 5.1. Multivariate volatility forecasting 5.2. EWMA 5.3. Orthogonal GARCH	L.O.3 L.O.4	Lecture Class discussion	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	5.4. CCC and DCC model 5.5. Estimation comparison 5.6. Multivariate extensions of GARCH			
14-15	**Chapter 6. Kernel estimators in time series analysis** 6.1. Non-parametric estimation 6.2. Kernel estimators for time series 6.3. Kernel estimation for regression 6.4. Applications of kernel estimators	L.O.1 L.O.2 L.O.3 L.O.4	Lecture Class discussion	Homework
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Ta Quoc Bao
- Email: baotq@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

34.3 DATA MINING IN SUPPLY CHAIN

1. General Information

- Course Title	
+ Vietnamese:	**Khai thác dữ liệu trong chuỗi cung ứng**
+ English:	**Data Mining in Supply Chain**
- Course ID:	IS066IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	None
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

An overview of business intelligence in the field of supply chain management and marketing. Addresses how to leverage business intelligence systems to define KPIs, sharpen the accuracy of forecasting and planning, track business activities, and deliver dashboards, scorecards, strategic reporting, and operational/real-time reporting to enhance decision making for supply chain and marketing. SAP business intelligence solution is introduced to illustrate the concepts.

3. Textbooks and References

Textbooks:

1. "Data Mining: Concepts and Techniques, 3rd Edition", Jiawei Han; Micheline Kamber; Jian Pei, Morgan Kaufmann

4. Course Objectives

Upon successful completion of this course, students will be able to (1) Articulate the philosophy and approach in data-driven Supply Chain Management, (2) Understand the important role of change management, develop key skills to implement new business solutions and processes, (3) Explain the key principles of Supply Chain Planning, and a typical end-to-end planning process flow, and (4) Evaluate a variety of business constraints and inputs in Supply Planning

Goals	Goal description	Course Learning Outcomes	Competency level

G1	Understand major principles and concepts of data mining	L.O.1 L.O.2	Knowledge
G2	Select and apply data mining algorithms to build analytical applications	L.O.3 L.O.4	Skill

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Understand the need for data mining in business contexts.	a	I,T
L.O.2	Understand fundamental concepts of ML/DM	a	T
L.O.3	Select and apply data mining algorithms to build analytical applications	c	T
L.O.4	Evaluate models and algorithms w.r.t their accuracy	c, g	T

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Quiz	15
	A1.2 Homework	15
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	40

7. Course Outlines

Week	Content	Learning Outcome	Teaching and Learning activities		Assessment Activities
			Lecturer	Student	
1	Introduction to DataMining	L.O.1	- Lecture presentation	- Group forming. - Class discussion - Read book	- Quiz **A1.1**
2	Data preprocessing	L.O.1	- Lecture presentation	- Class discussion - Read book	- Quiz **A1.1** - Homework **A1.2**

3	Data Warehousing and Online Analytical Processing	L.O.1	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
4&5	Data Cube Technology	L.O.1	- Lecture presentation	- Class discussion - Read book	- Homework **A1.2**
6 & 7	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods	L.O.3	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
8	Review for Midterm	L.O.1 L.O.2 L.O.3	- Problems solving	- Class discussion	- Quiz /HW **A1.1, A1.2**
Midterm exam					**A2**
9 & 10	Developing Business Intelligence and Market Intelligence	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
11&12	Supply Market Intelligence	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
13	Developing Sourcing Strategy	L.O.2 L.O.4	- Lecture presentation	- Class discussion - Read book	- Quiz /HW **A1.1, A1.2**
14	Benchmarking	L.O.2 L.O.4	- Lecture presentation	- Class discussion	- Quiz /HW **A1.1, A1.2**
15	Review	L.O.2 L.O.3 L.O.4	- Problems solving	- Class discussion	- Quiz /HW **A1.1, A1.2**
FINAL EXAMINATION					**A3**

8. Course Policy

Class Participation: 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.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified

causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dao Vu Truong Son
- Email: dvtson@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

35. MAAS ELECTIVE #4

35.1 OPTIMIZATION 2

1. General Information

- Course Title	
+ Vietnamese:	**Tối ưu 2**
+ English:	**Decision making**
- Course ID:	**MAFE307IU**
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory (exercises):	0
- Pre-courses:	Probability, Optimization 1
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

Following Optimization 1, this course mainly aims to supply students with higher level knowledge of optimization. Topics include applications of linear programming in management such as network flow problems, transportation problems, multi-objective linear programming problems. Some optimization models in finance are also studied.

3. Textbooks and References

1. F.S. Hillier, G.J. Lieberman, Introduction to Operations Research, 10th Edition, McGraw-Hill, 2015.

2. H.A. Taha, Operations research: An introduction (Eight Edition), Pearson Prentice Hall, 2007.

3. M. Sakawa, H. Yani, I. Nishizaki, Linear and multiobjective programming with fuzzy stochastic extension. Springer, New York, 2013

4. D. T. Luc, Multiobjective linear programming - An Introduction. Springer, 2016.

5. G. Cornuejols, R. Tutuncu, Optimization Methods in Finance, Cambridge University Press,

2007

4. Course Objectives

To provide the students with the main ideas and techniques of Applied Linear programming and basic knowledge of multi-objective linear programming.

To develop skills in mathematical modeling and problem solving. To provide an understanding of the practical meaning and applications of these ideas and techniques, through practical examples drawn from many areas of engineering, life sciences, management, and finance.

To develop abilities to think reasonably, of realizing new problems/questions and answer/solve/prove them under some new conditions arising in practice.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with basic knowledge of vector functions, functions of several variables, partial derivatives and multiple integrals	L.O.1 L.O.2	Knowledge
G2	Introduce students to solving optimal problems using partial derivatives and evaluating lengths, areas and volumes.	L.O.3 L.O.4	Skill
G3	Help students to be confident and efficient when dealing with derivatives and integrals of vector functions and functions of several variables.	L.O.5	Attitude

4. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Illustrate the ability to establish mathematical models and solution methods of network flow problems, transportation problems.	a, b	I, T
L.O.2	Evaluate models of linear multi-objective	a, b	I, T

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	problems, solution methods (graphical solution method, scalarization methods) with applications in finance, management.		
L.O.3	Build mathematical models of network problems and multi-objective linear problems from real-world problems, not in textbooks and probably not in the same conditions…. and modifying/judging the known algorithms to solve these problems.	c	T, U
L.O.4	Construct the ability to realize "problems" arising when applying the knowledge (from lecture notes/textbook) and also the ability to think reasonably and to find the way to solve.	e	T, U
L.O.5	Demonstrate independent thinking, required for independent research, on some content in the uncertain real world, beyond the confines of the textbook, through projects, presentations, seminars, assignments, and exercises. Develop a life-long learning attitude	e	T, U

5. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

6. Course Outlines

Week	Content	Learning	Teaching	Assessment

		Outcome	learning activiti	
1	Network flow problems	1,2	Lecture	
2	Networks and terminologie networks: Trees, cycles, spar trees	1,2	Lectures, Exercise	
3	Reduced cost, Network simplex method	1,2, 4, 5	Lectures, exercise	Quiz 1
4	Maximum flow problem, Seminar 1	1,2, 3	Lectrue,discussio presentation	Assignment 1 Presentation
5	Transportation problems: Statement of the transportation problem, Properties of transportation problems	1,2,3, 4	Lectures, exercise	
6	Properties of transportation problems, Initial BF solutions for transportation problems	1,2,3	Lecture, exercises	Quiz 2
7	Streamlined simplex method	1,2,3	Lectures, exercise	Quiz 3
8	Assignment problems Seminar 2	1,2,4	Lectures,presenta discussion	Assignment 2 presentation
Midterm Exam				Midterm Exam
9	Multi-objective linear problems	1,2,4	Lectures,exercise	Presentation (cont'd)
10	Problem formulation, solution concepts	4, 5	Lecture, presenta and discussion	Quiz 4
11	Graphical solution methods	3, 4,5	Lecture, Exercise	

12	**Scalarization methods** **Seminar 3**	**4,5**	**Lecture, Presenta** **Discussion**	**Assignment 3** **Presentation**
13	**Some optimization models in finance**	**3,5**	**Presentation,** **Discussion,** **Revision**	**Quiz 5**
14	**Some optimization models in fina** **Seminar 4**	**3, 5**	**Lecture**	**Assignment 4** **Presentation**
15	**Project presentations.** **Exercises. Revisions.**	**1,2,3,4,5**	**Lecture**	**Project presentation**
Final Exam				**Written Exam**

7. Course Policy

Class Participation: 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. Students must have more than 50/100 points overall to pass this course.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Prof. Dr. Sc. Nguyen Dinh
- Email: ndinh@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024
HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

35.2 SURVEY SAMPLING

General Information

Course Title	
Vietnamese:	**Phương pháp lấy mẫu điều tra**
English:	**Survey Sampling**
Course ID:	MAAS414IU
Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☒ Specialization (**elective**) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Statistics
Parallel Course:	None
Course standing in the curriculum:	Year 4

Course Description

The aim of this course is to provide students the methods and sampling techniques to the practical aspects of survey problems. The course begins with brief chapters on the role of sample surveys in the modern world. Thereafter, each chapter introduces a sample survey design or estimation procedure followed by describing the pertinent practical problem. The course provides the methodology proposed for solving the problem is described, followed by details of the estimation procedure, including a compact presentation of the formulas needed to complete the analysis. Many practical examples are worked out in complete detail.

Textbooks and References

Textbooks:

[1] Elementary Survey Sampling, Richard L. Scheaffer, Cengage Learning; 7th edition (2011).

[2] Sampling: Design and Analysis, Sharon L. Lohr, Chapman & Hall/CRC Texts in Statistical Science, 3rd Edition (2021).

Course Objectives

On completion of the course, students should be able to design and to analyze the sample surveys via a practical, engaging approach. They can comprehend the important role that sample surveys play in the modern world. They are able evaluate the methodology needed for solving the problem and provide the details of the estimation procedure using a compact presentation of the necessary formulas. Students can work out the practical example in full detail. Students are able to demonstrate the simulations for properties of estimators.

Goals	Goal description	Course Learning Outcomes		Competency level
G1	Provide students with the fundamental methods for the survey sampling in the modern world. Describe the methodology needed for solving the problem and provide the details of the estimation procedure using a compact presentation of the necessary formulas	L.O.1 L.O.2		Knowledge
G2	Be able to design and to analyze the sample surveys via a practical, engaging approach.	L.O.3		Skill
G3	Be able to develop lifelong learning and further applications of survey sampling in industry	L.O.4		Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Provide students with the fundamental methods for the survey sampling in the modern world.	a	I,T
L.O.2	Evaluate the methodology needed for solving the problem and provide the details of the estimation procedure using a compact presentation of the necessary formulas	c	T, U
L.O.3	Be able to design and to analyze the sample surveys via a practical, engaging approach.	b	T, U
L.O.4	Be able to develop lifelong learning and further applications of survey sampling in industry	d, h	T, U

Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude, Quizzes	10
	A1.2 Homework	10
	A1.3 Project	10
A2. Midterm assessment	A2 Mid-term exam	30

A3. Final assessment	A3 Final exam	40

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-2	**Chapter 1** Introduction to Survey Sampling **Chapter 2. Elements of the Sampling Problem** 2.1 Technical Terms 2.2 How to Select the Sample: Design of the Sample Survey 2.3 Sources of Errors in Surveys 2.4 Designing a Questionnaire 2.5 Planning a Survey 2.6 Critical Thinking with Real Data	L.O.1 L.O.2	Lecture Class discussion	Homework Quiz
3-4	**Chapter 3 Some Basic Concepts of Statistics** 3.1 Introduction 3.2 Summarizing Information in Populations and Samples: The Infinite Population Case 3.3 Summarizing Information in Populations and Samples: The Finite Population Case 3.4 Sampling Distributions 3.5 Covariance and Correlation 3.6 Estimation	L.O.1 L.O.2	Lecture Class discussion	Homework, Quiz
5-6	**Chapter 4 Simple Random Sampling** 4.1 How to Draw a Simple Random Sample 4.2 Estimation of a Population Mean and Total 4.3 Selecting the Sample Size for 4.4 Estimating Population Means and Totals 4.5 Estimation of a Population Proportion 4.6 Comparing Estimates 4.7 Sampling from Real Populations	L.O.1 L.O.2	Lecture Class discussion	Homework, Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
7-8	**Chapter 5 Stratified Random Sampling** 5.1 Introduction 5.2 How to Draw a Stratified Random Sample 5.3 Estimation of a Population Mean and Total 5.4 Selecting the Sample Size for Estimating Population Means and Totals 5.5 Allocation of the Sample 5.6 Estimation of a Population Proportion 5.7 Selecting the Sample Size and Allocating the Sample to Estimate Proportions 5.8 Additional Comments on Stratified Sampling 5.9 An Optimal Rule for Choosing Strata 5.10 Stratification after Selection of the Sample 5.11 Double Sampling for Stratification	L.O.2 L.O.3	Lecture Class discussion	Homework, Quiz
Midterm Examination				**Written exam**
9-10	**Chapter 6 Ratio, Regression, and Difference Estimation** 6.1 Introduction 6.2 Surveys that Require the Use of Ratio Estimators 6.3 Ratio Estimation Using Simple Random Sampling 6.4 Selecting the Sample Size 6.5 Ratio Estimation in Stratified Random Sampling 6.6 Regression Estimation 6.7 Difference Estimation 6.8 Relative Efficiency of Estimators	L.O.1 L.O.2 L.O.3	Lecture	Homework Quiz, Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
11	**Chapter 7. Systematic Sampling** 7.1 Introduction 7.2 How to Draw a Systematic Sample 7.3 Estimation of a Population Mean and Total 7.4 Estimation of a Population Proportion 7.5 Selecting the Sample Size 7.6 Repeated Systematic Sampling 7.7 Further Discussion of Variance Estimators	L.O.2 L.O.3	Lecture	Homework Quiz, Project
12-13	**Chapter 8 Cluster Sampling** 8.1 Introduction 8.2 How to Draw a Cluster Sample 8.3 Estimation of a Population Mean and Total 8.4 Equal Cluster Sizes: Comparison to Simple Random Sampling 8.5 Selecting the Sample Size for Estimating Population Means and Totals 8.6 Estimation of a Population Proportion 8.7 Selecting the Sample Size for Estimating Proportions 8.8 Cluster Sampling Combined with Stratification 8.9 Cluster Sampling with Probabilities Proportional	L.O.3 L.O.4	Lecture	Homework Quiz, Project
14	**Chapter 9 Two-Stage Cluster Sampling** 9.1 Introduction 9.2 How to Draw a Two-Stage Cluster Sample 9.3 Unbiased Estimation of a Population Mean and Total 9.4 Ratio Estimation of a Population Mean 9.5 Estimation of a Population Proportion 9.6 Two-Stage Cluster Sampling with Probabilities Proportional to Size	L.O.3 L.O.4	Lecture	Homework Quiz, Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
15	**Chapter 10 Estimating the Population Size** Estimation of a Population Size Using Direct Sampling Estimation of a Population Size Using Inverse Sampling **Review**	L.O.3 L.O.4	Lecture	Homework Quiz, Project
Final examination				**Written exam**

Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

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Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Nguyen Minh Quan
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Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

35.3 APPLIED PROBABILITY MODELS IN ACTUARIAL SCIENCE

1. General Information

- Course Title	
+ Vietnamese:	**Mô hình xác suất ứng dụng trong khoa học Bảo hiểm**
+ English:	**Applied Probability Models in Actuarial Science**
- Course ID:	MAAS415IU
- Course type ☐ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☒ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	Probability, Statistics
- Parallel Course:	
- Course standing in curriculum:	Year 4

2. Course Description

This course focus on applications of probability model for property and casualty insurance. First the course introduces some useful and severity models. Then the course helps students to understand the steps involved in the modelling process and how to carry out these steps in solving business problems.

3. Textbooks and References

Textbooks:

[1] Klugman, S.A., Panjer, H.H. and Willmot, G.E. *Loss Models: From Data to Decisions*, Wiley, 5th Edition, 2019.

[2] Brown, R. L. and Lennox ,W. S. *Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance*, Actex Publication, 4th Edition, 2015

4. Course Objectives

Students will be introduced to useful frequency and severity models. Students will be required to understand the steps involved in the modeling process and how to carry out these steps in solving business problems. Students should be able to:

1) analyze data from an application in a business context;

2) determine a suitable model including parameter values; and

3) provide measures of confidence for decisions based upon the model.

4) Use a variety of tools for the calibration and evaluation of the models.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Be familiar with survival, severity, frequency, and aggregate models.	L.O.1	Knowledge
G2	Be able to use statistical methods to estimate parameters of such models given sample data.	L.O.2	Knowledge
G3	Be able to identify steps in the modeling process, understand the underlying assumptions implicit in each family of models, recognize which assumptions are applicable in a given business application, and appropriately adjust the models for impact of insurance coverage modifications	L.O.3	Knowledge

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Be familiar with survival, severity, frequency, and aggregate models.	a	T, U
L.O.2	Be able to use statistical methods to estimate parameters of such models given sample data.	c	T, U
L.O.3	Be able to identify steps in the modeling process, understand the underlying assumptions implicit in each family of models, recognize which assumptions are applicable in a given business application, and appropriately adjust the models for impact of insurance coverage modifications	e	I, U

6. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*

A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	Topic	Learning Outcomes	Assessments	Learning activities
1	Review Random variables	1, 2	HW1	Lecture, Discussion
2	Basic Distributional Quantiles	1, 3	HW2	Lecture, HW
3	Characteristics of Actuarial Models	1, 2	HW3 Quiz1	Lecture, HW Inclass-Quiz
4	Frequency and Severity with Coverage Modifications	1, 3	HW5 Quiz2	Lecture, HW Inclass-Quiz
5 – 6	Aggregate Loss Models	1, 3	HW6	Lecture, HW
7-8	Construction of Empirical Models	2, 3	Quiz 3	Lecture, HW
9	Midterm			
10-11	Model selection	2, 3	HW8	Lecture, HW Inclass-Quiz
12-13	Coverages	1, 2		Lecture
14-15	Loss Reverting	1, 3	HW9	Lecture, HW
16	Ratemaking	2, 3	HW11	Lecture, HW, Inclass-Quiz
17	Final exam			

8. Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if

students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Pham Hai Ha
- Email: phha@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

36. OPTIMIZATION 1

1. General Information

- Course Title	
+ Vietnamese:	**Tối ưu hóa 1**
+ English:	**Optimization 1**
- Course ID:	**MAFE303IU**
- Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	4
+ Lecture:	4
+ Laboratory (exercises):	1
- Pre-courses:	Analysis 3, Linear Algebra
- Parallel Course:	None
- Course standing in curriculum:	Year 3

2. Course Description

This is the first course on optimization for students of Financial Engineering and Risk management and Applied statistics. The course includes:

- Elements of convex analysis
- Linear programming problems: LP models from real problems (especially, problems from finance), properties of LP, simplex method, duality.
- Nonlinear programming, unconstrained problems: Karush-Kuhn-Tucker conditions, convex problems, some solution methods (steepest descent method, Newton's method, conjugate direction method, Quasi-Newton Methods).
- Nonlinear programming, constrained problems: Karush-Kuhn-Tucker conditions, some solution methods (gradient projection method, penalty methods, barrier methods, dual methods).
- Models in finance and risk management.

3. Textbooks and References

Main textbooks

1. D. G. Luenberger, Y. Ye, *Linear and Nonlinear Programming*, 4th edition, Springer, 2016
2. R. W. Cottle, M. N. Thapa, *Linear and Nonlinear Optimization*, Springer, 2017

Other reference:

3. G. Cornuejols, R. Tutuncu, *Optimization Methods in Finance*, 2nd edition, Cambridge University Press, 2018

4. Course Objectives

The course will help students master the following topics:

- Basic theory of linear programming (LP) and simplex method for solving LP problems.
- Theory of nonlinear programming together with some important solution methods.
- Some applications to risk management and to finance.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Provide students with basic knowledge of linear programming problems and some nonlinear class of problems: Theory and solution methods	L.O.1	Knowledge
G2	How to model a real problem as a linear programming problem, or a nonlinear problem with or without constraints. Practice first and/or second order optimality conditions, strong duality, numerical methods (Newton/quasi-Newton methods), and penalty methods, barrier methods for problems with constraints. Volatility estimation.	L.O.2 L.O.3	Skill
G3	Help students how to apply the above knowledge and tools of optimization to some problems in risk management and finance.	L.O.4	Skill Attitude

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify different types of optimization problems, linear and nonlinear problems. Theory of linear / nonlinear programming problems: first/second optimality condition, duality theory.	a	I, T
L.O.2	Solution methods: simplex methods, Newton's method, quasi-Newton's method, method of steepest descent, penalty method, barrier method, …	a, b	T, U
L.O.3	Able to apply linear/non-linear programs in management and finance	c	U
L.O.4	Able to modify the models and solution methods to solve real problems with mathematical models being not exact the same as the ones in the course.	e, f, h	T, U

6. Course Assessment

Assessment Component	Assessment form	Percentage %
A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Home work	10
	A1.3 Quizzes, projects	
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

7. Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-3	**Chapter 1. Basic properties of linear programming** 1.1. Convex Sets. Extreme Points 1.2. Hyperplanes and Separation 1.3. Examples of Linear Programming Problems. Basic solutions 1.4. The Fundamental Theorem of Linear Programming. Relations to Convexity 1.5. LP models: asset/liability cash-flow matching	L.O.1	Lecture Class discussion	Homework Quiz
4-6	**Chapter 2. The Simplex Method** 2.1 Pivots. 2.2 Adjacent Extreme Points.	L.O.2 L.O.3	Lecture Class discussion	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	Determining a Minimum Feasible Solution 2.3 Computational Procedure—Simplex Method 2.4 Artificial Variables Dual Linear Programming. The Dual Theorem	L.O.4		
7-8	**Chapter 3. Unconstrained Minimization** 3.1 First-Order Necessary Conditions for Unconstrained Problems 3.2 Second-Order Conditions for Unconstrained Problems 3.3 Convex and Concave Functions 3.4 The Method of Steepest Descent 3.5 Newton's Method	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
Midterm Examination				**Written exam**
9	**Chapter 3. Unconstrained Minimization (cont'd)** 3.6 Conjugate Direction Methods 3.7 Quasi-Newton Methods		Lecture Class discussion	Homework
10-15	**Chapter 4. Constrained Minimization** 4.1 Constraints 4.2 First-Order Necessary Conditions for Constrained Problems 4.3 Second-Order Conditions for Constrained Problems 4.4 Inequality Constraints 4.5 Penalty Methods 4.6 Barrier Methods 4.7 Lagrangian Duality 4.8 NLP Models: Volatility Estimation	L.O.1 L.O.3 L.O.4	Class discussion	Homework Project
Final examination				**Written exam**

8. Course Policy

Class Participation: Student is expected that you will spend at least **12 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular

attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Assoc. Prof. Nguyen Ngoc Hai
- Email: nnhai@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

37. MULTIVARIATE STATISTICAL ANALYSIS

General Information

Course Title	
Vietnamese:	**Phân tích thống kê nhiều chiều**
English:	**Multivariate Statistical Analysis**
Course ID:	MAAS413IU
Course type ☐ General ☒ Specialization (required) ☐ Project/ Internship/ Thesis	 ☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	Regression models, Machine learning
Parallel Course:	None
Course standing in the curriculum:	Year 3

Course Description

The course is designed to provide students with comprehensive methods used in multivariate statistical analysis. Topics introduced and applied include reviewing matrix Algebra, descriptive techniques, multivariate distributions, theory of estimate and testing hypothesis, principle component analysis, especially, Copula theory, and some applications in finance.

Textbooks and References

Textbooks:

W. K. Härdle, L. Simar (2019). Applied Multivariate Statistical Analysis. 5th ed, Springer
R. Johnson, D. W. Wichern (2014). Applied Multivariate Statistical Analysis. 6th ed, Pearson
Bryan F.J. Manly (2014). Multivariate Statistical Methods. 3rd ed, Taylor and Francis

Course Objectives

The course is devoted to multivariate statistical analysis. Upon completion of the course, students are expected to understand the underlying theory of multivariate statistical methods. Students are also able to utilize techniques in multivariate statistical analysis in business analytics and data science.

Goals	Goal description	Course Learning Outcomes	Competency level
G1	Identify descriptive methods used in multivariate statistical analysis	L.O.1	Knowledge
G2	Students are able to work with various types of datasets, able to create graphs of data with R or Python programming, and use performance measures to evaluate predictive modeling.	L.O.2 L.O.3	Skill
G3	Students are able to utilize statistical and machine learning models to model business problems. Furthermore, students will be able to effectively communicate the results of applying predictive analytics to solve a business problem.	L.O.4	Attitude

Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
L.O.1	Identify and understand different descriptive techniques in multivariate statistical analysis. Translate questions into ones that can be analyzed with statistical models.	a	I,T
L.O.2	Demonstrate important multivariate distribution, especially multinormal distribution. Identify methods of estimation and testing hypothesis	c	I, T,U
L.O.3	Demonstrate the principle component analysis and theory of copula	d	I, T, U
L.O.4	Articulate the applicability of multivariate statistical methods and use R or Python programming for analyzing the real dataset in finance and business. Be able to interpret empirical results. Develop a life-long learning attitude	f, g, h	T, U

Course Assessment

Assessment Component	Assessment form	Percentage %

A1. Process assessment	A1.1 Attendance, attitude	5
	A1.2 Homework	10
	A1.3 Quizzes, projects	5
A2. Midterm assessment	A2.1 Mid-term exam	30
A3. Final assessment	A3.1 Final exam	50

Course Outlines

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1-2	**Chapter 1. Descriptive techniques: Comparation of Batches** Boxplots Histograms Kernel density Scatterplots Chenoff-Flury faces Andrew's curves Parallel coordinate plots Hexagon plots	L.O.1	Lecture Class discussion	Homework Quiz
3-5	**Chapter 2. Multivariate distributions** 2.1. Introduction to matrix algebra 2.2.Distribution and density function 2.3. Moments and characteristic functions 2.4. Transformations 2.5. The multipnormal distribution 2.6. Sampling distribution and limit theorems	L.O.1 L.O.2	Lecture Class discussion	Homework
5-7	**Chapter 3. Theory of estimation and hypothesis testing** The likelihood function The Cramer-Rao lower bound Likelihood ratio test Linear hypothesis	L.O.2	Lecture Class discussion	Homework project
Midterm Examination				**Written exam**
8-10	**Chapter 4. Principle component analysis**	L.O.3 L.O.4	Lecture Class discussion	Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	4.1. Standardized linear combination 4.2. Principle components in practice 4.3. Interpretation of the principle components 4.4. Asymptotic properties of the principle components 4.5. Normalized the principle components analysis 4.6. Common Principle components			
11-13	**Chapter 5. Copula theory** 5.1. Definitions 5.2. Copula classes 5.3. Dependence 5.4. Monte Carlo Simulation 5.5. Copula estimation	L.O.3 L.O.4	Lecture Class discussion	Homework Project
14-15	**Chapter 6. Applications in Finance** 6.1. Portfolio choice 6.2. Efficient portfolio 6.3. Efficient portfolios in practice 6.4. Capital Asset Pricing Model (CAPM)	L.O.1 L.O.2 L.O.3 L.O.4	Lecture Class discussion	Homework
Final examination				**Written exam**

Course Policy

Class Participation: Student is expected that you will spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignment and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particularly in view of the interactive teaching and learning approach adopted.

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items.

Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer: Dr. Ta Quoc Bao
- Email: baotq@hcmiu.edu.vn

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

38. OBJECT-ORIENTED PROGRAMMING

1. General information

- Course Title	
+ Vietnamese:	Lập trình hướng đối tượng
+ English:	**Object-Oriented programming**
- Course ID:	IT069IU
- Number of credits:	4
+ Lecture:	3
+ Laboratory:	1

Course designation	This subject introduces students to the object-oriented programming from basic notions to professional principles for designing an object-oriented software.
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (all programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Prerequisite course of OOP: C/C++ Programming
Course objectives	Introduction to object-oriented programming and design. Topics include core terminologies and basic design principles of object-oriented programming such as classes, objects, abstraction, encapsulation, inheritance, polymorphism, the SOLID design principles, and design patterns
Course learning outcomes	CLO 1. Explain and use concepts in object-oriented programming including classes, objects, abstraction, encapsulation, inheritance, and polymorphism. CLO 2. Implement an object-oriented solution in JAVA programming language. CLO 3. Analyze design principles and design patterns in object-oriented programing

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2, **CLO3**
Attitude	

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
Introduction to Java	3	I
Introduction to Object-Oriented Programming	3	I, T
Classes and Objects	3	T
Inheritance and composition	3	T
Polymorphism	3	T
Design with interfaces and abstract classes	3	T
Building Objects	3	T
Exception handling	3	T
Generic classes and methods	3	T
Introduction to SOLID principles Single responsibility principle	3	T, U
Open/closed principle	1.5	T, U
Lisko substitution principle	1.5	T, U
Interface segregation principle	1.5	T, U
Dependency inversion principle	1.5	T, U
Reusing Designs Through Design Patterns	6	T, U

Examination forms: 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. Paul J. Deitel (Author), Harvey Deitel (Author), Java How To Program, 11th Edition, Prentice Hall, 2017
2. Matt Weisfeld, The Object-Oriented Thought Process, 3rd Edition, Addison-Wesley, 2009
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional, 1994

	4. Eric Freeman, Bert Bates, Kathy Sierra and Elisabeth Robson, Head First Design Patterns: A Brain-Friendly Guide, O'Reilly Media, 2004

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program Learning Outcomes (PLO) (a-h) is shown in the following table:

	PLO					
CLO	a	b	c	d	e	f
1	X					
2		X				X
3		X				X

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Java	1	Quiz	Lecture	[1]
2	Introduction to Object-Oriented Programming	1	Quiz	Lecture, Discussion	[1,2]
3	Classes and Objects	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
4	Inheritance and composition	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
5	Polymorphism	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
6	Design with interfaces and abstract classes	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
7	Building Objects	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
8	Exception handling	1,2	Quiz	Lecture	[1]
9	**Midterm**				
10	Generic classes and methods	2,3	Quiz, Lab, Final	Lecture, Discussion, In-class exercises	[1,2]
11	Introduction to SOLID principles Single responsibility principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
12	Open/closed principle Lisko substitution principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
13	Interface segregation principle Dependency inversion principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]

14	Reusing Designs Through Design Patterns, part 1	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
15	Reusing Designs Through Design Patterns, part 2	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
16	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz (5%)	10%		20%
Labs (10%)	30%	30%	
Midterm examination (30%)	50%	40%	
Projects/Presentations/ Report (15%)	10%		30%
Final examination (40%)		30%	50%

5. Rubrics (optional)

5.1. 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		

5.2. 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.

5.3. 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 *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

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.
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: February 15, 2022

39. ALGORITHMS AND DATA STRUCTURES

1. General information

- Course Title	
+ Vietnamese:	Cấu trúc dữ liệu và giải thuật
+ English:	**Algorithms and Data structures**
- Course ID:	IT013IU
- Number of credits:	4
+ Lecture:	3
+ Laboratory:	1

Course designation	This subject introduces students to basic data structures and algorithms
Semester(s) in which the course is taught	4,6
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	Introduction to data structures and algorithms, including their design, analysis, and implementation.
Course learning outcomes	CLO 1. Understand basic data structures and algorithms CLO 2. Analyze and evaluate data structures and algorithms. CLO 3. Design algorithms and select data structures for real world applications.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2, CLO3
Attitude	CLO3

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
Review OOP & Java	3	I
Arrays	3	T
Complexity	3	T
Sorting	3	T, U
Queue, Stack	3	T
List	6	T
Recursion	3	T, U
Advanced Sorting	6	T
Binary Tree	3	T
Hash Table	3	T
Graphs	3	T
Algorithms on graphs	3	T, U

Examination forms

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. Michael T. Goodrich and Roberto Tamassia, Data Structures and Algorithms in Java 6th, 2014
2. Cormen, Thomas H., et al. Introduction to algorithms. MIT press, 2009.
3. Lafore, Robert. Data structures and algorithms in Java. Sams publishing, 2017.

2. Learning Outcomes Matrix

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

	PLO					
CLO	a	b	c	d	e	f
1	XX					

2		XXX				
3						X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Review OOP & Java	1	Quiz	Lecture	
2	Arrays	1	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
3	Complexity	2	Quiz	Lecture, Discussion	[2]
4	Sorting	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
5	Queue, Stack	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
6	List part 1	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
7	List part 2	2,3	Lab, Quiz, Midterm	Lecture, Discussion	
8	Recursion	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
9	**Midterm**				
10	Advanced Sorting part 1	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
11	Advanced Sorting part 2	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,2,3]
12	Binary Tree	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
13	Hash Table	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,3]
14	Graphs	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[2,3]
15	Algorithms on graphs	2,3	Lab, Quiz, Final	Lecture, Discussion	[2,3]
16	**Final exam**				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (5%)	20%	5%	
Labs (10%)		10%	
Midterm examination (30%)	40%	30%	30%
Projects/Presentations/ Report (15%)		15%	40%
Final examination (40%)	40%	40%	30%

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

Rubrics (optional)

5.1. 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		

5.2. 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.

5.3. 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 *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

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.
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: February 15, 2022

40. INTRODUCTION TO BUSINESS ADMINISTRATION

1. General Information

- Course Title	
+ Vietnamese:	Dẫn nhập quản trị kinh doanh
+ English:	**Introduction to business administration**
- Course ID:	**BA115IU**
- Course type ☒ General ☐ Specialization (required) ☐ Project/ Internship/ Thesis	☐ Fundamental ☐ Specialization (elective) ☐ Others : ……
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0
- Prerequisites:	None
- Parallel Course:	
- Course standing in curriculum:	Year 2

2. Course Description

This course is to introduce students to the complexities and the multi-dimensional aspects of business. It attempts to give familiarity as well as an applied understanding of each of the core subject areas: Marketing, Management, Human Resource. It also increases the student's awareness of global issues.

3. Textbooks and References

Textbooks:

[1] James A. O'Brien, George Marakas (2008), Introduction to Information Systems, Mc-Graw Hill

[2] Succeeding in Business with MS Office Excel 2007, Thomson Course Technology, 2008, ISBN 978-1-4239-0605-6

[3] New Perspective MS Office Access 2007 Brief, Thomson Course Technology, 2008, ISBN 978-1-4239-0587-5

[4] Case Grader - MS Office Excel 2007, Thomson Course Technology, 2008, ISBN 978-1-4239-9823-5

References:

[5] *Fundamentals of Information Systems*, 4th Edition, Thomson Course Technology, 2007, ISBN 978-1-4239-0113-5.

4. Course Objectives

The course aims to provide students with knowledge of functional areas of business and the integration among those; global issues, including an understanding of approaches to business ethics and multinational issues; basic research, analysis, writing, computer, teaming, and presentation skills; and applying critical thinking skills and communication through the development of a portfolio of a firm in an industry in which they are interested.

Goals	Goal description	Program Learning Outcomes	Competency level
G1	Develop a high level of familiarity with one or more of the functional areas of business, team building skills and understand group dynamics and students' applied critical thinking skills and communication through the development of a portfolio of a firm in an industry in which they are interested.	L.O.1	Knowledge
G2	Explain how rapidly the business world is changing and the importance of life-long learning; how global issues influence business entities and how global issues impact customers	L.O.2	Skill
G3	Organizing, analyzing and demonstrate information in an efficient and logical way: Theories and Concepts and information in a logical way: Skill Development and Practice	L.O.3	

5. Learning Outcomes

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes (*)
L.O.1	Develop a high level of familiarity with one or more of the functional areas of business, team building skills and understand group dynamics and students' applied critical thinking skills and communication through the development of a portfolio of a firm in an industry in which they are interested.	e
L.O.2	Explain how rapidly the business world is changing and the importance of life-long learning; how global issues influence business entities and how global issues impact customers	h

L.O.3	Organizing, analyzing and demonstrate information in an efficient and logical way: Theories and Concepts and information in a logical way: Skill Development and Practice	e

6. Course Assessment

Assessment Component	Assessment form	Assessment form
A1. Process assessment	A1.1	*10%*
	A1.2	*15%*
	A1.3	*5%*
A2. Midterm assessment	A2.1	*15%*
	A2.2	*15%*
A3. Final assessment	A3.1	*25%*
	A3.2	*25%*

7. Course Outlines

Theory

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	**Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits** Business And Entrepreneurship: Revenues, Profits And Losses Entrepreneurship Versus Working For Others The Business Environment The Evolution Of American Business	L.O.1 L.O.2	Lecture Class discussion	Quiz
2	**Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth** How Economic conditions Affect Businesses Understanding Free-Market Capitalism Understanding Socialism Understanding Communism The Trend toward Mixed Economies Understanding the Economic System of the United States	L.O.1 L.O.2	Lecture Class discussion	Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
3	**Chapter 5: Choosing a Form of Business Ownership** Basic Forms of Business Ownership Sole Proprietorships Partnerships Corporations Corporate Expansion: Mergers and Acquisitions Special Forms of Business Ownership Franchises Cooperatives Which Form of Ownership is for You?	L.O.1 L.O.2	Lecture Class discussion	Quiz Presentation
4	**Chapter 7: Management, Leadership, And Employee Empowerment** Managers' Roles Are Evolving Functions Of Management Planning: Creating A Vision Based On Values Organizing: Creating A Unified System Leading: Providing Continuous Vision And Values Controlling: Making Sure It Works	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
5	**Chapter 8: Adapting Organizations To Today's Markets** Everyone Is Doing It Issues Involved In Structuring Organizations Organization Models Managing the Interactions among Firms Adapting to Change	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
6	**Chapter 9: Producing World-Class Goods and Services** US Manufacturing in Perspective From Production to Operations Management Production Processes Operations Management Planning Controlling Procedures: PERT and Gantt Charts Preparing for the future	L.O.1 L.O.2	Lecture Class discussion	Quiz Presentation

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
7-8	**Chapter 10: Motivating Employees And Building Self-Managed Teams** The Importance Of Motivation Motivation And Maslow's Hierarchy Of Needs Herzberg's Motivating Factors Job Enrichment McGregor's Theory X And Theory Y Ouchi's Theory Goal-Setting Theory And Management By Objectives Meeting Employee Expectations: Expectancy Theory Reinforcing Employee Performance: Reinforcement Theory Treating Employees Fairly: Equity Theory Building Teamwork through Open Communication Motivation in the Future	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
9-10	**Chapter 11: HRM: Finding and Keeping the Best Employees** Working with People is Just the Beginning Determining Your Human Resource Needs Recruiting Employees from a Diverse Population Selecting Employees Who will Be Productive Training and Developing Employees for Optimum Performance Appraising Employee Performance to Get Optimum Results Compensating Employees: Attracting and Keeping the Best Scheduling Employees to Meet Organizational and Employee Needs Moving Employees Up, Over, and Out Laws Affecting HRM	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
11	**Chapter 13: Marketing: Building Customer Relationships** What Is Marketing? The Marketing Mix	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	Providing Marketers With Information The Consumer Market The B2B Market Your Prospects in Marketing			
12	**Chapter 14: Developing and Pricing Products and Services** Product Development and the Total Product Offer Product Differentiation Packaging Changes the Product Branding and Brand Equity The New-Product Development Process The Product Life Cycle Competitive Pricing Nonprice Competition	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
13	**Chapter 15: Distributing Products Quickly and Efficiently** The Emergence of Marketing Intermediaries The Utilities Created by Intermediaries Wholesale Intermediaries Retail Intermediaries Building Cooperation in Channel Systems The Emergence of Logistics Getting Goods from Producers to Consumers Efficiently Dealing with Change: Responding to National Emergencies What All This Means to You	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation
14-15	**Chapter 16: Using Effective Promotional Techniques** Promotion and the Promotion Mix Advertising: Fighting to Keep Consumer Interest Personal Selling: Providing Personal Attention Public Relation: Building Relationships Sales Promotion: Getting a Good Deal Managing the Promotion Mix: Putting It All Together	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Quiz Presentation

8. Course Policy

Class Participation: Students are expected to spend at least **8 hours** per week on studying this course. This time should be made up of reading, working on exercises and problems, group assignments and attending class lectures and tutorials. University regulations indicate that if students attend less than 80% of scheduled classes, they may be refused final assessment. Regular attendance is essential for successful performance and learning in this course, particular in view of the interactive teaching and learning approach adopted.

Academic Honesty and Plagiarism: Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade. For this class, all assignments are to be completed by the individual student unless otherwise specified. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for preparation, research, drafting, and the proper referencing of sources in preparing all assessment items.

9. Course Coordinator/ Lecturer

- Department of Mathematics: Room A2.610
- Course Coordinator/ Lecturer:
- Email:

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

41. SUMMER INTERNSHIP

1. General information

- Course Title	
+ Vietnamese:	Thực tập hè
+ English:	**Summer Internship**
- Course ID:	MAAS328IU
- Number of credits:	3
+ Lecture:	3
+ Laboratory:	0

Course designation	**This syllabus includes an overview of the process of obtaining academic credi for an internship through IU and an Industry company. It include information on eligibility, registration, and requirements. Summer Internshi is the requirement course for the BSc. degree in Applied Statistics. It i supervised academically by a faculty member and professionally by a internship supervisor in industry.**
Semester(s) in which the course is taught	**Summer of the third academic year**
Mentors/Advisors	**Industrial mentor and IU lecturers**
Language	**English**
Relation to curriculum	**Compulsory**
Training and teaching methods	**Industrial training, advice, personal and team meetings**
Workload (incl. contact hours, self-study hours)	**During the internship phase, students will be working at their internship placement for about 40 hours a week for at least 32 business days (around 1 month and 2 weeks).**
Credit points	**3**
Required and recommended prerequisites for joining the course	**1. The student must maintain a minimum cumulative GPA of 50 or higher.** **2. The student must have a minimum of cumulative credits of 85 credits.** **Students will work one-on-one with their university coordinator to identify that they will meet and create a plan for completing the internship.**

Internship objectives	**1. Critical Thinking/Problem Solving: Based on industrial projects or trainin exercises, one can analyze issues, make decisions, and overcome problems.** **2. Oral/Written Communications: Articulate thoughts and ideas clearly an effectively in written and oral forms. Students are able to express ideas t others; and can write/edit memos, letters, and reports clearly and effectively.** **3. Teamwork/Collaboration: Build collaborative relationships with industri colleagues and customers representing diverse cultures, ages, gender religions, lifestyles, and viewpoints.** **4. Leadership and Career Management: Leverage the strengths of others t achieve common goals and use interpersonal skills to coach and develop other Identify and articulate one's skills, strengths, knowledge, and experienc relevant to the position desired and career goals and identify areas necessar for professional growth.** **5. Professionalism/Work Ethic: Demonstrate effective work habits, e.g punctuality, working productively with many others, and time workloa management.** **6. Global/Intercultural Fluency: Value, respect, and learn from diversity cultures, ages, genders, sexual orientations, and religions. The individu demonstrates, openness, inclusiveness, sensitivity, and the ability to intera respectfully with all people and understand individuals' differences.**

Course learning outcomes	**Upon the successful completion of this course students will be able to:**

Competency level	**Course learning outcome (CLO)**
Knowledge	**CLO 1. Implement the statistical models and make decisions using their statistical background and DS.**
Skill	**CLO 2. Articulate thoughts and ideas clearly and effectively with colleagues and customers in written reports and oral forms.** **CLO 3. Demonstrate effective work habits, e.g., punctualit working productively with many others, and time workloa management.** **CLO 4. Build the financial/risk models for industrial projects using logical thinking and mathematical modelling techniques**
Attitude	**CLO 5. Show a good ability to communicate effectively in a diversity environment.** **CLO6. Adhere professional and ethical, legal, and responsibilities** **CLO 7. Formulate their professional development and lifelong learning**

Content	***The description of the contents should clearly indicate the weighting of the content and the level.***

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-7) and Program/Expected Learning Outcomes (PLO) (a-h) is shown in the following table:

CLO	a	b	c	d	e	f	g	h
1		x	x		x			
2						x		
3				x				
4					x			

5						x	x	
6				x				
7								x

3. Internship report:

The report includes the following sections.

1. Introduction

2. General information about the company.

3. Describe the tasks/projects/work in the company

4. Report the skills and knowledge gained during the internship

5. Discussion and conclusion.

4. Assessments:

4.1 Assessment plan for the Internship report and the presentation:

The internship report will be checked plagiarism by Turnitin.

No.	**Valuation for he internship report**	**Maximum scores**
1	**Introduction**	5
2	**General information about the company**	15
3	Describe the tasks/projects/work in the company	35
4	Report the skills and knowledge gained during the internship	40
5	Discussion and conclusion	5
6	**Total:**	**A/100**

4.2 Student internship evaluation by supervisor in the industrial company

Ranking: Excellent = 5, Good = 4, Fair = 3, Poor = 2, NO = Not Observe = 1.

No.		*1*	*2*	*3*	*4*	*5*
I	**Attitude and Manner at working place** **(Thái độ và tác phong làm việc)**					
1	**Willingness to learn** ***(Sẵn sàng học hỏi)***					
2	**Responsibility** ***(Có tinh thần trách nhiệm)***					
3	**Oral communication skills** ***(Kỹ năng giao tiếp)***					
4	**Punctuality** ***(Đảm bảo giờ giấc làm việc)***					
5	**Written communication skills** ***(Kỹ năng giao tiếp bằng văn bản)***					
II	**Professional Abilities (năng lực chuyên môn)**					
6	**Analysis, and problem solving skills** ***(Kỹ năng phân tích và giải quyết vấn đề)***					
7	**Team work skills** ***(khả năng làm việc nhóm)***					
8	**Ability to implementing knowledge/skills into work** ***(Khả năng áp dụng kiến thức/kỹ năng đã học vào công việc)***					
9	**Ability to fulfill tasks** ***(Khả năng hoàn thành nhiệm vụ được giao)***					

Total score evaluated by the industrial supervisor: B/100.

The final score for internship will be determined by (2A+B)/3

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
Internship report	**90%Pass**	**90%Pass**	**80%Pass**	**90%Pass**	**80%Pass**	**80%Pass**	**90%Pass**
Performance In Company	**90%Pass**	**90%Pass**	**80%Pass**	**90%Pass**	**80%Pass**	**80%Pass**	**90%Pass**

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

5. Date revised: January 10, 2022

Ho Chi Minh City, 06/05/2024

HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc

42. GRADUATION THESIS

1. General information

- Course Title	
+ Vietnamese:	Luận văn tốt nghiệp
+ English:	**Graduation thesis**
- Course ID:	MAAS420IU
- Number of credits:	12
+ Lecture:	12
+ Laboratory:	0

Course designation	Thesis fulfills the research requirement for the BSc. degree in Applied Statistics. Students will work one-on-one with their thesis advisor and the thesis coordinator to identify times that they will meet and create a plan for communication throughout the process of completing the BSc's Thesis.
Semester(s) in which the course is taught	8
Advisors	IU lecturers and visiting lectures
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, advice, seminar, presentation
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 540 Contact hours (please specify whether lecture, discussions, seminar, etc.): 15 Private study including examination preparation, specified in hours[10]: 525
Credit points	12

[10] When calculating contact time, each contact hour is counted as a full hour because the organization 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.

<table>
<tr><td>Required and recommended prerequisites for joining the course</td><td>1. The student must maintain a minimum cumulative GPA of 50 or higher.
2. The student must have a minimum of cumulative credits of 112 credits.
Students will work one-on-one with their thesis advisor and the thesis coordinator to identify times that they will meet and create a plan for completing the graduation thesis.</td></tr>
<tr><td>Course objectives</td><td>This thesis graduation is to create, to do, and to complete a project in Applied Statistics. Students need to make a thesis proposal and produce the first draft of the thesis. Writing a graduate thesis requires independent research, scientific writing, critical thinking, independent thinking, and effective communication.</td></tr>
<tr><td>Course learning outcomes</td><td>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>CLO 1. Analyze problems using their mathematical and statistical background in modeling and simulations.
CLO 2. Evaluate the results and product of a statistical model to meet needs and constraints of industry.</td></tr>
<tr><td>Skill</td><td>CLO 3. Build the statistical models using logical thinking, statistical modeling, and ML techniques.
CLO 4. Integrate knowledge of modern financial models and/or ML, AI techniques.
CLO 5. Adapt the broad knowledge to adjust applied statistical solutions on a specific problem in data science, economics, finance, and societal problems.</td></tr>
<tr><td>Attitude</td><td>CLO 6. Perform effectively on professional collaboration with advisor and other students in a seminar group.
CLO 7. Show a good ability to communicate effectively with audiences.
CLO8. Adhere professional and ethical, legal, and responsibilities.</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-8) and 08 Program/Expected Learning Outcomes (PLO) (a-h) is shown in the following table:

CLO	a	b	c	d	e	f	g	h
1	x		x					
2					x			
3		x						
4				x				
5					x			x
6							x	
7						x		
8							x	

Planned learning activities and teaching methods

3.1 Thesis Proposal

Students need to submit the proposal by Mid-semester and present the proposal with the Thesis Committee. The proposal should explain the purpose of the study or inquiry, including the following sections:

1. Introduction: An initial Introduction will be composed to establish a summary of existing research related to the question, a statement of the problem, and the purpose of the study. Review of relevant research.

2. Proposal Methodologies and approaches. The student will outline and describe appropriate research design

3. Timeline: A proposed timeline for the study will be included.

Thesis proposals should be roughly 10-20 pages excluding references. Guidelines for specific requirements of each section of the proposal will be assigned by the thesis advisor. The thesis committee will review the proposal and request for revisions to students as necessary.

3.2 Thesis report:

Generally, the thesis report includes the following sections.

1. Abstract

2. Introduction (5pts): Introduce the topic, and clearly state the problem or question, setting, motivation, and data.

3. Literature review. Review of relevant research

4. Background

5. Methodology

6. Simulations and results

7. Discussion and conclusion.

3. Assessment plan for the thesis report and the presentation:

The thesis will be checked plagiarism by Turnitin.

No.	**Valuation for thesis graduation**	**Scores**
1	Value of content	50
2	Writing quality of thesis	15
3	Level of difficulty	10
4	Response to questions	15
5	Quality of presentation	10
6	**Total:**	**100**

Grading scheme	**Needs Work**	**Maximum score**	**Suggested scores**
1. Purpose/motivation/problem stated clearly and organized and easy to follow.		**2**	
2. Presenter(s) exhibited a good understanding of the topic.		**2**	
3. Presenter(s) were/was well-prepared, logical order of presentation		**1.5**	
4. Presenter(s) spoke clearly/effectively and engaged with audience		**1.5**	
5. Time for presentation used effectively.		**1.5**	

6. Presenter responded effectively to Committee's questions and comments.		**1.5**	
Total		**10**	

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**
Thesis proposal	70%Pass	70%Pass	70%Pass	70%Pass	70%Pass	70%Pass	70%Pass	70%Pass
Thesis report	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass		90%Pass
Thesis presentation	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass	90%Pass

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

4. Date revised: January 12, 2022

Ho Chi Minh City, 06/05/2024
HEAD OF DEPARTMENT OF MATHEMATICS

Prof. Dr. Pham Huu Anh Ngoc