

**CHƯƠNG TRÌNH ĐÀO TẠO KHÓA 2024 – NGÀNH TOÁN ỨNG DỤNG**  
**TRÌNH ĐỘ ĐẠI HỌC**

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

**1. Thông tin chung**

- Tên ngành đào tạo:
- + Tiếng Việt: Toán ứng dụng
- + Tiếng Anh: Applied Mathematics
- Mã ngành đào tạo: 7460112.
- Trình độ đào tạo: Đại học
- Loại hình đào tạo: Chính qui
- Thời gian đào tạo: 4 năm
- Tên văn bằng sau khi tốt nghiệp:
- + Tiếng Việt: Cử nhân Toán ứng dụng
- + Tiếng Anh: Bachelor of Science in Applied Mathematics
- 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: 70 sinh viên**

**3. Mục tiêu đào tạo**

**a. Mục tiêu chung:**

Sinh viên sau khi tốt nghiệp ngành Toán ứng dụng có các khả năng sau đây:

(O1) Có nền tảng Toán học, CNTT, và Tài chính để ứng dụng hiệu quả kiến thức và kỹ năng trong lĩnh vực kỹ sư tài chính, phân tích, thiết kế các sản phẩm và quy trình tài chính và quản trị rủi ro hiện đại trong công nghiệp cũng như các cơ quan nhà nước.

(O2) Có khả năng làm việc và giao tiếp hiệu quả với các thành viên khác trên các nhóm liên ngành để phát triển các giải pháp thực tế, kỹ thuật và tiết kiệm chi phí cho các vấn đề tài chính và quản trị rủi ro phức tạp.

(O3) Có khả năng học tập suốt đời, tự cập nhật và liên tục học hỏi trong quá trình thực hành kỹ thuật tài chính và quản trị rủi ro một cách đạo đức và chuyên nghiệp

(O4) Có đạo đức và hiểu biết về pháp lý trong công việc. Có khả năng làm việc chuyên nghiệp, có khả năng lãnh đạo, là thành viên tích cực trong các hiệp hội chuyên nghiệp về kỹ thuật tài chính và quản trị rủi ro.

**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>(O1) Có nền tảng Toán học, CNTT, và Tài chính để ứng dụng hiệu quả kiến thức và kỹ năng trong lĩnh vực kỹ sư tài chính, phân tích, thiết kế các sản phẩm và quy trình tài chính và quản trị rủi ro hiện đại trong công nghiệp cũng như các cơ quan nhà nước.</p> <p>(O2) Có khả năng làm việc và giao tiếp hiệu quả với các thành viên khác trên các nhóm liên ngành để phát triển các giải pháp thực tế, kỹ thuật và tiết kiệm chi phí cho các vấn đề tài chính và quản trị rủi ro phức tạp.</p> <p>(O3) Có đạo đức và hiểu biết về pháp lý trong công việc. Có khả năng làm việc chuyên nghiệp, có khả năng lãnh đạo, là thành viên tích cực trong các hiệp hội chuyên nghiệp về kỹ thuật tài chính và quản trị rủi ro.</p> <p>(O4) Có khả năng học tập suốt đời, tự cập nhật và liên</p>	<p>1. Đào tạo nguồn <b>nhân lực có trình độ cao trong lĩnh vực kinh tế tài chính và QTRR</b>.</p> <p>2. Gắn kết chặt chẽ nội dung đào tạo với <b>nhu cầu thực tiễn của các doanh nghiệp và tổ chức tài chính</b> tại Việt Nam.</p> <p>3. Đào tạo và nghiên cứu về <b>kỹ thuật tài chính và quản trị rủi ro theo xu hướng của các nước tiên tiến</b> trên thế giới như Mỹ, Anh, Pháp.</p> <p>4. Ứng dụng và kết hợp kiến thức của các <b>ngành toán học và công nghệ thông tin vào hoạt động phân tích tài chính</b> và quản trị rủi ro tại Việt Nam.</p>	<p>1. <b>Đào tạo đại học chất lượng cao trong các lĩnh vực Toán ứng dụng</b> với chuyên ngành Kỹ thuật tài chính và Quản lý rủi ro và các lĩnh vực liên ngành trong Toán ứng dụng.</p> <p>2. Đào tạo các kỹ năng nghiên cứu bao gồm <b>nghiên cứu cơ bản và ứng dụng, đào tạo và phát triển nghiên cứu độc lập và khả năng học tập suốt đời</b> của người học để đáp ứng nhu cầu của ngành và xã hội.</p> <p>3. Tiên phong <b>phát triển lĩnh vực Kỹ thuật tài chính &amp; Quản lý rủi ro và</b></p>	<p>Mục tiêu chung:</p> <ul style="list-style-type: none"> <li>- 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;</li> <li>- 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</li> </ul>

tục học hỏi trong quá trình thực hành kỹ thuật tài chính và quản trị rủi ro một cách đạo đức và chuyên nghiệp.		<b>các lĩnh vực Toán ứng dụng khác tại Việt Nam</b> 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  <b>4. Giữ vai trò tiên phong trong giáo dục và nghiên cứu Toán học lý thuyết và ứng dụng tại Việt Nam.</b>	nhiệm nghề nghiệp, thích nghi với môi trường làm việc; có ý thức phục vụ Nhân dân.
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#### b. Mục tiêu cụ thể (Program Objectives - POs)

##### **PO1. Có khả năng chuyên môn**

- Nắm được các kỹ thuật, công cụ hiện đại trong kỹ thuật tính toán và phân tích tài chính.
- Có khả năng tham gia xây dựng và phân tích các mô hình tài chính cụ thể, tính toán và xử lý dựa trên công cụ toán học và công nghệ thông tin nhằm phân tích, đề xuất dự báo về tài chính.
- Có khả năng ứng dụng các phương pháp định lượng hiện đại vào các hoạt động quản trị tài chính và đầu tư để hỗ trợ và đưa ra giải pháp quản trị rủi ro tài chính.

##### **PO2. Có kỹ năng**

- Am hiểu và có khả năng tổ chức các hoạt động trong lĩnh vực tài chính.
- Nắm vững và có năng lực tổ chức các hoạt động của các công ty tài chính, ngân hàng, chứng khoán, bảo hiểm, phòng ban tài chính của các doanh nghiệp khác.
- Hiểu rõ cơ chế vận hành của thị trường tài chính trong nước và quốc tế.
- Có khả năng làm việc trong các tổ chức tài chính của chính phủ và các định chế tài chính quốc tế như IMF, World Bank, v.v.

##### **PO3. Có phẩm chất chính trị và phẩm chất đạo đức**

- Có phẩm chất chính trị, đạo đức nghề nghiệp tốt.
- Hiểu biết đúng đắn về pháp luật, về đường lối, chính sách của Đảng và Nhà nước.
- Có phẩm chất làm việc tận tâm, chuyên nghiệp

- Có sức khỏe tốt và tư duy tích cực.

**PO4. Có 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 lĩnh vực kinh tế tài chính học.
- Có thể tham gia vào việc nghiên cứu, cải tiến phương pháp, tham gia các đề án 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 nhiều ngành khác nhau.
- 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)**

Sinh viên tốt nghiệp ngành Toán ứng dụng (Kỹ thuật Tài chính và Quản trị rủi ro) đạt được các chuẩn đầu ra sau:

TT	Nội dung CDR (PLO)	Khối CDR (Domain of learning)	Bậc (Level)
1	(a) Giải thích được sự vận hành các mô hình Tài chính và Quản trị rủi ro từ đó có thể lựa chọn các mô hình, công cụ tính toán hiệu quả cho các mô hình Tài chính.	Kiến thức (knowledge)	Bậc 2 (Understand)
2	(b) Vận dụng nền tảng Toán ứng dụng và Công nghệ thông tin, áp dụng các kỹ thuật tính toán vào lĩnh vực kỹ thuật tài chính và quản trị rủi ro vào các mô hình Tài chính cụ thể.	Kiến thức (knowledge)	Bậc 3 (Apply)

3	<b>(c)</b> Có khả năng phân tích các quá trình xây dựng mô hình tài chính, từ việc lập mô hình và tính toán, dự báo, tổng hợp đến đề xuất các giải pháp tài chính, các phương án giảm thiểu rủi ro tài chính.	Kiến thức (knowledge)	Bậc 4 (Analyze)
4	<b>(d)</b> Đánh giá và cải tiến các mô hình tài chính, hỗ trợ ra quyết định, xây dựng và tổ chức thực hiện các dự án đầu tư tài chính, quản trị rủi ro tài chính cho doanh nghiệp, xây dựng các mô hình phân tích và dự báo về tài chính cho doanh nghiệp và xã hội.	Kiến thức (knowledge)	Bậc 5 (Evaluate)
5	<b>(e)</b> Thể hiện kỹ năng giao tiếp tốt, làm việc hiệu quả trong nhóm, tham gia xây dựng và tổ chức thực hiện các dự án nghiên cứu về tài chính, quản trị rủi ro.	Kỹ năng (skill)	Bậc 3 (Guided Response)
6	<b>(f)</b> Chứng tỏ kỹ năng sẵn sàng thích nghi với môi trường đa dạng để đưa ra những giải pháp, phương án khoa học cho các vấn đề ứng dụng tài chính và quản trị rủi ro trong thực tế.	Kỹ năng (skill)	Bậc 2 (Set: Readiness to act)
7	<b>(g)</b> Xây dựng quá trình tích lũy kiến thức chuyên môn các vấn đề của Toán tài chính và Quản trị rủi ro hiện đại và cơ chế vận hành của thị trường tài chính trong nước và quốc tế trong thời đại cách mạng công nghiệp 4.0.	Kỹ năng (skill)	Bậc 4 (Mechanism-basic proficiency)
8	<b>(h)</b> Tổ chức làm việc hiệu quả trong các nhóm công tác liên ngành, đa ngành, thực hiện các hoạt động thực tiễn đa dạng để đạt được mục tiêu chung.	Kỹ năng (skill)	Bậc 5 (Complex Overt Response-Expert)

9	(i) 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, về đường lối, chính sách của Đảng và Nhà nước. Có thể giới quan, nhân sinh quan đúng đắn và có khả năng nhận thức, đánh giá các hiện tượng một cách logic và tích cực.	Tự chủ và trách nhiệm (attitude)	Bậc 3 (Valuing)
10	(j) Hình thành thế giới quan khoa học, tư duy độc lập, chủ động, tích cực, cầu tiến, sáng tạo trong công việc. Có nhu cầu tự hoàn thiện nghề nghiệp, chấp nhận các ý kiến khác nhau, tranh luận trong tinh thần trách nhiệm để tiến bộ và vì lợi ích chung.	Tự chủ và trách nhiệm (attitude)	Bậc 4 (Organization)
11	(k) Thể hiện ý thức và khả năng học tập suốt đời.	Tự chủ và trách nhiệm (attitude)	Bậc 5 (Internalizing values-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
Kiến thức	PLO1 (a)	x			
	PLO2 (b)	x			
	PLO3 (c)	x			
	PLO4 (d)	x	x		x
Kỹ năng	PLO5 (e)	x	x		
	PLO6 (f)	x	x		
	PLO7 (g)	x	x		x

	<b>PLO8 (h)</b>	x	x		x
Tự chủ và trách nhiệm	<b>PLO9 (i)</b>			x	x
	<b>PLO10 (j)</b>			x	x
	<b>PLO11 (k)</b>			x	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

<b>Xếp loại</b>	<b>Thang điểm 100</b>	<b>Điểm chữ</b>	<b>Thang điểm 4</b>
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: 143 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 <sup>(3)</sup>	Khối lượng	
		Số tín chỉ	%
I	Khối kiến thức giáo dục đại cương	47	33
II	Khối kiến thức cơ sở ngành	41	29
III	Kiến thức chuyên ngành	40	28
V	Thực tập, khóa luận/luận văn tốt nghiệp	15	10
	Tổng cộng	143	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 (**)
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I		Kiến thức giáo dục đại cương			47	46	1	
		Lý luận chính trị			11	11		
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		
			Khoa học xã hội - Nhân văn - Nghệ thuật		3	3		
6	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3		
			Ngoại ngữ		8	8		
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		
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	15	1	

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		9	9		
15	BA117IU	Kinh tế vi mô	Microeconomics	Bắt buộc	3	3		
16	BA119IU	Kinh tế vĩ mô	Macro Economics	Bắt buộc	3	3		
17	MAFE105IU	Kinh tế Tài chính	Financial Economics	Bắt buộc	3	3		
<b>II</b>		<b>Kiến thức cơ sở ngành</b>			<b>41</b>	<b>40</b>	<b>1</b>	
18	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4		
19	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3		
20	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3		
21	MAFE204IU	Hệ thống quản lý dữ liệu	Database Management system	Bắt buộc	3	2	1	
22	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4		
23	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4		
24	MAFE212IU	Kế toán tài chính	Financial Accounting	Bắt buộc	4	4		
25	MAFE315IU	Giới thiệu về tài chính doanh nghiệp	Introduction to Corporate Finance	Bắt buộc	3	3		
26	MAFE215IU	Quản lý tài chính	Financial Management	Bắt buộc	3	3		

27	MAFE207IU	Lý thuyết ra quyết định	Decision	Bắt buộc	3	3		
28	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4		
29		Môn học tự chọn 1	FERM Elective #1	Tự chọn	3	3		
<b>III</b>		<b>Kiến thức chuyên ngành</b>			<b>40</b>	<b>40</b>		
30	MAFE302IU	Quá trình ngẫu nhiên	Random Processes	Bắt buộc	3	3		
31	MAFE303IU	Tối ưu 1	Optimization 1	Bắt buộc	4	4		
32		FERM Elective #2	Môn học tự chọn 2	Tự chọn	3	3		
33	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	Bắt buộc	3	3		
34	MAFE307IU	Tối ưu 2	Optimization 2	Bắt buộc	3	3		
35	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk Management 1	Bắt buộc	3	3		
36	MAFE314IU	Kinh tế lượng tài chính	Financial econometrics	Bắt buộc	3	3		
37	MAFE401IU	Toán tài chính 2	Financial Mathematics 2	Bắt buộc	3	3		
38	MAFE402IU	Quản lý danh mục đầu tư	Portfolio Management	Bắt buộc	3	3		
39	MAFE403IU	Phương pháp nghiên cứu trong tài chính	Research Methods in Finance	Bắt buộc	3	3		
40		FERM Elective #3	Môn học tự chọn 3	Tự chọn	3	3		
41		FERM Elective #4	Môn học tự chọn 4	Tự chọn	3	3		

42	MAFE309IU	Kỹ thuật phần mềm	Software Engineering	Bắt buộc	3	2	1	
VI		<b>Thực tập, khóa luận/luận văn tốt nghiệp</b>			<b>15</b>	<b>15</b>		
	MAFE313IU	Thực tập hè	Summer Internship	Bắt buộc	3	3		
	MAFE409IU	Khoá luận tốt nghiệp	GRADUATION THESIS	Bắt buộc	12	12		
		<b>Tổng số (tín chỉ)</b>			143	140	3	

### 10. Dự kiến kế hoạch giảng dạy (phân bố 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 Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
<b>I.</b> <b>Tổng số 21</b> <b>tín chỉ</b>	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2		

	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2		
	MAFE101IU	Giải tích 1	Analysis 1	Bắt buộc	4	4		
	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3		
	BA117IU	Kinh tế vi mô	Microeconomics	Bắt buộc	3	3		
	MAFE109IU	Giới thiệu về Python	Introduction to Python	Bắt buộc	4	3	1	
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	3		
<b>II. Tổng số 21 tín chỉ</b>	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2		
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2		
	MAFE103IU	Giải tích 2	Analysis 2	Bắt buộc	4	4		HT: Giải tích 1
	MAFE104IU	Đại số tuyến tính	Linear Algebra	Bắt buộc	4	4		
	MAFE105IU	Kinh tế học tài chính	Financial Economics	Bắt buộc	3	3		

	BA119IU	Kinh tế vĩ mô	Marco Economics	Bắt buộc	3	3		
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	3		
<b>III. Tổng số 20 tín chỉ</b>	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4		HT: Giải tích 2
	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3		HT: Giải tích 2
	MAFE212IU	Kế toán tài chính	Financial Accounting	Bắt buộc	4	4		
	MAFE204IU	Hệ thống quản lý dữ liệu	Database Management system	Bắt buộc	3	2	1	
		Môn học tự chọn 1	FERM Elective #1	Tự chọn	3	3		
	MAFE209IU	Thị trường Tài chính	Financial markets		3	3		
	MAFE210IU	Giải tích hàm	Functional analysis		4	4		TQ: Giải tích 1, Giải tích 2
	MAFE211IU	Lập trình ứng dụng Web	Web application programming		4	3	1	
	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism	Bắt buộc	3	3		
<b>IV. Tổng số 19</b>	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3		HT: Giải tích 2 SH: Giải tích thực, Giải tích 3

<b>tín chỉ</b>	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4		HT: Giải tích 2
	MAFE315IU	Giới thiệu về tài chính doanh nghiệp	Introduction to Corporate Finance	Bắt buộc	3	3		TQ: Kinh tế học tài chính
	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4		HT: Giải tích 3
	MAFE215IU	Quản lý tài chính	Financial Management	Bắt buộc	3	3		
	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism	Bắt buộc	2	2		SH: Triết học Mác-Lênin
<b>V. Tổng số 19 tín chỉ</b>	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4		HT: Xác suất
	MAFE302IU	Quá trình ngẫu nhiên	Random Processes	Bắt buộc	3	3		HT: Xác suất
	MAFE303IU	Tối ưu 1	Optimization 1	Bắt buộc	4	4		HT: Đại số tuyến tính, Giải tích 3
	MAFE309IU	Kỹ thuật phần mềm	Software Engineering	Bắt buộc	3	2	1	
		Môn học tự chọn 2	FERM Elective #2	Tự chọn	3	3		
	MAFE310IU	Mô hình hóa và mô phỏng	Modeling and simulations		4	3	1	HT: Xác suất TQ: Thống kê

	MAFE311IU	Định giá	Asset pricing		3	3		HT: Quản trị tài chính, Tài chính doanh nghiệp
	MAFE312IU	Khai phá dữ liệu	Data mining		4	3	1	
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2		<b>HT:</b> Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
<b>VI. Tổng số 19 tín chỉ</b>	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	Bắt buộc	3	3		HT: Xác suất
	MAFE307IU	Tối ưu 2	Optimization 2	Bắt buộc	3	3		HT: Tối ưu 1, Xác suất
	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk Management 1	Bắt buộc	3	3		
	MAFE207IU	Lý thuyết ra quyết định	Decision Making	Bắt buộc	3	3		HT: Xác suất, Tối ưu 1
	MAFE314IU	Kinh tế lượng tài chính	Financial econometrics	Bắt buộc	3	3		HT: Thống kê
	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2		HT: Chủ nghĩa xã hội khoa học
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2		



<b>Học kỳ hè năm Tổng số 3 tín chỉ</b>	MAFE313IU	Thực tập hè	Summer Internship	Bắt buộc	3	3		
<b>VII. Tổng số 15 tín chỉ</b>	MAFE401IU	Toán tài chính 2	Financial Mathematics 2	Bắt buộc	3	3		HT: Toán tài chính 1
	MAFE402IU	Quản lý danh mục đầu tư	Portfolio Management	Bắt buộc	3	3		
	MAFE403IU	Phương pháp nghiên cứu trong tài chính	Research Methods in Finance	Bắt buộc	3	3		
		Môn học tự chọn 3	FERM Elective #3	Tự chọn	3	3		
	MAFE404IU	Quản trị rủi ro tài chính 2	Financial Risk Management 2		3	3		HT: Quản trị Rủi ro tài chính 1
	MAFE411IU	Nhập môn vận trù học	Introduction to Operations research		3	3		HT: Tối ưu hóa 1
	MAFE406IU	Tính toán song song	Parallel computing		4	3	1	
		Môn học tự chọn 4	FERM Elective #4	Tự chọn	3	3		

	MAFE407IU	Toán kinh tế	Mathematical economics		3	3		HT: Giải tích 2
	MAFE410IU	Tỷ giá và Tài chính quốc tế	Exchange rates and International finance		3	3		
	MAFE412IU	Phân tích báo cáo tài chính	Financial statement analysis and business evaluation		3	3		
<b>VIII. Tổng số 12 tín chỉ</b>	MAFE409IU	Khóa luận tốt nghiệp	GRADUATION THESIS	Bắt buộc	12	12		
	<b>Tổng</b>				<b>149</b>	<b>146</b>	<b>3</b>	

## 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 Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	

<b>I</b> (tổng số 21 tín chỉ)	ENTP02		IE2	Bắt buộc	13	13		
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	3		
	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism	Bắt buộc	3	3		
	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism	Bắt buộc	2	2		SH: Triết học Mác-Lênin
<b>II</b> (tổng số 24 tín chỉ)	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2		
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2		
	MAFE101IU	Giải tích 1	Analysis 1	Bắt buộc	4	4		
	MAFE104IU	Đại số tuyến tính	Linear Algebra	Bắt buộc	4	4		
	MAFE105IU	Kinh tế Tài chính	Financial Economics	Bắt buộc	3	3		
	BA117IU	Kinh tế vi mô	Microeconomics	Bắt buộc	3	3		
	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3		
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	3		
<b>III</b> (tổng số 21)	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2		

<b>tín chỉ)</b>	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2		
	MAFE103IU	Giải tích 2	Analysis 2	Bắt buộc	4	4		HT: Giải tích 1
	BA119IU	Kinh tế vĩ mô	Macro Economics	Bắt buộc	3	3		
	MAFE109IU	Giới thiệu về Python	Introduction to Python	Bắt buộc	4	3	1	
	MAFE212IU	Kế toán tài chính	Financial Accounting	Bắt buộc	4	4		
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2		HT: Triết học Mác-Lênin, Kinh tế chính trị Mác- Lênin
<b>IV (tổng số 24 tín chỉ)</b>	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4		HT: Giải tích 2
	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3		HT: Giải tích 2
	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4		HT: Giải tích 2
	MAFE315IU	Giới thiệu về tài chính doanh nghiệp	Introduction to Corporate Finance	Bắt buộc	3	3		TQ: Kinh tế học tài chính
	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4		HT: Giải tích 3
	MAFE215IU	Quản lý tài chính	Financial Management	Bắt buộc	3	3		
		Môn học tự chọn 1	FERM Elective #1	Tự chọn	3	3		
	MAFE209IU	Thị trường Tài chính	Financial markets		3	3		

	MAFE210IU	Giải tích hàm	Functional analysis		4	4		TQ: Giải tích 1, Giải tích 2
	MAFE211IU	Lập trình ứng dụng Web	Web application programming		4	3	1	
<b>V</b> (tổng số 20 tín chỉ)	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3		HT: Giải tích 2 SH: Giải tích thực, Giải tích 3
	MAFE303IU	Tối ưu 1	Optimization 1	Bắt buộc	4	4		HT: Đại số tuyến tính, Giải tích 3
	MAFE204IU	Hệ thống quản lý dữ liệu	Database Management system	Bắt buộc	3	2	1	
	MAFE309IU	Kỹ thuật phần mềm	Software Engineering	Bắt buộc	3	3		
	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2		HT: Chủ nghĩa xã hội khoa học
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2		
		Môn học tự chọn 2	FERM Elective #2	Tự chọn	3	3		
	MAFE310IU	Mô hình hóa và mô phỏng	Modeling and simulations		4	3	1	HT: Xác suất TQ: Thống kê
	MAFE311IU	Định giá	Asset pricing		3	3		HT: Quản trị tài chính, Tài chính doanh nghiệp
	MAFE312IU	Khai phá dữ liệu	Data mining		4	3	1	
<b>VI</b>	MAFE307IU	Tối ưu 2	Optimization 2	Bắt buộc	3	3		HT: Tối ưu 1, Xác suất

<b>(tổng số 19 tín chỉ)</b>	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk Management 1	Bắt buộc	3	3		
	MAFE207IU	Lý thuyết ra quyết định	Decision Making	Bắt buộc	3	3		HT: Xác suất, Tối ưu 1
	MAFE314IU	Kinh tế lượng tài chính	Financial econometrics	Bắt buộc	3	3		HT: Thống kê
	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4		HT: Xác suất
	MAFE302IU	Quá trình ngẫu nhiên	Random Processes	Bắt buộc	3	3		HT: Xác suất
<b>Học kỳ hè năm 3 (tổng số 3 tín chỉ)</b>	MAFE313IU	Thực tập hè	Summer Internship	Bắt buộc	3	3		
<b>VII (tổng số 15 tín chỉ)</b>	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	Bắt buộc	3	3		HT: Xác suất
	MAFE402IU	Quản lý danh mục đầu tư	Portfolio Management	Bắt buộc	3	3		
	MAFE403IU	Phương pháp nghiên cứu trong tài chính	Research Methods in Finance	Bắt buộc	3	3		
		Môn học tự chọn 3	FERM Elective #3	Tự chọn	3	3		
	MAFE404IU	Quản trị rủi ro tài chính 2	Financial Risk Management 2		3	3		HT: Quản trị Rủi ro tài chính 1
	MAFE411IU	Nhập môn vận trù học	Introduction to Operations research		3	3		HT: Tối ưu hóa 1
	MAFE406IU	Tính toán song song	Parallel computing		4	3	1	
		Môn học tự chọn 4	FERM Elective #4	Tự chọn	3	3		

	MAFE407IU	Toán kinh tế	Mathematical economics		3	3		HT: Giải tích 2
	MAFE410IU	Tỷ giá và Tài chính quốc tế	Exchange rates and International finance		3	3		
	MAFE412IU	Phân tích báo cáo tài chính	Financial statement analysis and business evaluation		3	3		
<b>VIII</b> ( <b>tổng số 15 tín chỉ</b> )	MAFE409IU	Khoá luận tốt nghiệp	GRADUATION THESIS	Bắt buộc	12	12		
	MAFE401IU	Toán tài chính 2	Financial Mathematics 2	Bắt buộc	3	3		HT: Toán tài chính 1
	<b>Tổng</b>			<b>162</b>	<b>159</b>	<b>3</b>		

### 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 Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
<b>I</b> ( <b>tổng số 30 tín chỉ</b> )	IE1 (week: 1-7)		IE1 (week: 1-7)	Bắt buộc	17	17		
	IE2 (week: 8-14)		IE2 (week: 8-14)	Bắt buộc	13	13		
<b>II</b> ( <b>tổng số 24</b> )	EN007IU EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1 Listening AE1	Bắt buộc	2 2	2 2		

<b>tín chỉ)</b>	MAFE101IU	Giải tích 1	Analysis 1	Bắt buộc	4	4		
	MAFE104IU	Đại số tuyến tính	Linear Algebra	Bắt buộc	4	4		
	MAFE105IU	Kinh tế Tài chính	Financial Economics	Bắt buộc	3	3		
	BA117IU	Kinh tế vi mô	Microeconomics	Bắt buộc	3	3		
	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3		
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	3		
<b>Học kỳ hệ năm 1 (tổng số 5 tín chỉ)</b>	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism	Bắt buộc	3	3		
	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism	Bắt buộc	2	2		SH: Triết học Mác-Lênin
<b>III (tổng số 24 tín chỉ)</b>	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2		
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2		2	2		
	MAFE103IU	Giải tích 2	Analysis 2	Bắt buộc	4	4		HT: Giải tích 1
	BA119IU	Kinh tế vĩ mô	Macro Economics	Bắt buộc	3	3		
	MAFE109IU	Giới thiệu về Python	Introduction to Python	Bắt buộc	4	3	1	
	MAFE212IU	Kế toán tài chính	Financial Accounting	Bắt buộc	4	4		



	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	3		
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2		HT: Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
<b>IV</b> (tổng số 24 tín chỉ)	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4		HT: Giải tích 2
	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3		HT: Giải tích 2
	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4		HT: Giải tích 2
	MAFE315IU	Giới thiệu về tài chính doanh nghiệp	Introduction to Corporate Finance	Bắt buộc	3	3		TQ: Kinh tế học tài chính
	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4		HT: Giải tích 3
	MAFE215IU	Quản lý tài chính	Financial Management	Bắt buộc	3	3		
		Môn học tự chọn 1	FERM Elective #1	Tự chọn	3	3		
	MAFE209IU	Thị trường Tài chính	Financial markets		3	3		
	MAFE210IU	Giải tích hàm	Functional analysis		4	4		TQ: Giải tích 1, Giải tích 2
	MAFE211IU	Lập trình ứng dụng Web	Web application programming		4	3	1	
<b>V</b> (tổng số 20 tín chỉ)	MAFE204IU	Hệ thống quản lý dữ liệu	Database Management system	Bắt buộc	3	2	1	
	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3		HT: Giải tích 2 SH: Giải tích thực, Giải tích 3

	MAFE303IU	Tối ưu 1	Optimization 1	Bắt buộc	4	4		HT: Đại số tuyến tính, Giải tích 3
	MAFE309IU	Kỹ thuật phần mềm	Software Engineering	Bắt buộc	3	2	1	
	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2		HT: Chủ nghĩa xã hội khoa học
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2		
		Môn học tự chọn 2	FERM Elective #2	Tự chọn	3	3		
	MAFE310IU	Mô hình hóa và mô phỏng	Modeling and simulations		4	3	1	HT: Xác suất TQ: Thống kê
	MAFE311IU	Định giá	Asset pricing		3	3		HT: Quản trị tài chính, Tài chính doanh nghiệp
	MAFE312IU	Khai phá dữ liệu	Data mining		4	3	1	
<b>VI</b> (tổng số 19 tín chỉ)	MAFE307IU	Tối ưu 2	Optimization 2	Bắt buộc	3	3		HT: Tối ưu 1, Xác suất
	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk Management 1	Bắt buộc	3	3		
	MAFE207IU	Lý thuyết ra quyết định	Decision Making	Bắt buộc	3	3		HT: Xác suất, Tối ưu 1
	MAFE314IU	Kinh tế lượng tài chính	Financial econometrics	Bắt buộc	3	3		HT: Thống kê
	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4		HT: Xác suất
	MAFE302IU	Quá trình ngẫu nhiên	Random Processes	Bắt buộc	3	3		HT: Xác suất

<b>Học kỳ hè năm 3 (tổng số 3 tín chỉ)</b>	MAFE313IU	Thực tập hè	Summer Internship	Bắt buộc	3	3		
<b>VII (tổng số 15 tín chỉ)</b>	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	Bắt buộc	3	3		HT: Xác suất
	MAFE402IU	Quản lý danh mục đầu tư	Portfolio Management	Bắt buộc	3	3		
	MAFE403IU	Phương pháp nghiên cứu trong tài chính	Research Methods in Finance	Bắt buộc	3	3		
		Môn học tự chọn 3	FERM Elective #3	Tự chọn	3	3		
	MAFE404IU	Quản trị rủi ro tài chính 2	Financial Risk Management 2		3	3		HT: Quản trị Rủi ro tài chính 1
	MAFE411IU	Nhập môn vận trù học	Introduction to Operations research		3	3		HT: Tối ưu hóa 1
	MAFE406IU	Tính toán song song	Parallel computing		4	3	1	
		Môn học tự chọn 4	FERM Elective #4	Tự chọn	3	3		
	MAFE407IU	Toán kinh tế	Mathematical economics		3	3		HT: Giải tích 2
	MAFE410IU	Tỷ giá và Tài chính quốc tế	Exchange rates and International finance		3	3		
	MAFE412IU	Phân tích báo cáo tài chính	Financial statement analysis and business evaluation		3	3		
<b>VIII</b>	MAFE409IU	Khoá luận tốt nghiệp	GRADUATION THESIS	Bắt buộc	12	12		

<b>(tổng số 15 tín chỉ)</b>	MAFE401IU	Toán tài chính 2	Financial Mathematics 2	Bắt buộc	3	3		HT: Toán tài chính 1
	<b>Tổng</b>				179	176	3	

### 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 Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
<b>I</b> (tổng số 34 tín chỉ)	ENTP00		IE0 (week 1-7)	Bắt buộc	17	17		
	ENTP01		IE1 (week 8-14)	Bắt buộc	17	17		
<b>II</b> (tổng số 16 tín chỉ)	ENTP02		IE2	Bắt buộc	13	13		
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	3		
<b>Học kỳ hè năm 1</b>	PE015IU	Những nguyên lý cơ bản của Chủ nghĩa Mác – Lê nin	Philosophy of Marxism and Leninism	Bắt buộc	3	3		

<b>(tổng số 11 tín chỉ)</b>	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2		
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1		2	2		
	MAFE101IU	Giải tích 1	Analysis 1	Bắt buộc	4	4		
<b>III (tổng số 24 tín chỉ)</b>	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2		
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2		
	MAFE103IU	Giải tích 2	Analysis 2	Bắt buộc	4	4		HT: Giải tích 1
	MAFE104IU	Đại số tuyến tính	Linear Algebra	Bắt buộc	4	4		
	BA117IU	Kinh tế vi mô	Microeconomics	Bắt buộc	3	3		
	MAFE212IU	Kế toán tài chính	Financial Accounting	Bắt buộc	4	4		
	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism		2	2		SH: Triết học Mác-Lênin
		Môn học tự chọn 1	FERM Elective #1	Tự chọn	3	3		
	MAFE209IU	Thị trường Tài chính	Financial markets		3	3		
	MAFE210IU	Giải tích hàm	Functional analysis		4	4		TQ: Giải tích 1, Giải tích 2
	MAFE211IU	Lập trình ứng dụng Web	Web application programming		4	3	1	

<b>IV</b> (tổng số 22 tín chỉ)	MAFE201IU	Giải tích thực	Real Analysis	Bắt buộc	4	4		HT: Giải tích 2
	MAFE203IU	Giải tích 3	Analysis 3	Bắt buộc	3	3		HT: Giải tích 2
	BA119IU	Kinh tế vĩ mô	Macro Economics	Bắt buộc	3	3		
	MAFE105IU	Kinh tế Tài chính	Financial Economics	Bắt buộc	3	3		
	MAFE202IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	4		HT: Giải tích 2
	MAFE215IU	Quản lý tài chính	Financial Management	Bắt buộc	3	3		
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2		HT: Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
<b>V</b> (tổng số 20 tín chỉ)	MAFE204IU	Hệ thống quản lý dữ liệu	Database Management system	Bắt buộc	3	2	1	
	MAFE109IU	Giới thiệu về Python	Introduction to Python	Bắt buộc	4	3	1	
	MAFE206IU	Xác suất	Probability	Bắt buộc	3	3		HT: Giải tích 2 SH: Giải tích thực, Giải tích 3
	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2		HT: Chủ nghĩa xã hội khoa học
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2		
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	3		
		Môn học tự chọn 2	FERM Elective #2	Tự chọn	3	3		

	MAFE310IU	Mô hình hóa và mô phỏng	Modeling and simulations		4	3	1	HT: Xác suất TQ: Thống kê
	MAFE311IU	Định giá	Asset pricing		3	3		HT: Quản trị tài chính, Tài chính doanh nghiệp
	MAFE312IU	Khai phá dữ liệu	Data mining		4	3	1	
<b>VI</b> (tổng số 17 tín chỉ)	MAFE208IU	Giải tích số	Numerical Analysis	Bắt buộc	4	4		HT: Giải tích 3
	MAFE308IU	Quản trị rủi ro tài chính 1	Financial Risk Management 1	Bắt buộc	3	3		
	MAFE316IU	Thống kê	Statistics	Bắt buộc	4	4		HT: Xác suất
	MAFE302IU	Quá trình ngẫu nhiên	Random Processes	Bắt buộc	3	3		HT: Xác suất
	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3		
<b>Học kỳ hè năm 3</b> (tổng số 3 tín chỉ)	MAFE313IU	Thực tập hè	Summer Internship	Bắt buộc	3	3		
<b>VII</b> (tổng số 16 tín chỉ)	MAFE306IU	Toán tài chính 1	Financial Mathematics 1	Bắt buộc	3	3		HT: Xác suất
	MAFE314IU	Kinh tế lượng tài chính	Financial econometrics	Bắt buộc	3	3		HT: Thống kê
	MAFE303IU	Tối ưu 1	Optimization 1	Bắt buộc	4	4		HT: Đại số tuyến tính, Giải tích 3
	MAFE309IU	Kỹ thuật phần mềm	Software Engineering	Bắt buộc	3	2	1	
		Môn học tự chọn 3	FERM Elective #3	Tự chọn	3	3		



	MAFE404IU	Quản trị rủi ro tài chính 2	Financial Risk Management 2		3	3		HT: Quản trị Rủi ro tài chính 1
	MAFE411IU	Nhập môn vận trù học	Introduction to Operations research		3	3		HT: Tối ưu hóa 1
	MAFE406IU	Tính toán song song	Parallel computing		4	3	1	
<b>VIII</b> (tổng số 18 tín chỉ)	MAFE207IU	Lý thuyết ra quyết định	Decision Making	Bắt buộc	3	3		HT: Xác suất, Tối ưu 1
	MAFE401IU	Toán tài chính 2	Financial Mathematics 2	Bắt buộc	3	3		HT: Toán tài chính 1
	MAFE402IU	Quản lý danh mục đầu tư	Portfolio Management	Bắt buộc	3	3		
	MAFE307IU	Tối ưu 2	Optimization 2	Bắt buộc	3	3		HT: Tối ưu 1, Xác suất
	MAFE315IU	Giới thiệu về tài chính doanh nghiệp	Introduction to Corporate Finance	Bắt buộc	3	3		TQ: Kinh tế học tài chính
		Môn học tự chọn 4	FERM Elective #4	Tự chọn	3	3		
	MAFE407IU	Toán kinh tế	Mathematical economics		3	3		HT: Giải tích 2
	MAFE410IU	Tỷ giá và Tài chính quốc tế	Exchange rates and International finance		3	3		
	MAFE412IU	Phân tích báo cáo tài chính	Financial statement analysis and business evaluation		3	3		
<b>IX</b> (tổng số 15 tín chỉ)	MAFE403IU	Phương pháp nghiên cứu trong tài chính	Research Methods in Finance	Bắt buộc	3	3		
	MAFE409IU	Khoá luận tốt nghiệp	GRADUATION THESIS	Bắt buộc	12	12		
	<b>Tổng</b>				196	193	3	

**Danh sách môn học tự chọn**

	Mã MH	Tên MH	Số tín chỉ			
			Tổng số	Lý thuyết	Thực Hành	% thực hành/tổng số
FERM Elective #1 Môn học tự chọn 1						
1	MAFE209IU	Financial markets	3	3		
2	MAFE210IU	Functional analysis	4	4		
3	MAFE211IU	Web application programming	4	3	1	1/4
FERM Elective #2 Môn học tự chọn 2						
4	MAFE310IU	Modeling and simulation	4	3	1	1/4
5	MAFE311IU	Asset pricing	3	3		
6	MAFE312IU	Data mining	4	3	1	1/4
FERM Elective #3 Môn học tự chọn 3						
7	MAFE404IU	Financial Risk Management 2	3	3		
8	MAFE411IU	Introduction to Operations research	3	3		
9	MAFE406IU	Parallel computing	4	3	1	1/4
FERM Elective #4 Môn học tự chọn 4						
10	MAFE407IU	Mathematical economics	3	3		
11	MAFE410IU	Exchange rates and International finance	3	3		
12	MAFE412IU <sup>1</sup>	Financial statement analysis and business evaluation	3	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 Toán Ứng dụng (Kỹ thuật Tài chính và Quản trị rủi ro) được trình bày trong Bảng 10.

<sup>1</sup> Mã môn cũ là BA190IU

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

Học kỳ	Tên môn học <sup>(4)</sup>	Chuẩn đầu ra của CTĐT (PLO) <sup>(5)</sup>										
		a	b	c	d	e	f	g	h	i	j	k
<b>I.</b>	Writing AE1					x	x			x		x
	Listening AE1					x	x	x				x
	Analysis 1	x									x	x
	General Law											
	Micro Economics				x				x		x	x
	Introduction to Python	x				x		x	x			x
	Physical Training 1							x				x
<b>II.</b>	Writing AE2					x	x		x	x		x
	Speaking AE2					x	x	x		x		x
	Analysis 2	x									x	x
	Linear Algebra	x	x	x								x
	Financial Economics											
	Marco Economics	x		x	x						x	x
	Physical Training 2							x				x
<b>III.</b>	Real Analysis	x							x			
	Analysis 3	x							x	x		x
	Financial Accounting											
	Database Management system	x		x	x				x		x	x
	Philosophy of Marxism and Leninism							x		x		x
<b>FERM Elective #1</b>	Financial markets	x	x	x	x	x	x	x	x	x	x	x
	Functional analysis	x							x	x		x
	Web application programming	x				x		x			x	
<b>IV</b>	Probability	x								x		
	Differential Equations	x		x						x	x	x
	Introduction to Corporate Finance	x	x	x	x	x	x	x	x	x	x	x
	Numerical Analysis	x	x	x								x
	Financial Management	x		x						x	x	
	Political economics of Marxism and Leninism							x		x		x
<b>V</b>	Statistics	x	x	x							x	x
	Random Processes	x	x						x			
	Optimization 1	x	x									x
	Software Engineering	x				x	x		x			
	Scientific socialism							x	x	x		
<b>FERM Elective #2</b>	Modeling and simulation	x		x					x		x	x
	Asset pricing	x	x	x	x	x	x	x	x	x	x	x
	Data mining			x	x	x	x	x	x		x	
<b>VI</b>	Financial Mathematics 1	x	x	x					x	x	x	
	Optimization 2	x	x	x					x	x	x	x

	Financial Risk Management 1	x	x							x	x	x
	Decision Making	x	x	x					x	x	x	x
	Financial econometrics	x	x	x	x	x	x	x	x	x	x	x
	History of Vietnamese Communist Party							x	x		x	x
	Ho Chi Minh's Thoughts											
<i>Summer Semester 3</i>	MAFE313IU-Summer Internship	x		x	x	x	x	x	x		x	x
<b>VII</b>	Financial Mathematics 2	x			x	x			x		x	
	Portfolio Management	x	x	x	x				x		x	
	Research Methods in Finance	x	x	x	x	x	x	x	x		x	
<b>FERM Elective #3</b>	Financial Risk Management 2											
	Introduction to Operations research	x									x	x
	Parallel computing	x				x	x		x			
<b>FERM Elective #4</b>	Mathematical economics	x	x		x						x	x
	Exchange rates and International finance	x	x						x	x		x
	Financial statement analysis and business evaluation	x	x	x		x						x
<b>VIII</b>	MAFE409IU Graduation thesis	x	x	x	x	x	x	x	x	x	x	x

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

### Học kỳ I

**1. Tên môn học:** (Tiếng Anh chuyên ngành 1 - Kỹ năng Viết (EN007IU), English 1-Writing)

**Số tín chỉ:** 2 (2,0)

**Môn học tiên quyết:** sinh viên phải đạt TOEFL pBT 500 hoặc TOEFL iBT 60

**Mô tả vắn tắt nội dung:** Môn học nhằm nâng cao kỹ năng viết trình độ tiên nâng cao (pre-advanced). Chương trình tập trung vào việc xây dựng bài luận dựa trên các kỹ năng viết như: làm dàn bài, viết câu luận đề, kết nối và sắp xếp trình tự các đoạn, dung từ và cụm từ nối để tạo sự mạch lạc cho bài văn. Các thể loại bao gồm: miêu tả người, đồ vật, qui trình, trình bày ý kiến, so sánh và đối chiếu, nguyên nhân – kết quả, vấn đề - giải pháp, nghị luận

**2. Tên môn học:** (Tiếng Anh chuyên ngành 1- Kỹ năng Nghe (EN008IU), English 1-Listening)

**Số tín chỉ:** 2 (2,0)

**Môn học tiên quyết:** sinh viên phải đạt TOEFL pBT 500 hoặc TOEFL iBT 60

**Mô tả vắn tắt nội dung:** Những kỹ năng nghe tiếng Anh học thuật, ghi chú, và thảo luận sẽ giúp sinh viên làm quen với những khó khăn trong việc học tiếng Anh ở đại học. Sinh viên sẽ học các kỹ năng cần thiết cho sinh viên đại học quốc tế, bao gồm: nghe bài giảng chủ động, ghi chú hiệu quả, tham gia thảo luận tự tin. Cùng với các kỹ năng nghe, sinh viên cũng sẽ trau dồi thêm vốn từ vựng học thuật.

**3. Tên môn học (mã số):** Giải tích 1 (MAFE101IU), Analysis 1)

**Thời lượng:** 4 tín chỉ

**Môn học tiên quyết:** không có

**Mô tả vắn tắt nội dung môn học:** Là môn học cơ bản, giảng dạy cho sinh viên học kỳ 1, năm thứ 1 ngành Kỹ thuật Tài chính và Quản trị Rủi ro.

Nội dung chính: Logic, Các tính chất của tập số thực, Dãy số và giới hạn, Giới hạn hàm số, Tính liên tục, Đạo hàm và vi phân, Đạo hàm của các hàm số sơ cấp cơ bản, Quy tắc tính đạo hàm, Định lý giá trị trung bình và ứng dụng, Quy tắc L'Hospital, Định lý Taylor, Ứng dụng của đạo hàm.

**4. Tên môn học:** Pháp luật đại cương (PE021IU), General law

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Môn học sẽ giới thiệu cho sinh viên hệ thống pháp luật Việt Nam. Đặc biệt, học viên sẽ hiểu được 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 đảm bảo công lý, trong đó có việc chấm dứt tham nhũng trong xã hội.

**5. Tên môn học:** Kinh tế vi mô (BA117IU), Micro Economics

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Các kiến thức trong chủ đề này sẽ cho phép sinh viên hiểu biết không chỉ các khái niệm về kinh tế và nguồn lực khan hiếm, về thị trường và các thành tố của nó mà còn có thể đánh giá những dạng cấu trúc thị trường khác nhau cũng như các can thiệp của chính phủ vào thị trường. Môn học này cũng cung cấp cho sinh viên những khả năng cần thiết để đánh giá các yếu tố về hiệu quả của nền kinh tế. Tất cả các khái niệm và kiến thức này giúp cho sinh viên lập kế hoạch cho một doanh nghiệp trong ngắn hạn và dài hạn phát triển một cách hiệu quả hơn nhờ vào việc xem xét các ảnh hưởng của chính sách chính phủ.

**6. Tên môn học:** Introduction to Python (MAFE109IU), Lập Trình Python

**Số tín chỉ:** 4(3, 1)

**Môn học tiên quyết:** Không

**Mô tả vắn tắt nội dung:** Môn học giới thiệu bốn chủ đề của lập trình Python bao gồm: lập trình; cấu trúc dữ liệu; giới thiệu về Numpy, Pandas, Matplotlib; và lập trình hướng đối tượng.

## **Học kỳ II**

**1. Tên môn học:** Tiếng Anh chuyên ngành 2 - Kỹ năng Viết (EN011IU), English 2 - Writing

**Số tín chỉ:** 2(2,0)

**Môn học tiên quyết:** Tiếng anh chuyên ngành 1 (Kỹ năng Viết)

**Mô tả vắn tắt nội dung:** Khóa học nhằm cung cấp một cách tổng quát cấu trúc của một bài viết báo cáo nghiên cứu, từng bước giúp sinh viên hoàn tất một bài viết cụ thể trong lĩnh vực của mình. Nội dung của khóa học bao gồm: các thành phần của bài báo cáo, kỹ năng chọn và giới hạn đề tài, viết câu luận đề, làm dàn bài, tìm và dẫn chứng tài liệu, ghi chú, viết mở bài, nội dung chính và kết luận, viết và sửa chữa bản nháp. Sinh viên sẽ thực hành trên các đề tài liên quan đến môn học của mình.

**2. Tên môn học:** Tiếng Anh chuyên ngành 2 - Kỹ năng Nói (EN012IU), English 2-Speaking

**Số tín chỉ:** 2 (2,0)

**Môn học tiên quyết:** Sinh viên phải đạt Toefl pBT 500 hoặc Toefl iBT 60

**Mô tả vắn tắt nội dung:** Môn học cung cấp cho sinh viên các chiến lược thiết thực sử dụng trong việc thuyết trình. Ngoài ra sinh viên được giúp đỡ hình thành kỹ năng lắng nghe, nhận xét và nêu ý kiến phản hồi đối với các bài thuyết trình khác trong lớp.

**3. Tên môn học (mã số):** Giải tích 2 (MAFE103IU), Analysis 2

**Thời lượng:** 4 (4,0)

**Môn học trước:** Giải tích 1

**Mô tả vắn tắt nội dung môn học:** Là môn học cơ bản tiếp theo Giải tích 1, giảng dạy cho sinh viên học kỳ 2, năm thứ 1 ngành Kỹ thuật Tài chính và Quản trị Rủi ro. Nội dung chính: tích phân Riemann, cách phương pháp tính tích phân, định lý cơ bản của giải tích, tích phân suy rộng, áp dụng tích phân tính diện tích, thể tích, độ dài cung và một số đại lượng trong kinh tế kỹ thuật.

**4. Tên môn học:** Đại số tuyến tính (MAFE104IU), Linear Algebra

**Thời lượng:** 4 (3,1) tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Hệ phương trình tuyến tính, ma trận, định thức, không gian vector, phép biến đổi tuyến tính, Vector riêng và giá trị riêng

**5. Tên môn học:** Kinh tế vĩ mô (BA119IU), Microeconomics

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Môn học này cung cấp cho sinh viên những kiến thức để hiểu biết về các chủ đề rộng về kinh tế của một quốc gia hay một khu vực và đánh giá những chính sách kinh tế vĩ mô cũng như những thay đổi của nền kinh tế cả trên phạm vi quốc gia và thế giới. Môn học này sẽ cung cấp cho sinh viên khả năng cần thiết để đánh giá các hợp phần kinh tế như một tổng thể. Tất cả các khái niệm và kiến thức này giúp cho sinh viên lập kế hoạch cho một doanh nghiệp trong ngắn hạn và dài hạn phát triển một cách hiệu quả hơn nhờ vào việc xem xét các ảnh hưởng của chính sách vĩ mô của chính phủ.

**6. Tên môn học:** Kinh tế tài chính học (MAFE105IU), Financial Economics

**Thời lượng:** 3

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Môn học này cung cấp và bổ sung kiến thức nền tảng tài chính cho sinh viên. Đặc biệt môn học sẽ tập trung về giá trị của đồng tiền theo thời gian, các mô hình cơ bản trong các hoạt động tiết kiệm và đầu tư tài chính, quy trình quản trị rủi ro tài chính.

**7. Tên môn học:** Kinh tế Vĩ mô

### **Học kỳ III**

**1. Tên môn học:** Giải tích thực (MAFE201IU), Real Analysis

**Thời lượng:** 4 (4,0)

**Môn học trước:** Giải tích 2

**Mô tả nội dung:** Môn học nhằm giúp sinh viên nắm được 4 chủ đề chính của Giải Tích Thực: Các khái niệm về khoảng cách, không gian mêtric và những khái niệm gắn kết với không gian mêtric như sự hội tụ, ánh xạ liên tục giữa các không gian mêtric, không gian đầy đủ, không gian compact, v.v.

Lý thuyết độ đo

Tích phân Lebesgue và

Lý thuyết về đạo hàm của hàm số thực và của độ đo.

Các chuyên đề được trình bày ở dạng tổng quát nhưng chọn lọc cho phù hợp nhất với sinh viên ngành Toán ứng dụng

**2. Tên môn học (mã số):** Giải tích 3 (MAFE203IU), Analysis 3

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Sinh viên đã học môn Giải tích 2

**Mô tả vắn tắt nội dung môn học:** Là môn học cơ bản tiếp theo Giải tích 1 và 2, giảng dạy cho sinh viên học kỳ 1, năm thứ 2 ngành Kỹ thuật Tài chính và Quản trị Rủi ro. Nội dung chính: đạo hàm riêng, tích phân bội, tích phân đường và tích phân mặt, cùng các phương pháp tính.

**3. Tên môn học:** Kế Toán tài chính (MAFE212IU), Financial Accounting

**Thời lượng:** 4 tín chỉ

**Môn học tiên quyết:** không

**Mô tả môn học:** Môn học cung cấp các kiến thức cơ bản về các lý thuyết, nguyên tắc và ứng dụng của kế toán và báo cáo tài chính, những yếu tố cần thiết theo tiêu chuẩn Hoa Kỳ, bao gồm các chủ đề như lý thuyết ghi nợ và tín dụng, tài khoản, nhật ký đặc biệt, chu kỳ kế toán, ghi chú và lãi suất, các khoản dồn tích và trả chậm, tiền mặt, các khoản phải thu, hàng tồn kho, tài sản cố định và việc lập báo cáo tài chính. Nói chung, mục đích chính của nó là 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. người sử dụng thông tin kế toán.

**4. Tên môn học (mã số):** Hệ quản trị cơ sở dữ liệu (MAFE204IU), Database management system

**Thời lượng:** 3(2,1)

**Môn học tiên quyết:** không

**Mô tả môn học:** Môn học giới thiệu tổng quan về các mô hình cho hệ quản trị cơ sở dữ liệu. Môn học tập trung vào phương pháp thiết kế cơ sở dữ liệu; phát triển và sử dụng cơ sở dữ liệu vào thực tế với hệ quản trị cơ sở dữ liệu theo mô hình quan hệ.

**5. Tên môn học:** Triết học Mác-Lênin (PE015IU), Philosophy of Marxism and Leninism

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** 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 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.

**Môn Tự chọn 1**



**1. Tên môn học:** Thị trường tài chính (MAFE209IU), Financial markets

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Môn học này cung cấp sinh viên kiến thức và hiểu về vai trò của các tổ chức tài chính trung gian của nhà nước trong thị trường tài chính. Phân biệt giữa tổ chức tài chính có ký quỹ và không ký quỹ. Hiểu và phân tích được cơ cấu hoạt động của thị trường tài chính. Phân biệt giữa các loại thị trường như cổ phiếu, tiền tệ, trái phiếu và các ngành tài chính khác nhau.

**2. Tên môn học (mã số):** Giải tích hàm (MAFE210IU), Functional Analysis

**Thời lượng:** 4 tín chỉ

**Môn học tiên quyết:** Giải tích 1, Giải tích 2

**Mô tả vắn tắt nội dung môn học:** Là môn học về cơ sở toán, giảng dạy cho sinh viên năm thứ 2 ngành Kỹ thuật Tài chính và Quản trị Rủi ro. Nội dung chính: các không gian tổng quát quan trọng: không gian tô pô, không gian metric, không gian định chuẩn, phiếm hàm và toán tử tuyến tính, một số tính chất và định lý quan trọng, một số không gian cụ thể và phiếm hàm tuyến tính trên đó.

**3. Tên môn học (mã số):** Lập trình ứng dụng Web (MAFE211IU), Web application programming

**Thời lượng:** 4(3,1)

**Môn học tiên quyết:** không

**Mô tả nội dung:** Giới thiệu các khái niệm cơ bản trong lập trình web như lập trình phía client, lập trình phía server. Giới thiệu cú pháp của các ngôn ngữ lập trình web, công cụ và môi trường phát triển thông dụng như HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks as Ajax and Struts.

#### **Học kỳ IV.**

**1. Tên môn học (mã số):** Xác suất (MAFE206IU), Probability

**Thời lượng:** 3(3,0)

**Môn học trước:** Giải tích 2. Hai môn song hành là: Giải tích 3, Giải tích thực.

**Mô tả vắn tắt nội dung môn học:** Môn học trình bày lý thuyết xác suất theo quan điểm độ đo. Nội dung chính bao gồm kiến thức về các biến cố (độc lập, có điều kiện, ...), các biến ngẫu nhiên, phân phối, kỳ vọng, phương sai và các định lý giới hạn quan trọng trong xác suất (định lý giới hạn trung tâm, luật số lớn, ...).

**2. Tên môn học:** Phương trình vi phân (MAFE202IU), Differential Equations

**Thời lượng:** 4 (4,0)

**Môn học trước:** Giải tích 2

**Mô tả nội dung:** Phương trình vi phân bậc một, bậc hai; Hệ phương trình vi phân cấp một tuyến tính; Các phương pháp số; Phương trình đạo hàm riêng

**3. Tên môn học:** Quản trị tài chính (MAFE215IU), Financial Management

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết (các môn học phải học trước):** không

**Mô tả môn học:** Kiến thức về những nguyên tắc tài chính tạo thuận lợi cho các nhà quản lý ở hầu hết các lĩnh vực của kinh doanh. Môn học này được thiết kế nhằm giới thiệu về tài chính và là môn tiên quyết cho môn Tài chính doanh nghiệp bao gồm nhiều đề tài chuyên sâu hơn. Những nội dung cơ bản về phân tích báo cáo tài chính, về giá trị thời gian của tiền tệ, định giá chứng khoán, xác định mức rủi ro và chi phí vốn được đề cập chi tiết trong môn học này. Ngoài ra, sinh viên sẽ học về cách thức các thị trường tài chính hoạt động, về các loại chứng khoán và các công cụ tài chính khác nhau, và cách quản lý dòng tiền

**4. Tên môn học:** Giải tích số (MAFE208IU), Numerical Analysis

**Thời lượng:** 4 (4,0)

**Môn học trước:** Giải tích 3

**Mô tả nội dung:** Giới thiệu về MATLAB, sai số, Nghiệm của phương trình một ẩn, Phép nội suy và xấp xỉ đa thức, Đạo hàm và Tích phân số, Bài toán giá trị đầu cho phương trình vi phân, Hệ phương trình đại số tuyến tính, Nghiệm số của phương trình đạo hàm riêng.

**5. Tên môn học:** Nhập môn Tài chính doanh nghiệp (MAFE315IU), Introduction to Corporate Finance

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Kinh tế tài chính học

**Mô tả nội dung:** Môn học này nghiên cứu những vấn đề nâng cao trong quản trị tài chính doanh nghiệp, với trọng tâm là các vấn đề như cấu trúc vốn của doanh nghiệp, ra quyết định đầu tư trong doanh nghiệp sử dụng đòn bẩy tài chính, chính sách cổ tức, và các vấn đề liên quan đến thôn tính và sáp nhập doanh nghiệp. Các bài báo khoa học và các ví dụ thực tiễn sẽ được thảo luận trên lớp nhằm cập nhật cho sinh viên những nghiên cứu mang tính học thuật và cũng như thực tiễn của doanh nghiệp Việt Nam

**6. Tên môn học:** Kinh tế chính trị Mác-Lênin (PE016IU), Political economics of Marxism and Leninism

**Thời lượng:** 3 tín chỉ

## **Môn học song hành:** Triết học Mác-Lênin

**Mô tả nội dung:** 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 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.

### **Học kỳ V**

#### **1. Tên môn học:** Thống kê (MAFE316IU), Statistics

**Thời lượng:** 4 tín chỉ

**Môn học tiên quyết:** SV đã học môn Xác suất

**Mô tả nội dung** Thống kê mô tả, phân bố mẫu, ước lượng tham số, khoảng tin cậy, kiểm định giả thuyết, so sánh hai đám đông, phân tích phương sai, hồi quy, thực hành các nội dung trên ngôn ngữ R, Matlab, và Excel

**2. Tên môn học (mã số):** Quá trình ngẫu nhiên (MAFE302IU), Random processes (Stochastic processes)

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** SV đã học môn Xác suất

**Mô tả vắn tắt nội dung môn học:** Môn học bao gồm các kiến thức cơ bản về các quá trình ngẫu nhiên, phép tính tích phân, phương trình vi phân ngẫu nhiên.

#### **3. Tên môn học (mã số):** Tối ưu hóa 1 (MAFE303IU), Optimization 1

**Thời lượng:** 4 (4,0)

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

**Mô tả vắn tắt nội dung môn học:** Là môn học cơ bản đầu tiên về tối ưu hóa cho ngành Kỹ thuật Tài chính và Quản trị Rủi ro. Nội dung chính của môn học bao gồm:

- Các yếu tố cơ bản của giải tích lồi
- Bài toán quy hoạch tuyến tính: các mô hình thực tế (đặc biệt là các bài toán trong tài chính), các tính chất của bài toán qui hoạch tuyến tính, phương pháp đơn hình, đối ngẫu.
- Quy hoạch phi tuyến, Tối ưu không ràng buộc: điều kiện tối ưu Karush-Kuhn-Tucker, bài toán lồi, một số phương pháp giải (phương pháp đường dốc nhất, phương pháp Newton, phương pháp hướng liên hợp, các phương pháp tựa Newton).
- Quy hoạch phi tuyến, Tối ưu có ràng buộc: điều kiện tối ưu Karush-Kuhn-Tucker, một số phương pháp giải (phương pháp chiếu gradient, phương pháp hàm phạt, phương pháp hàm chắn, phương pháp đối ngẫu).

Các mô hình tối ưu trong tài chính và trong quản trị rủi ro.

**4. Tên môn học (mã số):** Kỹ thuật phần mềm (MAFE309IU), Software Engineering

**Thời lượng:** 3(2,1)

**Môn học tiên quyết:** không

**Mô tả nội dung:** Sinh viên sẽ học các khía cạnh trong việc phát triển phần mềm như thiết kế phần mềm (thiết hướng đối tượng, architectural design), thiết kế giao diện người dùng, kiểm thử, ước lượng chi phí.

**5. Tên môn học:** Chủ nghĩa xã hội khoa học (PE017IU), Scientific Socialism

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin

**Mô tả nội dung:** 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.

## **Môn tự chọn 2**

**1. Tên môn học:** Mô hình hóa và mô phỏng (MAFE310IU), Modeling and simulations

**Thời lượng:** 4 (3,1)

**Môn học trước:** Xác suất

**Môn học tiên quyết:** Thống kê

**Mô tả vắn tắt nội dung môn học:** Mô hình hóa, mô phỏng và phân tích các mô hình tài chính và quản trị rủi ro, mô phỏng liên tục và rời rạc ở nhiều cấp độ trong các phần mềm mô phỏng, phân tích các khía cạnh về thống kê trong mô phỏng, bao gồm: phân tích các yếu tố đầu vào, phát trạng thái ngẫu nhiên, phân tích kết quả đầu ra, và các kỹ thuật giảm phương sai. Sinh viên sẽ thu được kinh nghiệm xây dựng mô hình mô phỏng thông qua các bài tập về mô phỏng các mô hình tài chính và quản trị rủi ro.

**2. Tên môn học:** Định giá (MAFE311IU), Asset pricing

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Quản trị tài chính, Tài chính doanh nghiệp

**Mô tả nội dung:** Định giá là một môn học cổ điển từ khi ra đời các môn học cơ bản về tài chính và cấu trúc tài chính của Merton Miller and Franco Modigliani. Dựa trên mô hình này, chúng ta sẽ phát triển các mô hình phổ biến và hiện đại về định giá tài sản và doanh nghiệp trong các môi trường và điều kiện khác nhau. Đặc biệt môn học sẽ đi sâu vào

các mô hình của giáo sư Alfred Rappaport và Joel Stern (Stern Stewart & Co.) với các ứng dụng trong thực tiễn.

**3. Tên môn học:** Khai phá dữ liệu (MAFE312IU), Data Mining

**Thời lượng:** 4(3,1) tín chỉ

**Môn học tiên quyết:** Không

**Mô tả môn học:** Môn học này cung cấp cho sinh viên quy trình khai thác dữ liệu, kho dữ liệu và các công cụ kỹ thuật để khai thác dữ liệu như thuật toán phân loại, mạng nơ-ron.

### Học kỳ VI

**1. Tên môn học (mã số):** Toán Tài Chính 1 (MAFE306IU), Financial Mathematics 1

**Thời lượng:** 3

**Môn học trước:** SV đã học môn Xác suất

**Mô tả vắn tắt nội dung môn học:** Môn học cung cấp các khái niệm, công cụ toán tương ứng với các khái niệm trong tài chính: lợi nhuận, lãi suất, dòng tiền, trái phiếu, danh mục đầu tư, định giá tài sản, các nguyên lý cơ bản của tài chính.

**2. Tên môn học (mã số):** Tối ưu hóa 2 (MAFE307IU), Optimization 2

**Thời lượng:** 3 (3,0)

**Môn học trước:** Xác suất, Tối ưu hóa 1

**Mô tả vắn tắt nội dung môn học:** Tối ưu hoá 2 chia thành 2 phần: Tối ưu hóa tuyến tính áp dụng và cơ sở tối ưu hóa tuyến tính đa mục tiêu (tắt định và ngẫu nhiên), nhằm cung cấp cho sinh viên ngành Kỹ thuật Tài chính và Quản trị Rủi ro các áp dụng của lý thuyết quy hoạch tuyến tính học ở môn Optimization 1 và kiến thức nâng cao về tối ưu hoá, bao gồm các bài toán quy hoạch tuyến tính đa mục tiêu, mô hình với các điều kiện không chắc chắn hoặc với sự hiện diện của các yếu tố ngẫu nhiên (stochastic). Nội dung chính bao gồm: Các bài toán dòng trên mạng, các bài toán vận tải, các bài toán tối ưu tuyến tính (tắt định, ngẫu nhiên) đa mục tiêu.

**3. Tên môn học:** Quản trị rủi ro tài chính 1 (MAFE308IU), Financial Risk Management 1

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Xác suất

**Mô tả nội dung:** Môn học giới thiệu về lịch sử và sự phát triển của các hoạt động quản trị rủi ro trên thế giới nhằm giúp sinh viên có một cách nhìn tổng quan về ngành quản trị rủi ro và xu hướng phát triển của ngành quản trị rủi ro tài chính trong tương lai tại Việt

Nam. Sau đó môn học sẽ giới thiệu về các kỹ thuật cơ bản trong hoạt động quản trị rủi ro tài chính đặc biệt về các phương pháp xác định và đo lường rủi ro. Cuối cùng, môn học sẽ tìm hiểu một số trường hợp sử dụng phái sinh tài chính để giảm thiểu rủi ro tài chính cho doanh nghiệp kinh doanh và doanh nghiệp tài chính.

**4. Tên môn học:** Kỹ thuật ra quyết định (MAFE207IU), Decision making

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Sinh viên đã học môn Xác suất và Tối ưu hóa 1

**Mô tả môn học:** Ra quyết định là một trong những phần quan trọng trong hoạt động nghiên cứu và khoa học quản lý. Kỹ thuật ra quyết định giúp các nhà quản lý lựa chọn các phương án tốt nhất trên cơ sở các tiêu chí định lượng. Khóa học này cung cấp cho sinh viên những kiến thức cơ bản về các mô hình ra quyết định, qua đó sinh viên sẽ ra quyết định dựa trên các mô hình này. Ngoài ra khóa học còn cung cấp cho sinh viên những kỹ thuật đặc biệt để ứng dụng thực tiễn vào thực tế.

**5. Tên môn học:** Kinh tế lượng trong tài chính (MAFE314IU), Financial Econometrics

**Thời lượng:** 3 tín chỉ

**Môn học trước:** Sinh viên đã học môn Thống kê

**Mô tả nội dung:** Môn học giúp cho sinh viên tìm hiểu về các mô hình và khả năng ứng dụng mô hình kinh tế lượng đối với hoạt động tài chính trong thực tiễn, gồm mô hình chuỗi thời gian (time-series) và dữ liệu dạng bảng (panel data) để dự báo và đánh giá hiệu quả các tài sản tài chính như trái phiếu, cổ phiếu và các chứng khoán phái sinh cũng như xem xét độ biến thiên và các độ liên kết trong dài hạn giữa các loại tài sản tài chính này.

**6. Tên môn học:** Lịch sử Đảng Cộng Sản Việt Nam (PE018IU), History of Vietnamese Communist Party

**Số tín chỉ:** 2(2,0)

**Môn học trước:** Chủ nghĩa xã hội khoa học

**Mô tả môn học:** 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 kháng chiến chống thực dân Pháp và đế quốc Mỹ xâm lược (1945-1975), trong sự nghiệp xây dựng, bảo vệ tổ quốc thời kỳ cả nước quá độ lên chủ nghĩa xã hội, tiến hành công cuộc đổi mới (1975-2018).

**7. Tên môn học:** Tư tưởng Hồ Chí Minh (PE019IU), Ho Chi Minh's thoughts

**Số tín chỉ:** 2(2,0)

**Môn học trước:** Chủ nghĩa xã hội khoa học

**Mục tiêu môn học:** Cung cấp những hiểu biết có tính hệ thống về tư tưởng, đạo đức, giá trị văn hoá, Hồ Chí Minh. Tiếp tục cung cấp những kiến thức cơ bản về chủ nghĩa Mác - Lênin. Cùng với môn học *Những nguyên lý cơ bản của chủ nghĩa Mác-Lênin* tạo lập những hiểu biết về nền tảng tư tưởng, kim chỉ nam hành động của Đảng và của cách mạng nước ta. Góp phần xây dựng nền tảng đạo đức con người mới.

### **Học kỳ hè (Năm 3)**

**Tên môn học:** Thực tập hè (MAFE313IU), Summer Internship

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Thực tập mùa hè là khóa học bắt buộc. Khóa học này được giảng viên hướng dẫn học thuật và một người giám sát thực tập phía công ty thực tập hướng dẫn. Môn học có mục tiêu giúp sinh viên có tư duy phản biện, giải quyết vấn đề dựa trên dự án. Sinh viên diễn đạt suy nghĩ và ý tưởng một cách rõ ràng trong công ty và hiệu quả. Môn học còn giúp sinh viên phát triển khả năng làm việc nhóm, xây dựng các mối quan hệ hợp tác với đồng nghiệp và khách hàng trong ngành có sự đa dạng về nền văn hóa, độ tuổi, giới tính, tôn giáo, lối sống và quan điểm khác nhau. Sinh viên học tập được kiến thức và kinh nghiệm của mình liên quan đến vị trí mong muốn và mục tiêu nghề nghiệp và xác định các lĩnh vực cần thiết cho sự phát triển chuyên nghiệp. Môn học giúp sinh viên có sự chuyên nghiệp và đạo đức làm việc, thể hiện thói quen làm việc hiệu quả.

### **Học kỳ VII**

**1. Tên môn học:** Toán tài chính 2 (MAFE401IU), Financial Mathematics 2

**Thời lượng:** 3(3,0)

**Môn học trước:** Toán tài chính 1

**Mô tả nội dung:** Các kiến thức trong chủ đề này sẽ cho phép sinh viên hiểu về các mô hình toán tài chính ứng dụng trong ngành tài chính. Môn học sẽ bắt đầu với ôn lại những kiến thức toán và xác suất thống kê liên quan tới lĩnh vực toán tài chính. Sau đó, chúng ta sẽ nghiên cứu chi tiết các mô hình định giá quyền chọn Black-Scholes, quản trị rủi ro và quản trị danh mục đầu tư. Trước khi kết thúc môn học, chúng ta sẽ nghiên cứu các chủ đề nâng cao trong lĩnh vực toán tài chính qua các bài nghiên cứu quan trọng gần đây đăng bởi các tạp chí tài chính quốc tế uy tín.

**2. Tên môn học:** Quản Trị Danh Mục Đầu Tư (MAFE402IU), Portfolio management

**Thời lượng:** 3

**Môn học tiên quyết:** Không

**Mô tả nội dung:** Sinh viên được cung cấp: giới thiệu về lý thuyết quản lý danh mục hiện đại, các chiến lược quản trị danh mục, các mô hình định giá công cụ tài chính, đánh

giá rủi ro và thu nhận theo các tiêu chuẩn, mô hình CAPM và các vấn đề khác trong tài chính.

**3. Tên môn học (mã số):** Phương pháp nghiên cứu trong tài chính (MAFE403IU), Research Methods in finance

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** SV đã học môn Kinh tế lượng trong tài chính.

**Mô tả vắn tắt nội dung môn học:** Môn học giúp cho sinh viên có hiểu biết và khả năng ứng dụng các phương pháp toán học và định lượng nâng cao để đặc trưng hóa dữ liệu tài chính, xây dựng, ước lượng và kiểm định các mô hình tương quan. Môn học cũng sẽ tập trung vào các mô hình nâng cao để dự báo độ biến động chuỗi thời gian, và sử dụng các phương pháp mô phỏng.

### **Môn lựa chọn 3**

**1. Tên môn học:** Quản trị Rủi ro tài chính 2 (MAFE404IU), Financial Risk Management 2

**Thời lượng:** 3

**Môn học trước:** Quản trị Rủi ro tài chính 1

**Mô tả nội dung:** Các kiến thức trong chủ đề này sẽ cho phép sinh viên hiểu biết chi tiết các thức quản trị rủi ro dựa trên công cụ Value-at-risk. Môn học sẽ giới thiệu về cách đo lường rủi ro đơn giản đến những mô hình phức tạp của công cụ Value-at-risk.

**2. Tên môn học (mã số):** Nhập môn Vận trù học (MAFE411IU), Introduction to Operations Research

**Thời lượng:** 3

**Môn học trước:** SV đã học môn Tối ưu hóa 1

**Mô tả vắn tắt nội dung môn học:** Phần đầu môn học cung cấp cho sinh viên kiến thức cơ bản về lý thuyết quy hoạch nguyên và các áp dụng vào các bài toán thực tế. Sau đó sinh viên được học các bài toán quan trọng trong vận trù học như bài toán dòng trên mạng, bài toán quản lý dự án, Bài toán cân bằng, lý thuyết ra quyết định. Với từng loại bài toán, sinh viên được làm quen với các mô hình cụ thể và thực tập giải chúng với các phần mềm phù hợp trên máy tính trong giờ thực hành.

**3. Tên môn học (mã số):** Tính toán song song (MAFE406IU), Parallel computing

**Thời lượng:** 4(3,1)

**Môn học tiên quyết:** không



**Mô tả nội dung:** Môn học đề cập các thuật ngữ trong lập trình song song, kiến trúc bộ nhớ, các mô hình lập trình như threads model, Message Passing model, data parallel model.

#### **Môn lựa chọn 4**

**1. Tên môn học (mã số):** Toán kinh tế (MAFE407IU), Mathematical Economics

**Thời lượng:** 3 (3,0)

**Môn học trước:** Giải tích 2

**Mô tả vắn tắt nội dung môn học:** Là môn học cơ bản về áp dụng toán học vào các mô hình kinh tế, cho sinh viên năm thứ 2 hoặc 3 ngành Kỹ thuật Tài chính và Quản lý Rủi ro. Nội dung chính: bổ sung kiến thức về quy hoạch phi tuyến, tập tiêu thụ, hàm công dụng, thị trường phúc lợi, lý thuyết về nhu cầu, cân bằng cạnh tranh và sự ổn định của cân bằng này, tăng trưởng tối ưu.

**2. Tên môn học:** Tỷ giá và Tài chính quốc tế (MAFE410IU), Exchange rates and International Finance

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Kinh tế vĩ mô

**Mô tả nội dung:** Tài chính quốc tế đóng vai trò quan trọng trong nền kinh tế cả trên tầm vĩ mô và vi mô. Môn học này cung cấp những khái niệm cơ bản trong tài chính quốc tế, từ khái niệm về tỷ giá, thị trường ngoại hối, cho đến khái niệm về cán cân thanh toán quốc tế và lịch sử về các chế độ tỷ giá của các nước từ sau chiến tranh thế giới thứ hai. Môn học cũng đi sâu phân tích các lý thuyết cơ bản như thuyết ngang giá sức mua và thuyết ngang giá lãi suất để làm nền tảng cho việc giới thiệu các mô hình kinh tế về tỷ giá hối đoái, như mô hình của Mundell-Fleming và mô hình Dornbusch. Cuối cùng môn học thảo luận các vấn đề liên quan đến khu vực đồng tiền chung, với ví dụ điển hình là khu vực đồng tiền chung châu Âu (EMU).

**3. Tên môn học:** Phân tích báo cáo tài chính (MAFE412IU), Financial Statement analysis and Business evaluation

**Thời lượng:** 3 tín chỉ

**Môn học tiên quyết:** Không

**Mô tả môn học:** Môn học này đặt nền tảng trên các khái niệm của kinh tế học tài chính, chiến lược kinh doanh, kế toán và các nguyên lý kinh doanh khác nhằm đánh giá các quyết định kinh doanh trong các điều kiện khác nhau. Môn học này có ích cho các sinh viên mong muốn phát triển nghề nghiệp trong các lĩnh vực ngân hàng đầu tư, phân tích chứng khoán, phân tích tín dụng, tư vấn, tài chính công và quản trị doanh nghiệp

Môn học nhấn mạnh các ứng dụng thực tiễn. Vì vậy, phần lớn thời gian của môn học sẽ dành cho việc phân tích, thảo luận các trường hợp liên quan đến các báo cáo tài chính trong các hoàn cảnh ra quyết định thực tế. Cách tiếp cận này được bổ sung bằng các bài giảng, thảo luận các tài liệu trong sách giáo khoa hay các bài báo tài chính.

### **Học kỳ VIII**

**Tên môn học:** Khóa luận tốt nghiệp (MAFE409IU), Graduation Thesis

**Thời lượng:** 12 tín chỉ

**Yêu cầu và điều kiện tiên quyết cần thiết để SV làm LVTN:**

1. Sinh viên phải duy trì điểm GPA tích lũy tối thiểu là 50 trở lên.
2. Sinh viên phải có tối thiểu 90% tín chỉ tích lũy của CTĐT.

**Mô tả nội dung:** Luận văn tốt nghiệp đáp ứng yêu cầu nghiên cứu để hoàn thành chương trình Cử nhân ngành Toán ứng dụng. Dưới sự hướng dẫn của giảng viên (GV), sinh viên và giảng viên hướng dẫn (GVHD) cần đề xuất đề tài cho khóa luận tốt nghiệp vào đầu mỗi học kỳ. Thực hiện nghiên cứu luận văn tốt nghiệp giúp sinh viên phát triển khả năng nghiên cứu độc lập, viết báo cáo khoa học, phát triển tư duy phản biện, tư duy độc lập và giao tiếp hiệu quả. Sinh viên sẽ làm việc trực tiếp với GVHD luận văn để xác định các thời gian gặp và lập kế hoạch giao tiếp trong suốt quá trình hoàn thành khóa luận.

Sinh viên cần nộp đề cương nghiên cứu trước giữa học kỳ và trình bày đề cương trước Hội đồng Luận văn để nhận được các phản biện và góp ý từ Hội đồng. Đề cương cần giải thích mục đích của nghiên cứu, thông thường đề cương bao gồm các phần chính sau: Mở đầu, Phát biểu vấn đề và mục đích của nghiên cứu, Xem xét các nghiên cứu liên quan, Phương pháp và cách tiếp cận đề xuất. Sinh viên sẽ phác thảo và mô tả một thiết kế nghiên cứu phù hợp và đưa ra lộ trình để hoàn thành dự án nghiên cứu. Hội đồng luận văn sẽ xem xét đề xuất và yêu cầu sinh viên chỉnh sửa đề cương nếu cần thiết. Thông thường luận văn gồm các phần sau: Tóm tắt, Mở đầu, Tổng quan tài liệu. Xem xét các nghiên cứu liên quan, Kiến thức nền tảng, Phương pháp luận, Kết quả, Thảo luận và kết luận. Sinh viên nộp báo cáo luận văn đã hoàn thiện (được GVHD rà soát và thông qua) vào cuối học kỳ. Sinh viên sẽ bảo vệ trước Hội đồng chấm luận văn Tốt nghiệp.

**TRƯỞNG BỘ MÔN**



**Phạm Hữu Anh Ngọc**

**KT. HIỆU TRƯỞNG  
PHÓ HIỆU TRƯỞNG**

**Đinh Đức Anh Vũ**

Phụ lục 1

NỘI DUNG ĐIỀU CHỈNH CHƯƠNG TRÌNH ĐÀO TẠO  
NGÀNH TOÁN ỨNG DỤNG KHÓA 2024 SO VỚI KHÓA 2023

(Kèm theo Quyết định số       /QĐ-ĐTĐH ngày        tháng        năm 2024  
của Hiệu trưởng Trường Đại học Quốc tế)

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

Không có môn học loại bỏ khỏi chương trình đào tạo

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

Không có môn học bổ sung vào chương trình đào tạo

3. Các điều chỉnh khác:

- Thay đổi mã môn học Financial Statement Analysis and Business Evaluation. Mã môn học cũ: BA190IU. Mã môn học mới: MAFE412IU.

- Điều chỉnh môn học tiên quyết của các môn học trong danh sách sau đây:

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	MAFE307IU Optimization 2	Môn tiên quyết: MAFE303IU Optimization 1 MAFE206IU Probability	Môn học trước: MAFE303IU Optimization 1 MAFE206IU Probability
8	MAFE308IU Financial Risk Management 1	Môn tiên quyết: MAFE206IU Probability	Môn học trước: MAFE206IU Probability
9	MAFE306IU Financial Mathematics 1	Môn tiên quyết: MAFE206IU Probability	Môn học trước: MAFE206IU Probability
10	MAFE207IU Decision Making		Môn học trước: MAFE206IU Probability MAFE303IU Optimization 1
11	MAFE314IU Financial Econometrics		Môn học trước: MAFE316IU Statistics

**Phụ lục 2**

**ĐỀ CƯƠNG CHI TIẾT CÁC MÔN HỌC**

*(Kèm theo Quyết định số /QĐ-ĐHQT ngày tháng 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 <input checked="" type="checkbox"/> General <input type="checkbox"/> Specialization (required) <input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Fundamental <input type="checkbox"/> Specialization (elective) <input type="checkbox"/> 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 thể 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	<b>MIDTERM EXAM</b>			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	
<input checked="" type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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 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.

### 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



<b>Learning Outcome Codes</b>	<b>Course Learning Outcomes</b>	<b>Program Learning Outcomes (*)</b>
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

<b>Assessment Component</b>	<b>Assessment form</b>	<b>Percentage %</b>
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*

<b>Week</b>	<b>Content</b>	<b>Learning Outcome</b>	<b>Teaching and learning activities</b>	<b>Assessment</b>
1	Đối tượng, 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	<b>MIDTERM</b>			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.

### 9. Course Coordinator/ Lecturer

- Course Coordinator/ Lecturer:
- Email:

### 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	
<input checked="" type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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 kháng chiến chống thực dân Pháp và đế quốc Mỹ xâm lược (1945-1975), trong sự nghiệp xây dựng, bảo vệ tổ quốc thời kỳ cả nước quá độ lên chủ nghĩa xã hội, tiến hành công cuộc đổi mới (1975-2018).

#### 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	
<input checked="" type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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, giá trị văn hoá, Hồ Chí Minh.	h (level 3)

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 tượng, 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	<b>MIDTERM</b>			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

- 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	
<input checked="" type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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 của 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	<b>MIDTERM EXAM</b>			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

<b>Department</b>	Office of Academic Affairs
<b>Course classification</b>	Foundation course
<b>Course designation</b>	Face to face
<b>Semester(s) in which the course is taught</b>	All semesters in each academic year
<b>Person responsible for the course</b>	Dr. Vo Tuong Huan LLM. Bui Doan Danh Thao
<b>Language</b>	English
<b>Relation to curriculum</b>	Compulsory
<b>Teaching methods</b>	Student-centred approach
<b>Workload (incl. contact hours, self-study hours)</b>	(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 <sup>1</sup> : 90 hours
<b>Credit points</b>	3
<b>Required and recommended prerequisites for joining the course</b>	N/A
<b>Course objectives</b>	<p>The overarching aims of this course are to:</p> <ul style="list-style-type: none"> <li>• Provide essential knowledge of Vietnamese legal system through integrated technology and real cases for social and cultural sustainability.</li> <li>• Raise awareness of responsibility toward others and how to stand for ending all types of legal violations, <b>especially corruption in various social contexts</b>.</li> <li>• Practice necessary skills to act as an ambassador to ensure social fairness and global equitable rights.</li> <li>• Use integrated online legal resources and communication tools to help the community to identify issues and develop countermeasures.</li> </ul>

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<sup>1</sup> 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.

<b>Course learning outcomes</b>	<p>Upon the successful completion of this course, students will be able to:</p> <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> <p>CLO1. Apply appropriate legal knowledge in the Vietnamese legal system to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.1. Apply general knowledge on state and law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.2. Apply principle legal norms in some law branches such as constitution, civil, criminal, labor and administrative law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> </td></tr> <tr> <td>Skill</td><td> <p>CLO2. Communicate knowledge in the Vietnamese legal system to encourage people to raise their legal rights aiming for fair social/cultural moves.</p> <p>CLO3. Integrate ICTs to solve legal issues in <b>various social contexts</b>.</p> </td></tr> <tr> <td>Attitude</td><td> <p>CLO4. Detect the responsibility to ensure social and cultural fairness, <b>including ending corruption</b>, in <b>various social contexts</b> through understanding importance of law in social contexts.</p> <p>CLO5. Respond to the base for coexistence in <b>various social contexts</b>.</p> </td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	<p>CLO1. Apply appropriate legal knowledge in the Vietnamese legal system to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.1. Apply general knowledge on state and law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.2. Apply principle legal norms in some law branches such as constitution, civil, criminal, labor and administrative law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p>	Skill	<p>CLO2. Communicate knowledge in the Vietnamese legal system to encourage people to raise their legal rights aiming for fair social/cultural moves.</p> <p>CLO3. Integrate ICTs to solve legal issues in <b>various social contexts</b>.</p>	Attitude	<p>CLO4. Detect the responsibility to ensure social and cultural fairness, <b>including ending corruption</b>, in <b>various social contexts</b> through understanding importance of law in social contexts.</p> <p>CLO5. Respond to the base for coexistence in <b>various social contexts</b>.</p>
Competency level	Course learning outcome (CLO)								
Knowledge	<p>CLO1. Apply appropriate legal knowledge in the Vietnamese legal system to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.1. Apply general knowledge on state and law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p> <p>CLO1.2. Apply principle legal norms in some law branches such as constitution, civil, criminal, labor and administrative law to solve legal issues in <b>various social contexts</b> for a fair sustainable lifelong being.</p>								
Skill	<p>CLO2. Communicate knowledge in the Vietnamese legal system to encourage people to raise their legal rights aiming for fair social/cultural moves.</p> <p>CLO3. Integrate ICTs to solve legal issues in <b>various social contexts</b>.</p>								
Attitude	<p>CLO4. Detect the responsibility to ensure social and cultural fairness, <b>including ending corruption</b>, in <b>various social contexts</b> through understanding importance of law in social contexts.</p> <p>CLO5. Respond to the base for coexistence in <b>various social contexts</b>.</p>								
<b>Content</b>	<p>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, <b>including ending corruption</b>, in society.</p>								
<b>Examination forms</b>	<p>Multiple choice questions</p> <p>Case-based exams</p> <p>Essay exams</p> <p>Oral exams</p>								
<b>Study examination requirements and</b>	<p>To pass this course, the students must:</p> <ul style="list-style-type: none"> <li>• Achieve a composite mark of at least 50; and</li> <li>• Make a satisfactory attempt at all assessment tasks (see below).</li> </ul> <p><b>GRADING POLICY</b></p> <p>Grades can be based on the following:</p>								

Assignment	20%
Midterm examination	30%
Final examination	50%
<b>Total</b>	<b>100%</b>

## **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.

	<p><b>Special consideration</b></p> <p>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.</p> <p><b>Meeting up with the lecturers after classes</b></p> <p>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.</p>
<p><b>Reading list</b></p>	<p>Please note that it is very important to gain familiarity with the subject matter in the readings and cases available on Blackboard and the internet <i>before</i> attendance in classes.</p> <p><b>Required Course Texts and Materials</b></p> <p><u>Legal Texts:</u></p> <ol style="list-style-type: none"> <li>1. Constitution of Vietnam - 2013</li> <li>2. Civil Code of Vietnam - 2015</li> <li>3. Criminal Code of Vietnam – 2015 (amended in 2017)</li> <li>4. Law on Law on Handling of Administrative Violations 2012</li> <li>5. Law on Enterprises – 2020</li> <li>6. Labour Code 2019</li> <li>7. Law on anti-corruption 2018</li> </ol> <p>Available at <a href="https://luatvietnam.vn/">https://luatvietnam.vn/</a> or Blackboard</p> <p><u>Books:</u></p> <ul style="list-style-type: none"> <li>• PGS.TS. Phan Trung Hien, <i>Giáo trình Pháp Luật Đại cương</i>, NXB Chính Trị Quốc Gia Sự Thật 2022.</li> <li>• Mai Hong Quy (Chief Editor) (2<sup>nd</sup> 2017), <i>Introduction to Vietnamese Law</i>, Hong Duc Publishing House.</li> </ul> <p><u>Additional materials provided in Blackboard</u></p> <p>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.</p> <p><b>Optional Course Texts and Materials</b></p> <p><u>Recommended Internet sites</u></p> <p><a href="#">UNCTAD</a> (United Nations Conference on Trade and Development)</p> <p><a href="#">WTO</a> (World Trade Organization)</p> <p><a href="#">MOIT - Vietnam</a> (Official website of Ministry of Industry and Trade)</p> <p><a href="#">MPI - Vietnam</a> (Official website of Ministry of Planning and Investment)</p> <p><u>Other Resources, Support and Information</u></p>

	<p>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 <a href="#">VNU - Central Library</a>. Recommended articles will be duly informed to the students.</p> <p><u>Books:</u></p> <ul style="list-style-type: none"> <li>• Nguyen Phu Trong, <i>Kiên quyết, kiên trì đấu tranh phòng, chống tham nhũng, tiêu cực, góp phần xây dựng đảng và nhà nước ta ngày càng trong sạch, vững mạnh</i>, NXB Chính Trị Quốc Gia Sự Thật 2023.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình luật Hiến pháp Việt nam</i>, NXB Hồng Đức 2023.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình Luật hành chính</i>, NXB Hồng Đức 2022.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình Luật hình sự Việt Nam</i>, NXB Hồng Đức 2022.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình Luật dân sự Việt Nam</i>, NXB Hồng Đức 2022.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình Luật lao động Việt Nam</i>, NXB Hồng Đức 2022.</li> <li>• University of Law Ho Chi Minh City, <i>Giáo trình pháp luật về chủ thể kinh doanh</i>, NXB Hồng Đức 2022.</li> </ul>
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## 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	<b>Introduction to State</b> <ul style="list-style-type: none"> <li>• What is State?</li> <li>• Nature of state</li> </ul>	1-5 (level I - introduced)	Tests Peer evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system

	<ul style="list-style-type: none"> <li>Forms of state</li> <li>Functions of state</li> <li>Introduction to structure of Vietnamese state</li> </ul>		Class-performance evaluations		available on Blackboard
2	<b>Introduction to law?</b> <ul style="list-style-type: none"> <li>What is law?</li> <li>Nature of law</li> <li>Forms of law</li> <li>Structure of law</li> <li>Categorization of legal system.</li> <li>Enforcement</li> <li>Breach of law and liabilities for breach of law</li> <li>Introduction to structure of Vietnamese legal system</li> </ul>	1-5 (level I - introduced)	Tests  Peer evaluations  Class-performance evaluations	Discussions  Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard
3	<b>Constitutional Law</b> <ul style="list-style-type: none"> <li>General introduction on Vietnamese Constitution and its nature and basic principles.</li> <li>Political, economic and other regimes of Vietnam</li> <li>Basic rights and responsibilities of citizens. Relationship between citizens and the State.</li> <li>Structure, functions and duties of Vietnamese state, especially in prevention of corruption</li> </ul>	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	<b>Constitutional Law (Cont)</b> <ul style="list-style-type: none"> <li>Structure and functions and duties of Vietnamese state</li> <li>Duties of the state in prevention of corruption</li> </ul>	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	<b>Administrative Law</b> <ul style="list-style-type: none"> <li>Definition and nature of administrative law</li> <li>Administrative law violations</li> </ul>	1-5 (Level R - reinforced)	Tests  Peer evaluations	Discussions  Case studies and law on anti-corruption	PPT– Administrative law available on Blackboard



	<ul style="list-style-type: none"> <li>Liabilities for breach of administrative law, exemption from the liability</li> </ul>		Class-performance evaluations		Law on handling administrative violations 2012, and Law on anti-corruption 2018 available on Blackboard
6	<b>Criminal Law</b> <ul style="list-style-type: none"> <li>Definition and nature of criminal law</li> <li>Crimes</li> <li>Punishments</li> </ul>	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	<b>Criminal Law (Cont)</b> <ul style="list-style-type: none"> <li>Crimes related to corruption</li> <li>Punishments for corruption</li> </ul>	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	<b>Revision for mid-term exam</b>		Quizzes Projects		
9	<b>Civil Law (Part I)</b> <ul style="list-style-type: none"> <li>Definition and nature Civil law relationship</li> <li>Subject of civil law</li> <li>Property and ownership</li> <li>Civil transactions</li> </ul>	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	<b>Civil Law (Part II)</b> <ul style="list-style-type: none"> <li>Contracts</li> <li>Definitions</li> <li>Formation of contracts</li> <li>Validity of contracts</li> <li>Liability for breach of contracts</li> </ul>	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	<b>Civil Law (Part III)</b> <ul style="list-style-type: none"> <li>Inheritance</li> <li>Testamentary inheritance</li> </ul>	1-5 (Level M - Mastery)	Tests Peer evaluations	Discussions Case studies	PPT– Civil law available on Blackboard

	- Intestacy		Class- performance evaluations		Civil code 2015 available on Blackboard
12	<b>Law on Enterprises</b> <ul style="list-style-type: none"> <li>• Introduction to law on enterprises</li> <li>• Introduction to forms, features, establishment, reorganization and dissolution of an enterprise</li> </ul>	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	<b>Labor Law</b> <ul style="list-style-type: none"> <li>• Definition, and nature of labour law</li> <li>• Employees and employers</li> <li>• Working time, and resting time</li> <li>• Salary (including salary for overtime working hours)</li> </ul>	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	<b>Labour Law (Cont.)</b> <ul style="list-style-type: none"> <li>• Employment contracts</li> <li>• Labor disciplines</li> <li>• Dispute settlements</li> </ul>	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	<b>Revision/ Tutoring classes</b>		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.	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

					Some possible problems with source citations		
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	<i>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.</i>
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 <sup>2</sup> : 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 $\geq 61$ hold IELTS certificate with score $\geq 5.5$ have completed IE2 course
Course objectives	Throughout the whole course, students are required to read university-level texts to develop the ability to read critically and to respond accurately, coherently and academically in writing. Through providing them with crucial writing skills such as brainstorming, paraphrasing, idea developing, revising, and editing, this course prepares the students for research paper writing in the next level of AE2 writing.

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<sup>2</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	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	
	Skill	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)	
	Attitude	CLO5. Reason around ethical issues in writing academic essays and avoid committing plagiarism	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	The process of Academic Writing	1	I, T, U
	Using Outside Sources	3	T, U
	From Paragraph to Essay	4	T, U
	Process Essays	4	T, U
	Cause/Effect Essays	4	T, U
	Comparison/ Contrast Essays	4	T, U
	Argumentative Essays	6	T, U
	Summarizing	2	U
Review & Correction	2	U	
Examination forms	Essay writing		

Study and examination requirements	<p><i>Attendance</i></p> <p>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.</p> <p><i>Missed Tests</i></p> <p>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.</p> <p><i>Class Behaviors</i></p> <p>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:</p> <p>Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request.</p> <p>Participate fully and constructively in all course activities and discussions (if any).</p> <p>Display appropriate courtesy to all involved in the class.</p> <p>Provide constructive feedback to faculty members regarding their performance.</p> <p><i>Plagiarism</i></p> <p>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.</p> <p><i>Writing Center (Room 509)</i></p> <p>Students are encouraged to visit the Writing Center to schedule an appointment for additional help with essay writing.</p>
Reading list	<p>Oshima, A., &amp; Hogue, A. (2017). <i>Longman Academic Writing Series, Level 4: Essays</i> (5<sup>th</sup> ed.). New Jersey, NJ: Pearson Longman.</p> <p>Oshima, A., &amp; Hogue, A. (2006). <i>Longman Academic Writing Series, Level 4: Essays</i> (4<sup>th</sup> ed.). New Jersey, NJ: Pearson Longman.</p>

## 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	<b>The process of Academic Writing</b> Step 1: Creating (Prewriting) Step 2: Planning (Outlining) Step 3: Writing Step 4: Polishing  <i>Using Outside Sources</i> 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	<b>Using Outside Sources (Cont'd)</b> Strategies for writing a successful summary	[1] pp. 58 - 72	Do paraphrasing exercises <ul style="list-style-type: none"> <li>• Read [1] pp.74-100. Read, take notes and write the summary of ONE of the following articles:               <ul style="list-style-type: none"> <li>○ The Challenge of Many Languages (p. 280)</li> <li>○ Nice by Nature? (p. 281)</li> <li>○ Marital Exchanges (pp. 283- 4)</li> <li>○ Why We Should Send a Manned Mission to Mars (pp. 286-7)</li> <li>○ Let's Not Go to Mars (pp. 288-9)</li> </ul> </li> </ul>
3 & 4	<b>Review/ Correction:</b> Lecturer gives feedback to one or two students' writings in class. <b>From Paragraph to Essay</b> The introductory paragraph: <ul style="list-style-type: none"> <li>• General statements &amp; Introductory techniques</li> <li>• Thesis statements &amp; Logical division of ideas</li> </ul> Body paragraphs: <ul style="list-style-type: none"> <li>• Topic sentences</li> </ul> The concluding paragraph: <ul style="list-style-type: none"> <li>• Restatement</li> </ul> Final thoughts Outlines of essays	[1] pp. 74 – 100	Read pp. 101-15 Do exercises on: <ul style="list-style-type: none"> <li>○ Writing thesis statements</li> <li>○ Writing topic sentences from the thesis statement provided</li> </ul> Writing restatements
5	<b>Process Essays</b> Introduction Analyzing the models Thesis statements for process essays Transitional signals	[1] pp. 101 - 115	Write a short essay (150-200 words) describing how hydroelectric power



	<b>Write together:</b> Writing from a diagram (p.115)		is generated (or a topic of the lecturer's choice)
6	<b>Process Essays (Cont'd) Review/Correction:</b> Lecturer gives feedback to one or two students' writings in class. <b><u>In-class Assignment:</u></b> Write a process essay about one of these topics or a topic of the lecturer's choice: How to cook a favorite food How to do a favorite hobby How to succeed in your major area or professional field How to accomplish an academic task (register for classes, apply for a scholarship, pass an exam, etc.)	[1] pp. 101 - 115	Read [1] pp. 116-132
7	<b>Cause/ Effect Essays</b> Introduction Analyzing the models Organization Signal words and phrases <b>Write together:</b> 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 ○ The effects of regular reading on students' lives
8	<b>Cause/ Effect Essays (Cont'd) Review/Correction:</b> Lecturer gives feedback to one or two students' writings in class. <b><u>In-class Writing:</u></b> 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
<b>MID-TERM EXAMINATION</b>			
	<b>Comparison/ Contrast Essays</b>	[1] pp. 133	Practice 3, 4, 6, 7/pp.142-

9	<p>Introduction Analyzing the models          Organization:          Points of comparison          Point-by-point organization</p> <ul style="list-style-type: none"> <li>Block organization Comparison and Contrast signal words</li> </ul> <p><b>Write together:</b>          Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice:          Compare and contrast the relationship between parents and children in two different cultures.          Compare and contrast the university culture in two different countries.          Compare and contrast the culture of a small town and a big city.</p>	- 151	<p>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:</p> <ul style="list-style-type: none"> <li>Compare and contrast the relationship between parents and children in two different cultures.</li> <li>Compare and contrast the university culture in two different countries.</li> </ul> <p>Compare and contrast the culture of a small town and a big city.</p>
10	<p><b>Comparison/ Contrast Essays (Cont'd)</b>  <b>Review/ Correction:</b> Lecturer gives feedback to one or two students' writings in class.  <u><b>In-class Assignment:</b></u>          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</p>	[1] pp. 133 - 151	Read [1] pp. 152-168
11 & 12	<p><b>Argumentative Essays</b>          Introduction          Analyzing the model</p>	[1] pp. 152-168	<p>Write an argumentative essay (300 – 350 words) on ONE of the following topics or a topic</p>
13	<p>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</p> <ul style="list-style-type: none"> <li>Your own arguments</li> </ul>		<p>of the lecturer's choice:</p> <ul style="list-style-type: none"> <li>Can same-sex parenting negatively influence a child's mentality?</li> <li>Do famous artists have an innate talent, or do they put in great effort</li> </ul>

	<p>The introductory paragraph: Thesis Statement</p> <p>Statistics as support</p> <p><b>Write together:</b></p> <p>Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice:</p> <p>Can same-sex parenting negatively influence a child's mentality?</p> <p>Do famous artists have an innate talent, or do they put in great effort to improve their skills?</p> <p>Is homework helpful?</p> <p><b>Argumentative Essays (Cont'd) Review/Correction:</b> Lecturer gives feedback to one or two students' writings in class.</p> <p><b>In-class Writing:</b></p> <p>Write an argumentative essay on the topic left or a topic of the lecturer's choice:</p> <p>Can same-sex parenting negatively influence a child's mentality?</p> <p>Do famous artists have an innate talent, or do they put in great effort to improve their skills?</p> <p>Is homework helpful?</p>		<p>to improve their skills?</p> <p>Is homework helpful?</p>
<b>14</b>	<b>Review &amp; Practice: Summarizing</b>		<b>Sample final test</b>
<b>15</b>	<p><b>Review/Correction:</b> Lecturer gives feedback to one or two students' argumentative essays + sample final test in class.</p> <p>Lecturer has students check their own assignment scores.</p>		
<b>FINAL EXAMINATION</b>			

#### 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
<b>Topic sentence 1</b> 10 pts	The topic sentence introduces the topic and the controlling idea (1), starting with a transition signal*.	CLO 1
<b>Topic sentence 2</b> 10 pts	The topic sentence introduces the topic and the controlling idea (2), starting with a transition signal*.	CLO 1
<b>Topic sentence 3</b> 10 pts	The topic sentence introduces the topic and the controlling idea (3), starting with a transition signal*.	CLO 1
<b>Restatement</b> 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
<b>Language use and Mechanics</b> A wide variety of sentence patterns and vocabulary are presented correctly. Language used for <i>Cause-Effect Essay</i> is good and Meaning is clear. Spelling, capitalization, punctuation are correct.	<b>10</b>	CLO 1,4
<b>Content</b> 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)	<b>20</b>	CLO 1,4,5
<b>Organization</b> <i>Introduction:</i>	<b>30</b>	CLO 1,4

<p>The introduction ends with a thesis statement. (10)</p> <p><b>Body:</b></p> <p>Each paragraph discusses a particular point and begins with a clear topic sentence. (5)</p> <p>Each paragraph has specific supporting details (fact, examples, etc.) (5)</p> <p>Each paragraph has cohesion and coherence. (5)</p> <p><b>Conclusion:</b></p> <p>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)</p>		
<b>Total</b>	<b>60</b>	

## 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
<p><b>Language use and mechanics (20)</b></p> <p>A wide variety of sentence patterns and vocabulary are presented correctly.</p> <p>Language control is good, and meaning is clear.</p> <p>Spelling, capitalization and punctuation are correct.</p>	20	16	12	CLO 1,4
<p><b>Content: (20)</b></p> <p>The essay fulfills the task requirements, and the topic is fully addressed. The content is originally created by the students.</p>	20	16	12	CLO 1,4,5
<p><b>Organization: (60)</b></p> <p><b>Introduction:</b></p> <p>The introduction has a thesis statement. (10)</p> <p><b>Body:</b></p> <p>At least one paragraph discusses the counter-arguments. (10)</p>	<p>10</p> <p>10</p>	<p>8</p> <p>8</p>	<p>6</p> <p>6</p>	CLO 1,4

Each paragraph discusses a particular point and begins with a clear topic sentence. (10)	10	8	6	
Each paragraph has specific supporting details (fact, examples, etc.). There are no sentences that are off-topic. (10)	10	8	6	
Each paragraph has cohesion and coherence. There are transition signals to show the relationship among ideas and to link paragraphs. (10)	10	8	6	
<b>Conclusion:</b> 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	8	6	
<b>Total</b>	<b>100</b>	<b>80</b>	<b>60</b>	

**08. LISTENING AE1 (LISTENING & NOTE-TAKING)**

Course ID: EN008IU

**1. General information**

Course designation	<i>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.</i>
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 <sup>3</sup> : 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 $\geq 61$ hold IELTS certificate with score $\geq 5.5$ complete IE2 course

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<sup>3</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	<p>There are a number of objectives embedded in various teaching activities in Listening AE1 course:</p> <p>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.</p> <p>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.</p> <p>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.</p>								
Course learning outcomes	<p>Upon the successful completion of this course, students will be able to:</p> <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> <p>CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes.</p> <p>CLO2. Improve their specialized knowledge of academic lectures</p> </td></tr> <tr> <td>Skill</td><td> <p>CLO3. Respond to academic lectures with appropriate strategies</p> <p>CLO4. Communicate effectively with their classmates and professors.</p> </td></tr> <tr> <td>Attitude</td><td>CLO5. Respond to academic lectures with confidence</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	<p>CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes.</p> <p>CLO2. Improve their specialized knowledge of academic lectures</p>	Skill	<p>CLO3. Respond to academic lectures with appropriate strategies</p> <p>CLO4. Communicate effectively with their classmates and professors.</p>	Attitude	CLO5. Respond to academic lectures with confidence
Competency level	Course learning outcome (CLO)								
Knowledge	<p>CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes.</p> <p>CLO2. Improve their specialized knowledge of academic lectures</p>								
Skill	<p>CLO3. Respond to academic lectures with appropriate strategies</p> <p>CLO4. Communicate effectively with their classmates and professors.</p>								
Attitude	CLO5. Respond to academic lectures with confidence								



Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (2 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table><tr><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>Orientation &amp; 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 &amp; 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 &amp; Review</td><td>2</td><td>T, U</td></tr></table>	Topic	Weight	Level	Orientation & Introduction of strategies and techniques in note-taking	2	I, T, U	Chapter 1: New Trends in Marketing Research	3	T, U	Chapter 2: Business Ethics	3	T, U	Chapter 3: Trends in Children’s Media Use	2	T, U	Chapter 4: The Changing Music Industry	2	T, U	Chapter 5: The Placebo Effect	2	T, U	Midterm Sample Test & Review	2	T, U	Chapter 6: Intelligent Machines	3	T, U	Chapter 7: Sibling Relationships	3	T, U	Chapter 8: Multiple Intelligences	3	T, U	Chapter 9: The Art of Graffiti	3	T, U	Final Sample Test & Review	2	T, U
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Chapter 9: The Art of Graffiti	3	T, U																																						
Final Sample Test & Review	2	T, U																																						
Examination forms	Paper and pen tests: Correct the mistakes, Fill in the blanks, Write short answers, Write a summary paragraph.																																							
Study and examination requirements	<p><i>Attendance</i> 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.</p> <p><i>Missed tests</i> 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.)</p> <p><i>Class behavior</i> 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</p>																																							

Reading list	<p>[1] Frazie, L., &amp; Leeming, S. (2013). <i>Lecture ready 3</i>. Oxford: Oxford University Press. References:</p> <p>[2] Frazie, L., &amp; Leeming, S. (2013). <i>Lecture ready 1, 2</i>. Oxford: Oxford University Press.</p>
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## 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	<b><u>Chapter 1</u></b> <b>New Trends in Marketing Research</b>	Recognizing topic introducing and lecture plan presenting expressions Organizing ideas by outlining	Expressing ideas during a discussion
WEEK 3	2	<b><u>Chapter 2</u></b> <b>Business Ethics</b>	Recognizing transition expressions Using symbols and abbreviations	Asking for clarification and elaboration during a discussion
WEEK 4	2	REVIEW		
WEEK 5	2	<b><u>Chapter 3</u></b> <b>Trends in Children's Media Use</b>	Recognizing generalization and support expressions	Giving opinions and asking for opinions during a discussion
WEEK 6	2	<b><u>Chapter 4</u></b> <b>The Changing Music Industry</b>	Recognizing expressions for clarification or emphasis Organizing notes by using a split-page format	Expressing interest and asking for elaboration during a discussion

<b>WEEK 7</b>	2	<b><u>Chapter 5</u></b> <b>The Placebo Effect</b>	Recognizing cause and effect expressions Noting causes and effects	Agreeing and disagreeing during a discussion
<b>WEEK 8</b>	2	<b>Sample test correction</b> <b>WRAP-UP AND REVIEW</b>		
<b>MID-TERM EXAMINATION</b>				
<b>WEEK 9</b>	2	<b><u>Chapter 6</u> Intelligent Machines</b>	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
<b>WEEK 10</b>	2	<b>REVIEW</b>		
<b>WEEK 11</b>	2	<b><u>Chapter 7</u> Sibling Relationships</b>	Recognizing expressions of comparison and contrast Noting comparison and contrast	Expanding on ideas during a discussion
<b>WEEK 12</b>	2	<b><u>Chapter 8</u> Multiple Intelligences</b>	Recognizing non-verbal signals indicating important information Representing information in list form	Keeping the discussion on topic
<b>WEEK 13</b>	2	<b>REVIEW</b>		
<b>WEEK 14</b>	2	<b><u>Chapter 9</u></b> <b>The Art of Graffiti</b>	Recognizing expressions of definition Reviewing and practicing all note taking strategies	Indicating to other when preparing to speak or pausing to collect thoughts
<b>WEEK 15</b>	2	<b>WRAP-UP AND REVIEW</b>		
<b>FINAL EXAMINATION</b>				

#### 4. Assessment plan

<b>Assessment Type</b>	<b>CLO1</b>	<b>CLO2</b>	<b>CLO3</b>	<b>CLO 4</b>	<b>CLO 5</b>
<b>On-going assessment (30%)</b> (participation, individual work, group work, assignments, etc.)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass
<b>Midterm exam (30%)</b>	80% Pass		80% Pass		
<b>Final exam (40%)</b>	80% Pass		80% Pass		

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

**09. WRITING AE2 (RESEARCH PAPER WRITING)**

Course ID: EN011IU

**1. General information**

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

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<sup>4</sup> 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.

<b>Course objectives</b>	<p>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.</p> <p>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.</p>									
<b>Course learning outcomes</b>	<p>Upon the successful completion of this course, students will be able to:</p> <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>		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand the structure of a research paper and employ appropriate academic language in writing a research paper	Skill	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.	Attitude	CLO4. Reason around ethical issues in writing research paper and avoid committing plagiarism
Competency level	Course learning outcome (CLO)									
Knowledge	CLO1. Understand the structure of a research paper and employ appropriate academic language in writing a research paper									
Skill	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.									
Attitude	CLO4. Reason around ethical issues in writing research paper and avoid committing plagiarism									

<b>Content</b>	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (2 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table><tr><th>Topic</th><th>Weight</th><th>Level</th></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 &amp; Feedback</td><td>2</td><td>T, U</td></tr><tr><td>Unit 4: Definitions, Vocabulary &amp; 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 &amp; Reality</td><td>2</td><td>T, U</td></tr><tr><td>Unit 8: Results, Discussion &amp; 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>	Topic	Weight	Level	Unit 1: The Academic Writing Process Introduction	4	I, T, U	Unit 2: Researching and Writing	2	T, U	Unit 3: Fundamentals & Feedback	2	T, U	Unit 4: Definitions, Vocabulary & Clarity	2	T, U	Unit 5: Generalizations, Facts and Honesty	4	T, U	Unit 6: Seeing Ideas and Sharing Texts	2	T, U	Unit 7: Description, Methods & Reality	2	T, U	Unit 8: Results, Discussion & Relevance	2	T, U	Unit 9: The Whole Academic Text	2	T, U	Unit 10: Creating the Whole Text	4	T, U	Course Review	2	U
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Unit 9: The Whole Academic Text	2	T, U																																			
Unit 10: Creating the Whole Text	4	T, U																																			
Course Review	2	U																																			
<b>Examination forms</b>	Essay writing																																				
<b>Study and examination requirements</b>	<p><i>Attendance</i></p> <p>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.</p> <p><i>Assignment (Literature review)</i></p> <p>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.</p> <p>Task:</p> <p>Follow guidelines on how to write a literature review.</p> <p>Use relevant academic writing skills such as paraphrasing, summarising, developing arguments, and APA 7th Style Guidelines – see <a href="https://www.apastyle.org/">https://www.apastyle.org/</a></p> <p>Develop arguments in relation to the research scope and identify the research gap</p>																																				

**Study and examination requirements**

**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:

Degree of magnitude	Description
Below 15%	Marked as it is.
15% - 25%	The score is deducted by <b>25%</b> .
25% - 40%	The score is deducted by <b>50%</b>
Over 40%	The score is <b>0</b> .

Notes: Part of the test is marked as it is if no plagiarism is detected. Students who plagiarize over 40% twice will be prohibited from sitting the final examination.

*Writing Center (Room 509)*

Students are encouraged to visit the Writing Center or to schedule an appointment for additional help.



<b>Reading list</b>	<p>[1] Hamp-Lyons, L., &amp; Heasley, B. (2006). <i>Study Writing</i>. Cambridge, UK: Cambridge University Press</p> <p>[2] Articles and Essays taken from <i>The Allyn and Bacon Guide to Writing</i> by Ramage et al (2009), Pearson Longman.</p> <p>[3] Cormack, J. &amp; Slaughter, J. (2009). <i>English for academic study: Extended writing and research skills</i>. Cambridge: Cambridge University Press. Garnet Education</p> <p>[4] Folse, K. S. &amp; Pugh, T. (2010). <i>Great writing 5: Greater essays</i>. Boston: Heinle, Cengage Learning.</p> <p>[5] Keezer, S. (Ed.) (2003). <i>Write your research report: A real-time guide</i>. New Jersey: Pearson Learning Group.</p> <p>[6] Kumar, R. (2019). <i>Research methodology: A step-by-step guide for beginners</i>. Sage Publications</p>
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## 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	<b>Orientation of the Course</b> <b>Unit 1: The Academic Writing Process Introduction</b>	
2	<b>Unit 1: The Academic Writing Process (Cont.)</b> Thinking about writing processes Distinguishing between academic and personal styles of writing Grammar of academic discourse	HW: Task 10
3	<b>Unit 2: Researching and Writing</b> Recognizing categories and classification The language of classification The structure of a research paper	HW: Task 17
4	<b>Unit 3: Fundamentals &amp; Feedback</b> Exploring comparison and contrast structures The language of comparison and contrast Using comparisons and contrasts to evaluate and recommend	HW: Task 12

WEEK	CONTENT—SUGGESTED TASKS	ASSIGNMENT/ HOMEWORK
5	<b><u>Unit 3: Fundamentals &amp; Feedback (Cont.)</u></b> The research paper Identifying a research gap The writing process	<b>Assignment 1: Task 20</b>
6	<b><u>Unit 4: Definitions, Vocabulary &amp; Clarity</u></b> The clarity principle The language of definition The place of definition The writing process	HW: Task 15
7	<b><u>Unit 5: Generalizations, Facts and Honesty</u></b> Honesty principle The language of generalization	HW: Task 13
8	<b><u>Unit 5: Generalizations, Facts and Honesty (Cont.)</u></b> Writing a literature review The writing process Brainstorming and clustering APA 7th Style Guidelines – see <a href="https://www.apastyle.org/">https://www.apastyle.org/</a>	<b>Assignment 2: Writing Literature review</b>
<b>MID-TERM EXAMINATION</b>		
9	<b><u>Unit 6: Seeing Ideas and Sharing Texts</u></b> Writing about events in time Connecting events Learning about peer reviews	HW: Tasks 12 & 13
10	<b><u>Unit 7: Description, Methods &amp; Reality</u></b> 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	<b><u>Unit 8: Results, Discussion &amp; Relevance</u></b> What is an argument? The language of argument The Results and Discussion sections Finding an academic voice	HW: Task 9
12	<b><u>Unit 9: The Whole Academic Text</u></b> 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	<b>Unit 10: Creating the Whole Text</b> Structure of the research paper Creating your own research	
14	<b>Unit 10: Creating the Whole Text</b> Plagiarism Creating citations Paraphrase and summary Authorial identity	
15	<b>Course Review</b>	<b>Submitting Literature review</b>
<b>FINAL EXAM</b>		

#### 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. Rubrics

##### 5.1. Midterm exam sample rubrics (100 points)

##### TASK 1: 30 points

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

<b>Sub-category 3</b>	3. Pigs' different reactions react differently based on past experience a. avoid the place where they have been shut for long b. go for the place where they were released from quickly.	<b>7.5</b>	CLO 1,2
<b>Total</b>		<b>30</b>	

**TASK 2: 70 points**

<b>CATEGORIES</b>	<b>CRITERIA</b>	<b>POINTS</b>	<b>CLO</b>
<b>Content</b>	All main points relevant to topic Essay question fully answers	<b>20</b>	CLO 1,3,4
<b>Organization</b>	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	<b>20</b>	CLO 1,3,4
<b>Coherence</b>	Paragraphs ordered in a systematic manner based on, for example, importance, priority, etc. Comparison/contrast transitions are properly used.	<b>15</b>	CLO 1,3,4
<b>Style and Tone</b>	Formal writing with full forms Polite writing Academic vocabulary	<b>15</b>	CLO 1,3,4
<b>Total</b>		<b>70</b>	

**5.2. Final exam rubrics: 100 points**

<b>CATEGORIES</b>	<b>CRITERIA</b>	<b>POINTS</b>	<b>CLO</b>
<b>Content</b>	Presenting his/her view on the question clearly and persuasively	<b>20</b>	CLO 1,3,4
<b>Structure of ideas</b>	<ul style="list-style-type: none"> <li>Introduction with thesis statement, and conclusion with summary and comment</li> <li>Topic sentences well supported with explanations, examples, etc.</li> </ul>	<b>40</b>	CLO 1,3,4
<b>Convincing argumentative techniques, e.g., counterargument</b>		<b>20</b>	CLO 1,3,4
<b>Language use:</b> <i>use vocabulary and grammatical structures</i>		<b>20</b>	CLO 1,3,4
<b>Total</b>		<b>100</b>	

## 10. SPEAKING AE2 (EFFECTIVE PRESENTATIONS)

Course ID: EN012IU

### 1. General information

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

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<sup>5</sup> 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.

<b>Course learning outcomes</b>	Upon the successful completion of this course, students will be able to:	
	<b>Competency level</b>	<b>Course learning outcome (CLO)</b>
	Knowledge	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
	Skill	CLO2. Prepare and deliver effective, formal, structured presentations that are appropriate to the specific environment and audience.
	Attitude	CLO3. Deliver both informative and persuasive speech with confidence

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

<b>Study and examination requirements</b>	<p><i>Class Behaviors</i></p> <p>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:</p> <p>Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request.</p> <p>Participate fully and constructively in all course activities and discussions (if any).</p> <p>Display appropriate courtesy to all involved in the class.</p> <p>Provide constructive feedback to faculty members regarding their performance.</p> <p><i>Plagiarism</i></p> <p>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.</p>
<b>Reading list</b>	<p>[1] Lowe, S, &amp; Pile, L. (2010). <i>Presenting</i>. Singapore: Cengage Learning</p> <p>[2] Comfort, J. (1997). <i>Effective presentations</i>. Oxford: Oxford University Press</p> <p>[3] Lucas, S. (2014). <i>The art of public speaking</i> (12<sup>th</sup> edition). New York: McGraw-Hill Education.</p> <p>[4] Harrington, D., &amp; Lebeau, C. (2009). <i>Speaking of speech</i>. Macmillan</p>

## 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	<ul style="list-style-type: none"> <li>• <b>Orientation &amp; Introduction</b></li> <li>• <b>Needs analysis</b></li> </ul>	[1] <i>Presenting</i> , p. 5	<p>Students will:</p> <ul style="list-style-type: none"> <li>• receive an introduction to effective presentation</li> <li>• think about their strength and weaknesses in presenting in English</li> <li>• identify and prioritize their immediate and future needs for presenting</li> </ul> <p>share tips on improving weaknesses</p>
WEEK 2	<b>Building up confidence</b>		<p>Student will:</p> <ul style="list-style-type: none"> <li>- give a short speech about themselves to help them overcome initial shyness of standing up and speaking in public</li> </ul>
WEEK 3	<b>Unit 1: The first few minutes</b>	<i>Presenting</i> , pp. 8-13 <ul style="list-style-type: none"> <li>• <i>Effective Presentations</i>: p.7 + video clip; p.13+ video clip</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• learn the importance of making a good first impression</li> <li>• learn useful phrases for greeting the audience, introducing themselves and others, and giving the purpose of their presentation</li> </ul>
WEEK 4	<b>Unit 3: Organizing what you want to say</b>	<ul style="list-style-type: none"> <li>• <i>Presenting</i>, pp. 22- 27)</li> <li>• <i>Effective Presentations</i>: p.19 + video clip</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• look at the importance of structuring their presentation</li> <li>• learn the useful phrases for outlining their presentation, organizing ideas and moving between different sections of their presentation</li> </ul>
WEEK 5	<b>Unit 6: Summarizing and concluding</b>	<ul style="list-style-type: none"> <li>• <i>Presenting</i>, pp. 40- 45</li> <li>• <i>Effective Presentations</i>: p.41 + video clip</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• look at ways of finishing a presentation effectively</li> <li>• learn useful phrases for ending their presentation, summarizing, handing over and thanking</li> </ul>

<b>WEEK 6</b>	<b>Unit 2: Using equipment</b>	<ul style="list-style-type: none"> <li>• <i>Presenting</i>, pp. 14- 21)</li> <li>• <i>Effective Presentations</i>: p.31 + video clip</li> </ul>	Students will: <ul style="list-style-type: none"> <li>• use equipment and visuals to support their presentation</li> <li>• learn useful phrases for referring to visuals, ensuring their audience can see and expanding on notes</li> </ul>
<b>WEEK 7</b>	<b>Delivery techniques: Putting it all together</b>	[2] <i>Effective Presentations</i> : p.50 + video clip Assignment: Topic(s) for group presentation)	Students will: <ul style="list-style-type: none"> <li>• watch a model presentation and discuss do's and don'ts for effective delivery</li> </ul> pick group members and plan their presentations for Week 8
<b>WEEK 8</b>	Group presentations for the instructor's evaluation and advice		Students will: <ul style="list-style-type: none"> <li>• take turn to deliver a presentation on the topic(s) assigned by the instructor</li> </ul> consult the instructor for advice on the mid-term exam preparation
<b>MIDTERM EXAMINATION</b> Students will give a five-to-six minute informative presentation on a topic to be determined.			
<b>WEEK 9</b>	<b>Introduction to persuasive speeches</b>	[3] <i>The art of public speaking</i> , Chapter 15 (Handout given by the instructor)	Students will: <ul style="list-style-type: none"> <li>• know types of persuasive speeches</li> <li>• know typical organizations of a persuasive speech</li> </ul>
<b>WEEK 10</b>	<b>Methods of persuasion</b>	[3] <i>The art of public speaking</i> , Chapter 16 (Handout given by the instructor)	Students will learn to persuade the audience by: <ul style="list-style-type: none"> <li>building credibility</li> <li>using evidence</li> <li>reasoning</li> <li>appealing to emotions</li> </ul>
<b>WEEK 11</b>	<b>Unit 4: Maintaining interest</b>	<ul style="list-style-type: none"> <li>• <i>Presenting</i>: pp. 28- 33)</li> <li>• <i>Effective Presentations</i>: p.25 + video clip)</li> </ul>	Students will: <ul style="list-style-type: none"> <li>• look at maintaining interest through effective delivery</li> <li>• learn useful phrases for clarifying what you mean, checking if the audience is following and involving the audience</li> </ul>

<b>WEEK 12</b>	<b>Unit 5: Dealing with problems and questions</b>	<ul style="list-style-type: none"> <li>○ <i>Presenting</i>: pp. 34- 39)</li> <li>○ <i>Effective Presentations</i>: p.44 (Question time)</li> </ul>	Students will: <ul style="list-style-type: none"> <li>● learn strategies for coping in unexpected situations</li> <li>● learn useful phrases for dealing with problems and questions</li> </ul>
<b>WEEK 13</b>	<b>Unit 6: Body language</b>	[2] <i>Effective Presentations</i> : pp.36-39	Students will: <ul style="list-style-type: none"> <li>● practise using language and body language to communicate the message clearly and persuasively</li> <li>● watch video clips about body language</li> </ul> learn how to control posture, eye contact, gestures and voice inflection
<b>WEEK 14</b>	<b>Practice</b>	(to be determined by the instructor)	Students will: <ul style="list-style-type: none"> <li>- deliver individual or group presentations (assigned by the instructor)</li> </ul>
<b>WEEK 15</b>	<b>Wrap-up and advice</b>	(to be determined by the instructor)	Students will: <ul style="list-style-type: none"> <li>● consult the instructor for advice on the final exam preparation</li> </ul> continue to deliver individual or group presentations (if any)
<b>FINAL EXAMINATION</b> Students will deliver a seven-to-eight-minute persuasive presentation on a topic to be determined			

#### 4. Assessment plan

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

## 11. ANALYSIS I

### General Information

Course Title	
Vietnamese:	Giải tích I
English:	Analysis I
Course ID:	MAFE101IU
Course type <input checked="" type="checkbox"/> General Specialization (required) <input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Fundamental <input type="checkbox"/> Specialization (elective) <input type="checkbox"/> 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, 4<sup>th</sup> edition, 2012.  
R. G. Bartle, D. R. Sherbert, *Introduction to Real Analysis*, 4<sup>th</sup> edition, John Wiley & Sons, 2011  
R.A. Adam, C. Essex, *Calculus: A complete course*, 7<sup>th</sup> 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  $\mathbb{R}$ , Absolute Value and the Real Line, Supremum, infimum, and the Completeness Property of  $\mathbb{R}$ .
- 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	c	I, T,U

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	meaning of derivatives and compute the derivative of algebraic, exponential and logarithmic functions of one variable. □		
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	<b>Chapter 1. Primiraries</b> - Logic, Sets and Functions. - Proof methods: Direct and indirect proof, Mathematical induction. - The algebraic and order properties of $\mathbb{R}$ , 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	<b>Chapter 2. Limits of functions, Continuous functions</b> -Limits of functions, Limit theorems, One-sided limits. -Infinite limits and Limits at infinity. - Continuous functions -Combinations of continuous Functions -Properties of continuous functions -Applications	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework Project
7-9	<b>Chapter 3. Differentiation</b> - 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
<b>Midterm Examination</b>				<b>Written exam</b>
10-13	<b>Chapter 4. Mean value theorems and applications</b>	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	- The mean value Theorems and applications -L' Hospital's Rules -Taylor's Theorem			
14-15	<b>Chapter 5. Applications of differentiation.</b> - Related rates problems - Optimization Problems	L.O.3 L.O.4	Lecture Class discussion	Homework Project
<b>Final examination</b>				<b>Written exam</b>

### 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](mailto: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:	<b>Nhập môn Python</b>
+ English:	<b>Introduction to Python</b>
- Course ID:	MAFE109IU
- Course type	
<input checked="" type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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. Necaie. *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
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### 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	
<input checked="" type="checkbox"/> General	<input checked="" type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	4
Lecture:	4
Laboratory:	0
Precourses:	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 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 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

## 6. 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: Dr. Nguyen Anh Tu
- Email: [natu@hcmiu.edu.vn](mailto: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:	<b>Đại số tuyến tính</b>
English:	<b>Linear Algebra</b>
Course ID:	MAFE104IU
Course type	
<input type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input checked="" type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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	<b>Chapter 1: Systems of Linear Equations and Matrices</b> 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

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
4-5	<b>Chapter 2. Determinants</b> 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	<b>Chapter 3. Vector Spaces</b> 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
<b>Midterm Examination</b>				<b>Written exam</b>
9-11	<b>Chapter 4. Inner Product Spaces</b> 4.1 Length and Dot Product in $R^n$ 4.2 Inner Product Spaces 4.3 Orthonormal Bases and Gram-Schmidt Process 4.4 Orthogonal complements 4.5 Projections and Least Squares	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
12-13	<b>Chapter 5. Linear Transformations</b> 5.1 Introduction to Linear Transformations 5.2 The Kernel and Range of a Linear Transformation 5.3 Matrices for Linear Transformations	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	5.4 Transition Matrices and Similarity			
14-15	<b>Chapter 6. Eigenvalues and Eigenvectors</b> 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
<b>Final examination</b>				<b>Written exam</b>

## 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. MICRO ECONOMICS

Course ID: BA117IU

### 1. General information

Course designation	Knowledge in the subject would enable the students not only to understand economic concepts and scarce resources, markets and its elements but also to evaluate various types of market structures as well as the Government intervention into the market. The subject also provides the students with necessary abilities to evaluate economic variables of efficiency. All of this helps the students plan for a company's short- run and long-run development more effectively with consideration of effects of the government's policies.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, exercise, discussion, presentation
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 <sup>6</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	None

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<sup>6</sup>

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

Course objectives	The course aims to provide students with knowledge and skills including (1) Evaluating the concepts of economics, the allocation of scarce resources, (2) Analyzing factors that affect supply, demand, and price of a good in a market, the elasticity, (3) Applying the government intervention into the market of a particular product such as price ceiling and price floor, (4) Applying various kinds of market structures	
Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Evaluate the concepts of economics, the allocation of scarce resources (Program outcomes: d)
	Skill	CLO2. Analyze factors that affect supply, demand, and price of a good in a market, the elasticity (Program outcomes: d)  CLO3. Apply the government intervention into the market of a particular product such as price ceiling and price floor (Program outcome: h, j)  CLO4. Apply various kinds of market structures (Program outcome: h, j)
	Attitude	CLO5. Develop life-long learning attitude (Program outcome: k)
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	

	Topic	Weight	Level
	Measuring a nations' income	2	T, U
	Measuring the cost of living	2	T, U
	Production and growth	2	T, U
	Saving, Investment, and the Financial System	2	T, U
	Unemployment and its Natural Rate	3	I, T, U
	The monetary system	3	I, T, U
	Revision	1	T, U
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Principles of Economics"- N. Gregory Mankiw – 2002, 2004		

## 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:

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

### 1. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Measuring a nations' income	1,2	Quiz	Lecture and exercises
2	Measuring a nations' income	1,2		
3	Measuring the cost of living	1,2,3,5	Quiz, HW	Lectures and exercises
4	Measuring the cost of living	1,2,3,5	HW	Lecture and exercises
5	Production and growth	1,2,3,4	Quiz, HW	Lecture and exercises
6	Production and growth	1,2,3,4	HW	Lecture and exercises
7	Saving, Investment and the Financial System	1,2,3,5	Quiz, HW	Lecture and discussion
8	Saving, Investment and the Financial System	1,2,4	HW	Lectures and exercises
<b>Midterm Exam</b>				



9	Unemployment and its Natural Rate	1,2	Quiz, HW	Lecture and discussion
10	Unemployment and its Natural Rate	1,2	Quiz, HW	Lecture and exercises
11	Unemployment and its Natural Rate	1,2		Lecture and exercises
12	The monetary system	1,2,3,4,5	Quiz, HW	Lecture and exercises
13	The monetary system	1,2,3,4,5		Lecture and discussion
14	Revision	1,2,4		Lecture
Final Exam		1,2,3,4,5		

## 2. 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 50% Pass

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

## 16. MARCO ECONOMICS

Course ID: BA119IU

### 1. General information

Course designation	Knowledge in the subject would enable the students not only to understand various broad economic issues of a country or a region but also to evaluate macroeconomic policies as well as economic fluctuations both in a country and the world. The subject also provides the students with necessary abilities to evaluate economic variables as a whole. All of this helps the students plan for a company's short- run and long-run development more effectively with consideration of effects of the government's macroeconomic policies.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, exercise, discussion, presentation
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 <sup>7</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	None

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<sup>7</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The course aims to provide students with knowledge and skills including (1) Evaluating four macroeconomic issues and how they are important to a country's economic development, (2) Analyzing factors that affect economic growth rate or recession, inflation, unemployment, and budget deficit and trade deficit in an economic, (3) Analyzing macroeconomic policies such as: fiscal policy, monetary policy, external policy and income policy.	
Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Evaluate four macroeconomic issues and how they are important to a country's economic development (Program outcomes: a,d)
	Skill	CLO2. Analyze factors that affect economic growth rate or recession, inflation, unemployment, and budget deficit and trade deficit in an economic (Program outcome: c,j)  CLO3. Analyze macroeconomic policies such as: fiscal policy, monetary policy, external policy and income policy (Program outcome: e,i)
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	

	Topic	Weight	Level
	Measuring a nations' income	2	T, U
	Production and growth	1	U
	Saving, Investment, the Financial System	1	T, U
	Unemployment and its Natural Rate	1	T, U
	The monetary system	1	T, U
	Money Growth and Inflation	1	I, T, U
	Open –Economy Macroeconomics: Basic Concepts	1	I, T
	A Macroeconomic Theory of the Open Economy	1	I, T
	Aggregate Demand and Aggregate Supply	1	T, U
	The Influence of Monetary and Fiscal Policy on Aggregate Demand	1	T, U
	Revision	1	T, U
Examination forms	Written examination		
Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		
Reading list	<p>Textbooks: Principles of Economics”- N. Gregory Mankiw – 2002, 2004</p> <p>References: Economics, David Begg, Stanley Fischer</p>		

### 3. 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	
3					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	3			3							
2			3							3	
3					3				3		

#### 4. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Measuring a nations' income	1,2	Quiz	Lecture and exercises
2	Measuring a nations' income	1,2		
3	Production and growth	1,2	Quiz, HW	Lectures and exercises
4	Saving, Investment, the Financial System	1,2	HW	Lecture and exercises
5	Unemployment and its Natural Rate	1,2	Quiz, HW	Lecture and exercises
6	The monetary system	1,3	HW	Lecture and exercises
Midterm Exam				
7	The monetary System	1,3	Quiz, HW	Lecture and discussion

8	Money Growth and Inflation	1,3	Quiz, HW	Lecture and exercises
9	Open –Economy Macroeconomics: Basic Concepts	1,2		Lecture and exercises
10	A Macroeconomic Theory of the Open Economy	1,2	Quiz, HW	Lecture and exercises
12	Aggregate Demand and Aggregate Supply	1,2		Lecture and exercises
13	The Influence of Monetary and Fiscal Policy on Aggregate Demand	3		Lecture and discussion
14	Revision	1,2,3		Lecture
Final Exam		1,2,3		

## 5. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Participation/ Attendance/ Project/ Homework/ Quiz (30%)	Quiz/ HW 80% Pass	Quiz/ HW 80% Pass	HW/ Project 80% Pass
Midterm exam (30%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass
Final exam (40%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass

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

## 17. FINANCIAL ECONOMICS

Course ID: **MAFE105IU**

### 1. General information

Course designation	The course provides students with fundamentals of financial knowledge. Especially, the course will focus on time value of money, basic models of savings and financial investment activities, financial risk management process.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr.Cao Minh Man
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, exercise, discussion, presentation
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 <sup>8</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	None
Course objectives	The course aims to provide students with knowledge and skills including (1) Analyzing financial models, investment and financial risk management, (2) Analyzing savings and financial investment decisions from the view of both individuals and the whole economy, (3) Demonstrating securities and financial derivatives.

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<sup>8</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	<p>CLO1. Explain financial models, types of investments, and risk management (Program outcomes: a, b)</p> <p>CLO2. Understand theories of savings and financial investment decisions from the view of both individuals and the whole economy. (Program outcomes: a, b, d)</p>
	Skill	<p>CLO3. Describe financial assets such as securities and financial derivatives in the economy (Program outcome: c, h )</p> <p>CLO4. Understand technique of hedging and portfolio diversification (Program outcome: h, j)</p>
	Attitude	<p>CLO5. Enhance research and investigative as well as communication skills within a team in a responsible environment (Program outcome: e, f, g)</p> <p>CLO6. Develop life-long learning attitude (Program outcome: i, k)</p>



Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Overview of finance	1	T, U
	Time and resources allocation	2	U
	Households’ savings and investment decisions	2	T, U
	Project analysis	2	T, U
	Risk management	2	T, U
	Hedging and portfolio diversification	2	I, T, U
	Equilibrium in financial markets	2	I, T
Forwards and futures markets	1	I, T	
Revision	1	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	Textbooks: Zvi Bodie, Robert Merton and David Cleeton, Financial Economics - 2nd edition, Pearson, 2009		

## 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	Overview of finance Why study finance? Household investment decisions Forms of business organizations Corporate governance and ownership	1,2	Quiz	Lecture and exercises
2	Time and resources allocation Time value of money Present value and discounting Annuities	1,2	Quiz, HW	Lecture and exercises
3	Time and resources allocation Cash flow and discounting	1,2	Quiz, HW	Lectures and exercises

	Exchange rate and time value of money Inflation and cash flow analysis			
4	Households' savings and investment decisions  Basic savings model Social welfare policy and savings decisions Taxes and retirement decisions Other cases	1,2,3,5	HW	Lecture and exercises
5	Households' savings and investment decisions  Basic savings model Social welfare policy and savings decisions Taxes and retirement decisions Other cases	1,2,3,5	Quiz, HW	Lecture and exercises
6	Project analysis Net present value Cash flow forecasting Cost of financing Sensitivity analysis Inflation and investment projects Analysis of specific cases	1,2,5,6	HW	Lecture and exercises
7	Project analysis Net present value Cash flow forecasting Cost of financing Sensitivity analysis Inflation and investment projects Analysis of specific cases	1,2,5,6	HW	Lecture and exercises
Midterm Exam				
8	Risk management <b>1.</b> Definition of risk <b>2.</b> Risk and economic decisions <b>3.</b> Risk management process	1,5	Quiz, HW	Lecture and discussion

	<b>4. Risk mitigation</b> <b>5. Risk management institutions</b> <b>6. An optimal risk management model</b> <b>7. Methods of measuring risk</b>			
9	Risk management Definition of risk Risk and economic decisions Risk management process Risk mitigation Risk management institutions An optimal risk management model Methods of measuring risk	1,5	Quiz, HW	Lecture and exercises
10	Hedging and portfolio diversification Definition of hedging Financial instruments for hedging Principles of portfolio diversification	3,5	Quiz, HW	Lecture and exercises
12	Hedging and portfolio diversification Definition of hedging Financial instruments for hedging Principles of portfolio diversification	3,5		Lecture and exercises
13	Forwards and futures markets Difference between forwards and futures The relationship between present value and future value of commodities Futures in finance	4,5		Lecture and discussion
14	Revision	1,2,3,5, 6		Lecture

Final Exam	1,2,3,4, 5,6		
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#### 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**

## 18. REAL ANALYSIS

### 1. General Information

Course Title	
Vietnamese:	Giải tích thực
English:	Real Analysis
Course ID:	MAFE201IU
Course type	
<input checked="" type="checkbox"/> General	<input checked="" type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	4
Lecture:	4
Laboratory:	0
Precourse (Pre-take)	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:  $\sigma$ -algebras, outer measures, measures, Lebesgue measure on  $\mathbb{R}^n$ , 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 theory	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 $\mathbb{R}$	1,3, 5	Lectures and Quiz	Quiz
4	Convergent sequences. Convergence in $\mathbb{R}^n$ . 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 $\sigma$ -algebras. Borel $\sigma$ -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 $\mathbb{R}^n$ . 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**

## 19. ANALYSIS 3

### 1. General Information

Course Title	
Vietnamese:	Giải tích 3
English:	Analysis 3
Course ID:	MAFE203IU
Course type	
<input checked="" type="checkbox"/> General	<input checked="" type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	3
Lecture:	3
Laboratory:	0
Precourse (Pre-take)	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](mailto:tvkhanh@hcmiu.edu.vn)

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**

**Prof. Dr. Pham Huu Anh Ngoc**

## 20. PROBABILITY

### 1. General Information

Course Title	
Vietnamese:	<b>Xác suất</b>
English:	<b>Probability</b>
Course ID:	MAFE206IU
Course type <input type="checkbox"/> General <input type="checkbox"/> Specialization (required) <input type="checkbox"/> Project/ Internship/ Thesis	<input checked="" type="checkbox"/> Fundamental <input type="checkbox"/> Specialization (elective) <input type="checkbox"/> Others : .....
Number of credits:	3
Lecture:	3
Laboratory:	0
Prerequisites:	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**

## 21. DATABASE MANAGEMENT SYSTEM

### 1. General Information

Course Title	
Vietnamese:	Hệ Quản trị Dữ liệu
English:	Database Management System
Course ID:	MAFE204IU
Course type	
<input checked="" type="checkbox"/> General	<input checked="" type="checkbox"/> Fundamental
<input type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> 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
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### 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**

## 22. DIFFERENTIAL EQUATIONS

### 1. General Information

Course Title	
Vietnamese:	Phương trình vi phân
English:	Differential Equations
Course ID:	MAFE202IU
Course type <input checked="" type="checkbox"/> General <input type="checkbox"/> Specialization (required) <input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Fundamental <input type="checkbox"/> Specialization (elective) <input type="checkbox"/> Others : .....
Number of credits:	4
Lecture:	4
Laboratory:	0
Precourse:	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, 8<sup>th</sup> Edition, John Wiley & Sons.

### References:

- P. Hartman, Ordinary differential equations, SIAM Classics in applied mathematics 38, 2<sup>nd</sup> 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	<p>Students demonstrate the ability to:</p> <p>Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations.</p> <p>Evaluate first order differential equations including separable, homogeneous, exact, and linear. □ Show existence and uniqueness of solutions.</p>	a	I,T

Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
	<p>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.</p> <p><input type="checkbox"/> Solve second order and higher order linear differential equations. <input type="checkbox"/> Determine fundamental solutions and independence using the Wronskian.</p> <p><input type="checkbox"/> Solve nonhomogeneous equations. <input type="checkbox"/></p> <p>Create and analyze mathematical models using higher order differential equations to solve application problems such as harmonic oscillator and circuits. <input type="checkbox"/></p> <p>Solve differential equations using variation of parameters <input type="checkbox"/> Evaluate Laplace Transforms. <input type="checkbox"/></p> <p>Find series solutions. <input type="checkbox"/> Solve linear systems of ordinary differential equations.</p>		
L.O.2	<p>Students demonstrate the ability to:</p> <p>Effectively write mathematical solutions in a clear and concise manner. This may be assessed through class assignments, quizzes and tests, and a final exam.</p> <p>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.</p> <p>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.</p>	a, b	I, T,U
L.O.3	<p>Students will be able to :</p> <p>Demonstrate an intuitive and computational understanding of differential equations by solving a variety of application problems arising from</p>	c	T, U

<b>Learning Outcome Codes</b>	<b>Course Learning Outcomes</b>	<b>Program Learning Outcomes</b>	<b>Teaching Level</b>
	<p>biology, chemistry, physics, engineering and mathematics. This may be assessed through homework, class quizzes and tests, and a final exam.</p> <p>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.</p> <p>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.</p>		
L.O.4	<p>Students demonstrate the ability to:</p> <p>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.</p>	e, f, h	I, T, U

### Course Assessment

<b>Assessment Component</b>	<b>Assessment form</b>	<b>Percentage %</b>
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

### Course Outlines



Week	Content	Learning Outcome	Teaching and learning activities	Assessment
1	<b>Chapter 1. Introduction</b> 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	<b>Chapter 2. First-order differential equations</b> 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  Modeling with First Order Differential Equations (Further discussion)	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Homework Project
5-8	<b>Chapter 3. Linear second-order differential equations</b> 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	L.O.2 L.O.4	Lecture Class discussion	Quiz Homework

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	Method of variation of Parameters Mechanical and Electrical Vibrations Forced Vibrations			
<b>Midterm Examination</b>				<b>Written exam</b>
9-11	<b>Chapter 4. Higher Order Linear Equations</b> General Theory of nth Order Linear Equations Homogeneous Equations with Constant Coefficients The Method of Undetermined Coefficients The Method of Variation of Parameters	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework
12-14	<b>Chapter 5. Linear systems of first-order differential equations</b> 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	<b>Chapter 6. Partial differential equations</b> Method of separation of variables Heat conduction in a bar Wave equation Laplace equation			
<b>Final examination</b>				<b>Written exam</b>

## 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: 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. NUMERICAL ANALYSIS

### 1. General Information

Course Title	
Vietnamese:	<b>Giải tích số</b>
English:	<b>Numerical Analysis</b>
Course ID:	MAFE208IU
Course type <input type="checkbox"/> General <input checked="" type="checkbox"/> Specialization (required) <input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Fundamental <input type="checkbox"/> Specialization (elective) <input type="checkbox"/> 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	<b>Chapter 1. Errors and Solutions of nonlinear equations</b> Errors	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	<ul style="list-style-type: none"> <li>Bracketing methods for nonlinear equations</li> <li>Open methods for nonlinear equations</li> <li>Multiple roots</li> <li>Systems of nonlinear equations</li> </ul>			
4-5	<b>Chapter 2. Linear Systems of Equations</b> 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	<b>Chapter 3. Curve Fitting and Interpolation</b>  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
<b>Midterm Examination</b>				<b>Written exam</b>
9-10	<b>Chapter 4. Numerical Differentiation and Integration</b> 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	<b>Chapter 5. Numerical methods for differential equations</b> 5.1. One-step methods 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	L.O.1 L.O.2 L.O.3	Lecture Class discussion	Homework Quiz
14-15	<b>Chapter 6. Numerical methods for partial differential equations</b>	L.O.1 L.O.2	Lecture Class	Homework Quiz

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	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.3	discussion	
<b>Final examination</b>				<b>Written exam</b>

## 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: 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**

## 24. 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 <sup>9</sup> : 60
Credit points	4
Required and recommended prerequisites for joining the course	None

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<sup>9</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.



Course objectives	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	
Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Identify the importance of accounting information in decision making and the role it plays within the business environment (Program outcome: b)
	Skill	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)
	Attitude	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)
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	

	Topic	Weight	Level
	Introduction to Accounting and Business	1	I, T
	Analyzing Transactions	1	T, U
	The Adjusting Process	1	I, T, U
	Completing the Accounting Cycle	1	T, U
	Accounting for Merchandising Businesses	1	I, T
	Inventories	1	I, T
	Cash and Receivables	1	I, T
	Fixed assets	1	I, T
	Liabilities	1	I, T
	Owners' Equity	1	I, T
	Bonds Payable and Investment in Bonds	1	T, U
	Cash Flow Statement and Financial Statements Analysis	1	T, U
Examination forms	Written examination		
Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		
Reading list	<p>Textbook:</p> <p>Warren, Reeve, Fess, Accounting, 23rd Edition (Chapters 1-17); Thomson South-Western Publishing Co., 2009</p> <p>Reference Books:</p> <p>Weygandt, Kieso and Kimmel, Financial Accounting, 5th Ed, John Wiley &amp; Sons, Inc. 2005</p>		

## 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 Unadjusted trial balances	1,2,3,5	Quiz, HW	Lecture
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**

## 25. INTRODUCTION TO CORPORATE FINANCE

Course ID: **MAFE305IU**

### 1. General information

Course designation	The course examines advanced issues in corporate finance management, with a strong emphasis on capital structure, capital budgeting for the levered firm, dividend policy, and mergers and acquisitions in financial markets. Academic papers as well as practical cases will be provided and discussed in class to broaden students' perspectives on related issues.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, laboratory session, exercise, 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 <sup>10</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	Financial Economics

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<sup>10</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The course aims to provide students with the knowledge and skills necessary to apply the following concepts in a business enterprise:  Financing leverage and capital structure policy  Capital budgeting for a levered firm		
Course objectives	Various arguments on how dividend policy affects firm value  Mergers and acquisitions		
Course Learning Outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Explain the nature and concept of financing leverage and capital structure policy (Program outcomes: a, b)  CLO2. Explain how capital budgeting decisions are made for a levered firm (Program outcomes: a, b, d)	
	Skill	CLO3. Describe the common factors influencing dividend policy that affects firm value (Program outcomes: c, h)  CLO4. Analyze Merge and Acquisition strategy (Program outcomes: h, j)	
	Attitude	CLO5. Display effective work and communication within a team in a responsible environment (Program outcome: e, f, g)  CLO6. Articulate applicability of research methods to improve activities in a business context, develop a lifelong learning attitude (Program outcome: i, k)	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>  Weight: lecture session (3 hours)  Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Financing leverage and capital structure policy	3	T, U
	Capital budgeting for a levered firm	4	T, U
	Various arguments on how dividend policy affects firm value	4	T, U

Examination forms	Written examination
Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
Reading list	<p>Textbooks:</p> <p>1. Ross, S. A., Westerfield, R. W. and Jaffe, J. (2005), Corporate Finance, 10th edition, McGraw-Hill.</p> <p>References:</p> <p>2. Brealey, R. A., Myers, S. C. and Marcus, A. J. (2007), Fundamentals of Corporate Finance, 5th edition, McGraw-Hill.</p> <p>3. Bruner, R. F. (2007), Case studies in Finance, 5th edn, McGraw-Hill Irwin.</p>

## 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	Financing leverage and capital structure policy	1,2,5	Quiz	Lecture and discussion
2	Financing leverage and capital structure policy	1,2,5	HW	Lecture and discussion
3	Financing leverage and capital structure policy	1,2,5	Quiz, HW	Lecture and discussion
4	Capital budgeting for a levered firm	1,2,4	Quiz	Lecture and discussion
5	Capital budgeting for a levered firm	1,2,3,5	Quiz, HW	Lecture and discussion
6	Capital budgeting for a levered firm	1,2,4	HW	Lecture and discussion
7	Capital budgeting for a levered firm	1,2,3,5	Quiz, HW	Lecture and discussion
Midterm Exam				
9	Various arguments on how dividend policy affects firm value	1,2,3,5	Quiz, HW	Lecture and discussion
10	Various arguments on how dividend policy affects firm value	1,2,5	Quiz, HW	Lecture and discussion
11	Various arguments on how dividend policy affects firm value	1,2,4,5	HW	Lecture and discussion
12	Various arguments on how dividend policy affects firm value	1,2,3,4,5	Quiz, HW	Lecture and discussion

14	Revision	1,2,4,6		Lecture
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 60% 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**

## 26. FINANCIAL MANAGEMENT

1. **Course title and code:** Financial Management (MAFE215IU)

2. **Number of Credits:** 3

3. **Responsible School/Department:** Department of Mathematics

4. **Prerequisites:** (None)

5. **Course Description**

The knowledge of financial principles is advantageous to managers in virtually every discipline in business. This course is designed as an introduction to finance and is the primary Prerequisites to Corporate Finance which covers more in-depth topics. The content of this course integrates both conceptual and mathematical information.

The basic concepts of the time value of money, valuation and rates of return, cost of capital and capital budgeting are covered. Students will learn how capital markets function, about different types of securities and financing instruments that exist, and how to manage cash flow. Risk, working capital management, leverage, forecasting, and the analysis of financial statements and ratios are given particular attention. This course should provide students with basic financial math skills and an excellent introduction to financial management concepts.

6. **Overall Educational Objectives/ Learning Outcomes:**

Students will develop the skills necessary to apply the following concepts in a business enterprise:

- CLO1: Apply operating, financial leverage, Cash and current asset management;
- CLO2: Analyze effectiveness of short-term financing alternatives; Weighted average cost of capital of a corporation;
- CLO3: Articulate capital budgeting evaluation; cost of capital, net present value, and internal rate of return;
- CLO4: Build the integrating skill in long-term debt financing decisions (bond and leasing), value of stock, dividends and stock splits;
- CLO6: Form a scientific view for financial management in an international business environment and modern issues..

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

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

**7. Course Outline:**

Topic Number	Content	Number		
		Lecture	Practice	Exercise
1	Introduction to corporate finance	4	0	
2	Financial statements and cash flows	8	0	
3	Time value of money	8	0	
5	Bond and bond valuation	4	0	
6	Stock and stock valuation	4	0	
7	Investment rules and capital budgeting	8	0	
8	Risk, return and cost of capital	8	0	
9	Review	1		
Total		45		

**8. Course Assessment Policy:**

- One midterm exam: 20% - 40%
- One comprehensive final exam: 40% - 60%
- In-class quizzes, class participation and learning attitude: 20% - 40%

**9. Textbooks and Other Required Materials:**

Brealey R. A., Myers S. T. & Marcus A. J., Fundamentals of Corporate Finance, 5<sup>th</sup> ed., 2007, McGraw Hill.

Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe, Bradford D. Jordan, Modern financial management, 8th ed., 2008, McGraw Hill.

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**



**Prof. Dr. Pham Huu Anh Ngoc**

## 27. DECISION MAKING

### 1. General Information

Course Title	
Vietnamese:	<b>Lý thuyết ra quyết định</b>
English:	<b>Decision making</b>
Course ID:	<b>MAFE207IU</b>
Course type	
<input type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input checked="" type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	3
Lecture:	3
Laboratory (exercises):	0
Precourses	MAFE206IU Probability; MAFE303IU 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, 10<sup>th</sup> 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

<b>Learning Outcome Codes</b>	<b>Course Learning Outcomes</b>	<b>Program Learning Outcomes</b>	<b>Teaching Level</b>
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

<b>Assessment Component</b>	<b>Assessment form</b>	<b>Percentage %</b>
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	<b>Chapter 1. Introduction to Decision making – steps to effective decision making</b>	L.O.1	Lecture Class discussion	Homework Quiz
2-5	<b>Chapter 2. Decision analysis</b> 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	<b>Chapter 3. Game theory: two-person zero-sum games</b>  Solving simple games Stable and unstable solutions	L.O.1 L.O.2 L.O.4	Lecture Class discussion	Quiz Homework
<b>Midterm Examination</b>				<b>Written exam</b>
9	<b>Chapter 3. Game theory: two-person zero-sum games (cont'd)</b>  Game with mixed strategies – graphical solution procedure		Lecture Class discussion	Homework
10-12	<b>Chapter 4. More on games</b> 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
13-15	<b>Chapter 5. Project management with PERT/CPM</b> 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

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
<b>Final examination</b>				<b>Written exam</b>

## 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@hcmu.edu.vn](mailto:ndinh@hcmu.edu.vn)

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**



**Prof. Dr. Pham Huu Anh Ngoc**

## 28. STATISTICS

Course ID: **MAFE316IU<sup>11</sup>**

### 1. General information

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 <sup>12</sup> : 60
Credit points	4
Required and recommended prerequisites for joining the course	MAFE206IU-Probability

<sup>11</sup> Since K2019 intake, the course ID MAFE301IU (Statistics, 3 credits) has been changed to MAFE316IU (Statistics, 4 credits). The changed has been applied to K2019 and later in-take who have taken MAFE316IU since 2021-2022.

<sup>12</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The 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.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Apply the 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).
	Skill	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).		
Attitude	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).	

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (4 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Descriptive Statistics: Describe and summarizing data sets	2	I, T
	Distributions: Normal distribution, Gamma distribution, T-T-distribution, chi-square distribution, F-distribution.	2	I, U
	Sampling and Distributions of Sampling Statistics: The sample mean, The central limit theorem. Lab section with R and Python.	3	T, U
	Parameter estimations: Maximum likelihood Estimators. Lab section: R and Python.	2	T, U
	Hypothesis Testing: z-test and t-test	2	T, U
	Compare Two Normal Populations. Project: released and team discussions.	2	T, U
	Regression, OLS, inferential concerning beta. Lab section: Python.	1	T, U
	Analysis of Variance: One factor and two factors. Lab section: Python.	1	I, U
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[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, 2 <sup>nd</sup> Edition, O'Reilly Media, 2015.		

## 2. 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:

CLO	PLO										
	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).

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Descriptive Statistics (1): Population and sample, describe data sets, Summarizing data sets, Mean, Median, Mode, Percentiles	1,2	Quiz 1	Lecture, quiz, discussions
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		

#### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/ quizzes (10%)	Qz1->Qz6 Exercises 80%Pass	Qz1->Qz6 Exercises/Qz 2 60%Pass	Qz3->Qz4 Exercises/Qz 3 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**

## 29. FERM Elective #1

### 29.1 FINANCIAL MARKETS

Course ID: **MAFE209IU**

#### 1. General information

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 <sup>13</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	None

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<sup>13</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The 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	
Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	<b>Competency level</b>	<b>Course learning outcome (CLO)</b>
	Knowledge	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)
	Skill	<p>CLO2. Apply and analyze the industry and characteristics of each different financial sector such as banking, insurance, and securities (Program outcome: a, b, d)</p> <p>CLO3. Research and analyze macroeconomic policies and impact on the financial system (Program outcomes: c, h)</p> <p>CLO3. Research and analyze macroeconomic policies and impact on the financial system (Program outcomes: h, j)</p>
	Attitude	<p>CLO5. Display the effective work and communication within a team in a responsible environment (Program outcome: e, f, g)</p> <p>CLO6. Articulate applicability of portfolio management concepts and techniques to their specific business problems, develop a life-long learning attitude (Program outcome: i, k)</p>

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Introduction	1	T, U
	Interest rate	1	T,U
	Interest rate and Macroeconomic policies	2	T, U
	Risk and Interest rate	2	T, U
	Financial Market Efficiency	2	I, T
	Central bank and Federal reserve system	1	I, T
	Monetary Policy and Central Bank	2	I, T
	Money Market	1	T, U
	Bond Market	2	T, U
	Stock Market	2	I, T
	Banking operation and Financial management	1	T, U
Insurance Industry	2	T, U	
Securities brokerage and Investment banking	2	T,U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Frederic S. Mishkin, Stanley G. Eakins, Financial Markets and Institutions, Addison Wesley, 2009		

## 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	1,2	HW	Lecture

	1. Overview of interest rate 2. Determination of interest rate 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. Basic knowledge of banks 2. Measuring effectiveness of banks 3. Bank management 4. Competition in the banking sector	1,2,4,5	HW	Lecture and discussion
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	4,5,6		Lectures and discussion

	2. Investment bank 3. Brokerage company			
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**



## 29.2 FUNCTIONAL ANALYSIS

Course ID: **MAFE210IU**

### 1. General information

Course designation	- For 2nd year students in Financial Engineering and Risk Management.  - Main contents: important general spaces: topology spaces, metric spaces, normed spaces; functionals and linear operators, some important properties and theorems; some specific spaces and linear functions on them.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours <sup>14</sup> : 60
Credit points	3
Required and recommended prerequisites for joining the course	Analysis 2
Course objectives	The purpose of this course is to provide students with foundations of functional analysis. Many applications will be studied.

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<sup>14</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Have basic knowledge of the fundamentals of functional analysis. (Program outcome: a) CLO2. Know the scope of applications of functional analysis. (Program outcome: a)
	Skill	CLO3. Able to recognize situations where functional analysis can be applied to analyze economic models (Program outcome: b, d) CLO4. Able to applied results of functional analysis to study economic models (Program outcome: b, d)
	Attitude	CLO5. Develop life-long learning attitude (Program outcome: j, k)

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (4 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Sets, ordered sets Topological spaces	1	I, T
	Metric space Completeness	1	T, U
	Separability and compactness	1	T,U
	Vector spaces Operators and functionals	1	T, U
	Convex sets and seminorms	1	T, U
	Hahn-Banach Theorem	1	T, U
	Basic definitions and properties Some important inequalities	1	T, U
	Space of measurable functions and sequences	1	T, U
	Some other space functions Hilbert spaces	1	I, T
	Operator spaces and adjoint operator	1	I, T
	Operators and Functionals on Hilbert spaces	1	T, U
	Weak topology	1	T, U
	Reflexive spaces	1	T, U
	Representation of Functionals on functions spaces	1	T, U
$L^p$ spaces	1	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		

Reading list	1. L.V. Kantorovich, Functional Analysis, Pergamon Press, Oxford, 1982. 2. E. Kreyszig, Introductory Functional Analysis with Applications, Wiley, New York, 1989. 3. D. H. Griffel, Applied Functional Analysis, Dover, Mineola-New York, 2002
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## 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:

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

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Sets, ordered sets Topological spaces	1,3		Lecture
2	Metric space Completeness	1,3	Quiz	Lectures and Quiz
3	Separability and compactness	3, 5	Quiz	Lectures and Quiz
4	Vector spaces Operators and functionals	3, 5	HW1	Lectures and HW
5	Convex sets and seminorms	3, 5	Quiz	Lectures and Quiz
6	Hahn-Banach Theorem	3, 5	HW2	Lectures and HW
7	Basic definitions and properties Some important inequalities	3, 5	Quiz	Lectures and Quiz

8	Space of measurable functions and sequences	3, 5	HW3	Lectures and HW
Midterm Exam				
9	Some other space functions Hilbert spaces	2, 4	Quiz	Lectures and Quiz
10	Operator spaces and adjoint operator	2, 4	Quiz	Lectures and Quiz
11	Operators and Functionals on Hilbert spaces	4, 5	HW4	Lectures and HW
12	Week topology	2, 4	Quiz	Lectures and Quiz
13	Reflexive spaces	4, 5	Quiz	Lectures and Quiz
14	Representation of Functionals on functions spaces	2, 4, 5	HW5	Lectures and HW
15	$L^p$ spaces	1, 2, 3, 4, 5	Exercises	
Final Exam		1, 2, 3, 4, 5		

#### 4. Assessment plan

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

Final exam (50%)		Q1, Q2 80% Pass		Q3, Q4 70% Pass	Q5 50%
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*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**

## 29.3 WEB APPLICATION PROGRAMMING

Course ID: **MAFFE211IU**

### 1. General information

Course designation	Basic concepts in web programming such as client-side programming, server-side programming. Introducing syntax of common web programming languages, tools, and development environments such as HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks such as Ajax and Struts.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Lecturer from Faculty of Computer Science
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours <sup>15</sup> : 90
Credit points	4
Required and recommended prerequisites for joining the course	None
Course objectives	Equipped students with the necessary knowledge that can be used to evaluate web-based systems, as well as skills in designing and developing web-based applications.

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<sup>15</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Comprehend concepts in web programming such as client-side programming, and server-side programming (Program outcome: a)	
	Skill	CLO2. Employ syntax of common web programming languages, tools, and development environments such as HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks such as Ajax and Struts. (Program outcome: e)  CLO3. Apply web-based systems to design and develop web-based applications (Program outcome: g)	
	Attitude	CLO4. Develop life-long learning attitude (Program outcome: j)	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Overview of web programming	2	I, T
	Creating webpage with HTML	2	T, U
	Server programming languages	2	T,U
	Client programming languages	2	T, U
	Web session	2	T, U
	Ajax	2	I,T, U
Trusts, XML & XSLT	3	T, U	
Examination forms	Written examination		



Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
Reading list	<p>[1]. Programming the World Wide Web, third edition. Robert Sebesta. Addison Wesley Publishing.</p> <p>[2]. Marty Hall and Larry Brown, Core Web Programming, Second Edition, Prentice Hall, 2001</p> <p>[3]. Marty Hall and Larry Brown, Core Servlets and JavaServer Pages™, Volume 1: Core Technologies, Second Edition, Prentice Hall, 2003</p> <p>[4]. James L. Weaver, Kevin Mukhar, and Jim Crume, Beginning J2EE 1.4: From Novice to Professional, Apress, 2004.</p>

## 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	3										
2					3						
3							4				
4										4	

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Overview of web programming	1		Lecture and practice
3,4	Creating webpage with HTML	1,2	task1	Lectures and discussion
5,6	Server programming languages	1,2	task 2	Lecture and practice
7,8	Client programming languages	2,3	Personal project 1	Lectures
Midterm Exam				

10,11	Web session	2,3	task 3	Lecture and practice
11,12	Ajax	1,2		Lectures
13,14	Trusts	2, 3	Min-project	Lectures and discussion
15	XML & XSLT	2, 3,4	Personal Project 2	Lecture and practice
Final Exam		1, 2, 3, 4, 5		

#### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class tests/ (10%)	Task1 80% Pass	Task2 80%Pass	Task 3 80% Pass	
Persional tasks (20%)	Personal project 1 80%		Personal project 2 75% Pass	Min-project 70% Pass
Midterm exam (30%)	Q1, 80% Pass	Q2, 80% Pass	Q3 75% Pass	Q4 70% Pass
Final exam (40%)	Q1, 80% Pass	Q2 75%Pass	Q3, 70% Pass	Q4 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**

### 30. RANDOM PROCESS

Course ID: **MAFE302IU**

#### 1. General information

Course designation	<i>This subject will provide basic and advanced topics on Random Processes, Stochastic calculus and simulation approach to solve stochastic differential equations.</i>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Pham Hai Ha
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 70 Contact hours (lecture, exercise): 45 Private study including examination preparation, specified in hours <sup>16</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	Probability

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<sup>16</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	Upon the successful completion of this course students will be able to: Analyze the basic concepts and results of Random Processes and Stochastic Calculus such as Markov process, Poisson process, Brownian motion, Ito integral, Stochastic Differential Equations  Simulate Random processes and solve Stochastic Differential Equation  Apply stochastic models to solve real problems.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Comprehend basic concept of random processes, some special random processes and their applications (PLO a; level 2)  CLO2. Analyze the simulations of random processes and applications in Finance (PLO b; level 4)	
	Skill	CLO3. Manipulate stochastic calculus, solve stochastic differential equations and build the modern stochastic models currently used in Economics, Finance, and real-life applications (PLO h, level 4)	
	Attitude		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Review of Probability	2	I, T
	Introduction to random process and some important properties	2	I, T
	Special random processes	7	T, U
Stochastic calculus	4	T, U	
Examination forms	Written exam		
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	<p>[1] S.E. Shreve, <b>Stochastic Calculus for Finance I: The Binomial Asset Pricing Models</b>, Springer Finance, 1997</p> <p>[2]. S.E. Shreve, <b>Stochastic Calculus for Finance II: Continuous-Time Models</b>, Springer Finance, 1997</p> <p>[3]. D. P. Bertsekas, J. N. Tsitsiklis, <b>Introduction to Probability</b>, Athena Scientific, Belmont, Massachusetts (Second edition), 2008</p>
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## 2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) 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	2										
2		4									
3								4			

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

## 3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1 - 2	Review probability and introduction to simulation	1, 2	HW1	Lecture, Discussion	[1].2. [2].1.2.
3 - 4	Introduction to random processes	3	HW2 Quiz1	Lecture, HW Inclass-Quiz	[1].1.2.
5 - 6	Poisson process and applications	1, 2	HW3 Quiz2	Lecture, HW Inclass-Quiz	[3].5.
7 - 8	Markov chain and long term behavior	1, 3	HW4	Lecture, Group work, HW	[3].6.
9	Midterm				
10	Random walk and binomial asset pricing model	2, 3	HW5	Lecture, HW	[1].5. [2].3.
11 - 12	Brownian motion	1, 3	HW6 Quiz3	Lecture, HW	[2].3.

				Inclass-Quiz	
13	Ito integral	1, 3	HW7	Lecture, HW	[2].4.
14	Ito formula	2, 3	HW8 Quiz3	Lecture, HW, Inclass-Quiz	[2].4.
15	Stochastic differential equation and	1	HW9	Lecture, HW,	[2]. 4.
16	Financial models: Black-Scholes - Merton				
17	Final exam				

#### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (10%)	Quiz 70% Pass	Quiz 70% Pass	
Homework/assignment (10%)	70% Pass	70% Pass	Assignments 70% Pass
Midterm exam (30%)	70% Pass		
Final exam (50%)	70% Pass		70% 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**

## 31. OPTIMIZATION 1

### 1. General Information

Course Title	
Vietnamese:	<b>Tối ưu hoá 1</b>
English:	<b>Optimization 1</b>
Course ID:	MAFE303IU
Course type	
<input type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input checked="" type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	4
Lecture:	3
Laboratory (exercises):	1
Precourses:	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*, 4<sup>th</sup> 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*, 2<sup>nd</sup> 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



Learning Outcome Codes	Course Learning Outcomes	Program Learning Outcomes	Teaching Level
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	<b>Chapter 1. Basic properties of linear programming</b> 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	<b>Chapter 2. The Simplex Method</b> 2.1 Pivots. 2.2 Adjacent Extreme Points. Determining a Minimum Feasible Solution 2.3 Computational Procedure—	L.O.2 L.O.3 L.O.4	Lecture Class discussion	Homework Project

Week	Content	Learning Outcome	Teaching and learning activities	Assessment
	Simplex Method 2.4 Artificial Variables Dual Linear Programming. The Dual Theorem			
7-8	<b>Chapter 3. Unconstrained Minimization</b> 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
<b>Midterm Examination</b>				<b>Written exam</b>
9	<b>Chapter 3. Unconstrained Minimization (cont'd)</b> 3.6 Conjugate Direction Methods 3.7 Quasi-Newton Methods		Lecture Class discussion	Homework
10-15	<b>Chapter 4. Constrained Minimization</b> 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
<b>Final examination</b>				<b>Written exam</b>

## 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.

## 8. 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**

## 32. FERM Elective #2

### 32.1 MODELING AND SIMULATIONS

Course ID: MAFE310IU

#### 1.General information

<b>Course designation</b>	For 3 <sup>rd</sup> or 4 <sup>th</sup> year students in Financial Engineering and Risk Management.  Modeling, simulating and analyzing the models in financial and risk management; Simulating continuous and discrete models/events at multiple levels in Matlab/R/Python and/or simulation software ARENA; Monte Carlo simulations; Analyzing statistical aspects of simulation, these including analysis of inputs, analysis of generating random states, analysis of outputs, and analysis of variance reduction techniques; Presenting a few models in Financial Engineering and Risk Management such as Jump-diffusion models, LIBOR market model dynamics, Pricing American options, Value at Risk models.
<b>Semester(s) in which the course is taught</b>	1, 2
<b>Person responsible for the course</b>	Dr. Nguyen Minh Quan
<b>Language</b>	English
<b>Relation to curriculum</b>	Elective
<b>Teaching methods</b>	Lectures, assignments
<b>Workload (incl. contact hours, self-study hours)</b>	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours <sup>17</sup> : 60
<b>Credit points</b>	4

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<sup>17</sup> 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.

Required and recommended prerequisites for joining the course	Statistics and Probability courses	
Course objectives	The purpose of this course is to provide students with the the basic theories and methodologies of modeling and simulations in financial engineering and risk management. Help student to build, design, and run simulation models through exercises and projects on simulating financial models and risk management models. Furthermore, the course also help students apply existing skills and knowledge to solve practical problems in modeling and simulation, including building the model, simulating the model, analyzing the results, and deducing conclusions.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Master the basic theories and methodologies of modeling and simulations in financial engineering and risk management (Program outcome: a)
	Skill	CLO2. Build, design, and run simulation models through exercises and projects on simulating financial models and risk management models. (Program outcome: c)  CLO3. apply existing skills and knowledge to solve practical problems in modeling and simulation, including building the model, simulating the model, analyzing the results, and deducing conclusions. (Program outcome: h, j)
	Attitude	CLO4. Develop life-long learning attitude (Program outcome: k)

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	<b>Weight: lecture session (4 hours)</b>		
	<b>Teaching levels: I (Introduce); T (Teach); U (Utilize)</b>		
	Topic	Weight	Level
	Introduction to modeling and simulation	1	I, T
	Monte Carlo simulation in Financial Engineering and Risk Management	1	T, U
	Monte Carlo simulation with Matlab/R/Python	1	T,U
	Discrete simulation and Continuous simulation	1	T, U
	Introduction of simulation software (ARENA, GoldSim, etc.)	1	T, U
	Generating of random numbers, Generating of random variables, Analysis of input data	1	T, U
	Analysis of random states, Generating sample paths	2	T, U
	Jump-diffusion model, LIBOR market model dynamics	1	T, U
	Variance reduction techniques	2	I, T
	Test and evaluate the aspects of the simulation model	1	I, T
Analyze the outputs with statistical techniques, draw conclusions	1	T, U	
Applications: Simulation in financial engineering and risk management (Pricing American options, Value at Risk model)	2	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		

<b>Reading list</b>	<ol style="list-style-type: none"> <li>1. P. Glasserman, <i>Monte Carlo Methods in Financial Engineering</i>, 1<sup>st</sup> edition, Springer, 2004.</li> <li>2. B. P. Zeigler, B. P., H. Praehofer, T. G. Kim, <i>Theory of Modeling and Simulation</i>, 2<sup>nd</sup> edition, Academic Press, 2004</li> <li>3. W. D. Kelton, R. P. Sadowski, and D. T. Sturrock, <i>Simulation with Arena</i>, McGraw-Hill, New York (4<sup>th</sup> edition), 2006.</li> </ol>
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### 1. 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	2										
2			6								
3								5		5	
4											4

### 2. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Introduction to modeling and simulation	1,2		Lecture
2	Monte Carlo simulation in Financial Engineering and Risk Management	1,2	Quiz	Lectures and Quiz
3	Monte Carlo simulation with Matlab/R/Python	2, 3	Quiz	Lectures and Quiz
4	Discrete simulation	1, 2	HW1	Lectures and HW
5	Continuous simulation	2, 3	Quiz	Lectures and Quiz

6	Introduction of simulation software (ARENA, GoldSim, etc.)	1, 2	HW2	Lectures and HW
7	Generating of random numbers, Generating of random variables, Analysis of input data	2, 3	Exercises	Lectures
8	Analysis of random states, Generating sample paths (1)	2, 3	HW3	Lectures and HW
Midterm Exam				
9	Generating sample paths (2)	1, 2, 3	Class Exercises	Lectures
10	Jump-diffusion model, LIBOR market model dynamics	2, 3	Class Exercises	Lectures
11	Variance reduction techniques (1)	1, 2	HW4	Lectures and HW
12	Variance reduction techniques (2)	2, 3	Class exercises	Lectures
13	Test and evaluate the aspects of the simulation model	2, 3	Quiz	Lectures and Quiz
14	Analyze the outputs with statistical techniques, draw conclusions	2, 3, 4	HW5	Lectures and HW
15	Applications: Simulation in financial engineering and risk management (Pricing American options, Value at Risk model)	1, 2, 3, 4	Exercises	
Final Exam		1, 2, 3, 4		

### 3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/ quizzes (10%)	Qz1->Qz2 70% Pass	Qz3 70%Pass	Qz4 70% Pass	



Homework exercises (10%)	HW1->H2 70% Pass	HW3 70%	HW4 70% Pass	HW5 70%
Midterm exam (30%)	Q1, Q2 80% Pass		Q3, Q4 60% Pass	
Final exam (50%)		Q1, Q2 70% Pass		Q3, Q4 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**

## 32.2 ASSET PRICING

Course ID: **MAFE311IU**

### 1. General information

Course designation	Asset Pricing is a classic course since the inception of basic courses in finance and financial structure by Merton Miller and Franco Modigliani. Based on this model, we will develop popular and modern models of asset pricing and business valuation under different context and conditions. Specially, this course will focus on the models of Professor Alfred Rappaport and Joel Stern (Stern Stewart & Co..) and their practical applications.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr.
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, laboratory session, exercise, 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 <sup>18</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	Financial Management, Corporate Finance

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<sup>18</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The course aims to provide students with knowledge and skills including (1) Understanding asset pricing and business valuation models, (2) Analyzing business development strategies to increase the value of ownership, (3) Valuating of Mergernd Acquisitions, restructuring	
Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Apply and analyze the asset pricing and business valuation models (Program outcome: a, b) CLO2. Identify and explain business development strategies in order to the value of ownership (Program outcome: a, b, d)
	Skill	CLO3. Apply valuation of Mergers and Acquisitions, Restructuring (Program outcome: c, h) CLO4. Analyze ways of business performance and creating added-value (Program outcome: h, j)
	Attitude	CLO5. Display effective work and communication within a team in a responsible environment (Program outcome: e, f, g) CLO6. Articulate applicability of research methods to improve activities in a business context, develop a lifelong learning attitude (Program outcome: i, k)
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	


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. Tim Koller, Marc Goedhart and David Wessels  2. Valuation measuring and managing the value of companies, 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	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
1,2	Foundations of Value 1. Why should maximize value? 2. The Role of Financial Manager 3. Fundamental Principles of Value Creation	1,2	Quiz	Lecture
3,4,5	Core Valuation Techniques 1. Frameworks for Valuation 2. Investment and Growth 3. Ratio Analysis	1,2,3,5	Quiz, HW	Lecture
5,6,7	Core Valuation Techniques (Cont.) 4. Forecasting 5. Forecasting Financial Cost 6. Calculating and Interpreting Results 7. Using Multiples for Valuation	1,2,3,5	Quiz, HW	Lecture and lab session
Midterm Exam				
9,10, 11	Analysis and Valuation 1. Performance Evaluation 2. Performance Management 3. Creating Value through Mergers and Acquisitions 4. Creating Value through Divestitures 5. Capital Structure 6. Investors	1,2,3,4, 5	Quiz, HW	Lecture and lab session
12, 13, 14	Advanced Valuation Issues 1. Valuing Multi-national Companies 2. Valuing Flexibility 3. Valuing Foreign Companies 4. Valuing High-Growth Companies 5. Valuing Cyclical Companies 6. Valuing Financial Companies	1,2,5	Quiz, HW	Lecture and exercises
15	Revision	1,2,3,4, 5,6	Group presentation	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**

### 32.3 DATA MINING

Course ID: **MAFE312IU**

#### 1. General information

Course designation	<ul style="list-style-type: none"> <li>- For third or fourth year students in Financial Engineering and Risk Management.</li> <li>- This course provides student about data mining process, data warehouse and technique tools to mining data such as, classification algorithm, neural network. It helps students getting knowlege to explore data in finance and economics.</li> </ul>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Le Manh Ha
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours <sup>19</sup> : 60
Credit points	3
Required and recommended prerequisites for joining the course	None

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<sup>19</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.



Course objectives	The purpose of this course is to provide students the following skills: Comprehend structure of data, Prepare a clean data, Apply technique in data science and machine learning to analyse a dataset.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Comprehend structure of data (Program outcome: c)
	Skill	CLO2. Prepare a clean data (Program outcome: d, e) CLO3. Apply technique in data science and machine learning to analyse a dataset (Program outcome: f, g)
	Attitude	CLO4. Develop life-long learning attitude (Program outcome: h, k)

Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
	Topic	Weight	Level
	Introduction: What is data mining? What makes it a new and unique discipline?	1	I, T
	Data Warehousing	1	T, U
	Data mining process: Data preparation/cleansing, task identification	1	T,U
	Association Rule mining	1	T, U
	Association rules - different algorithm types	1	T, U
	Classification/Prediction	2	I,T, U
	Classification - tree-based approaches, Neural Networks	2	T, U
	Clustering basics	1	I,T, U
	Time Series Mining	1	I, T, U
	Multi-Relational Data Mining	2	I, T, U
	ILP / Decision Rules	2	T, U
Examination forms	Written examination		
Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		
Reading list	<p>[1] Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, The Morgan Kaufmann Series in Data Management Systems, Jim Gray, Series Editor. Morgan Kaufmann Publishers, August 2000. 550 pages. ISBN 1-55860-489-8.</p>		

## 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	x						
3						x	x				
4								x		x	

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

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Introduction: What is data mining? What makes it a new and unique discipline? Relationship between Data Warehousing, On-line Analytical Processing, and Data Mining	1		Lecture
3	Data Warehousing	1,2	Test1	Lectures and discussion
4	Data mining process: Data preparation/cleansing, task identification	1,2	Test 2	Lectures and discussion
5,6	Association Rule mining	2,3	Personal task 1	Lectures
6,7	Association rules - different algorithm types	2,3		Lectures and presentation
8	Classification/Prediction	1,2	Test 3	Lectures
Midterm Exam				
9	Classification/Prediction	2, 3	Personal Task 2	Lectures and discussion

10	Classification - tree-based approaches, Neural Networks.	2,3	Test 4	Lectures and presentation
11	Clustering basics	1,2		Lectures
12	Time Series Mining	2, 3	Min-project	Lectures and discussion
13	Multi-Relational Data Mining	2, 3,4	Test 5	Lectures
14	ILP / Decision Rules	2, 3, 4		Lectures
15	ILP / Decision Rules	2, 3, 4, 5	Personal Task 3	Lectures and presentation
Final Exam		1, 2, 3, 4, 5		

#### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class tests/ (10%)	Test1->test 2 80% Pass	Test2->test3 80%Pass	Test 4 70% Pass	Test 5 70% Pass
Personal tasks (20%)	Task 1 70% Pass	Task 2 80%	Task 3 75% Pass	Min-project 75% Pass
Midterm exam (30%)	Q1, 80% Pass	Q2, 80% Pass	Q3 70% Pass	Q4 70% Pass
Final exam (40%)	Q1, 80% Pass	Q2 70%Pass	Q3, 70% Pass	Q4 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**

### 33. FINANCIAL MATHEMATICS 1

Course ID: **MAFE306IU**

#### 1. General information

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 <sup>20</sup> : 25
Credit points	3
Precourses:	MAFE302IU - Random processes
Course objectives	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 portfolios based on Markowitz mean-variance theory. Student will be able to use to hedge and speculate, and can apply binomial trees to evaluate options

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<sup>20</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Evaluate simple and compounded interest, and then evaluate fixed-income securities (Program outcomes: a, level 5)	
	Skill	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)	
	Attitude	CLO5. Articulate applicability of conduct tools in financial mathematics in investment funds, stock market. Integrate a life-long learning attitude (Program outcome: h, j)	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Theory of interest, Fixed income securities	1	I, T
	Capital allocation (Part A, B, C,D)	2	T, U
	Mean-variance portfolio theorem	1	I, T
	Forward contract, Futures contracts	2	T, U
	Options contracts	3	T, U
	Binomial pricing methods (Part A, B)	3	T, U
	Binomial pricing methods (Part C,D)	2	T, U
Binomial pricing methods (Part E,F)	4	T,U	
Examination forms	Written examination		

Study and examination requirements	<p>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.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
Reading list	<p>David Luenberger, <i>Investment Science</i>, David, Oxford University Press, 1998,</p> <p>Bill Dalton, <i>Financial products- an introduction using mathematics and Excel</i>, Cambridge University Press (2008)</p> <p>John-C.-Hull, <i>Options, Futures and other derivatives</i>, Prentice Hall 2014.</p> <p>Mondher Bellalah, <i>Derivatives, Risk management and value</i>, World Scientific Publishing Co. Pte. Ltd., 2010.</p>

## 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**

<b>Assessment Type</b>	<b>CLO1</b>	<b>CLO2</b>	<b>CLO3</b>	<b>CLO4</b>	<b>CLO5</b>
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**

## 34. OPTIMIZATION 2

### 1. General Information

Course Title	
Vietnamese:	Tối ưu 2
English:	Optimization 2
Course ID:	MAFE307IU
Course type	
<input type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input checked="" type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	3
Lecture:	3
Laboratory:	0
Precourses:	Probability, Optimization 1.
Parallel Course:	None
Course standing in curriculum:	Year 2

### 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.

<b>Goals</b>	<b>Goal description</b>	<b>Course Learning Outcomes</b>	<b>Competency level</b>
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

<b>Learning Outcome Codes</b>	<b>Course Learning Outcomes</b>	<b>Program Learning Outcomes</b>	<b>Teaching Level</b>
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 problems, solution methods (graphical solution method, scalarization methods) with applications in finance, management.	a, b	I, T
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

<b>Learning Outcome Codes</b>	<b>Course Learning Outcomes</b>	<b>Program Learning Outcomes</b>	<b>Teaching Level</b>
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

<b>Week</b>	<b>Content</b>	<b>Learning Outcome</b>	<b>Teaching and learning activities</b>	<b>Assessment</b>
1	Network flow problems	1,2	Lecture	
2	Networks and terminologies of networks: Trees, cycles, spanning trees	1,2	Lectures, Exercises	
3	Reduced cost, Network simplex method	1,2, 4, 5	Lectures, exercises	Quiz 1
4	Maximum flow problem, Seminar 1	1,2, 3	Lecture, discussion, presentation	Assignment 1 Presentation

5	Transportation problems: Statement of the transportation problem, Properties of transportation problems	1,2,3,4	Lectures, exercises	
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, exercises	Quiz 3
8	Assignment problems Seminar 2	1,2,4	Lectures, presentation, discussion	Assignment 2 presentation
Midterm Exam				Midterm Exam
9	Multi-objective linear problems	1,2,4	Lectures, exercises,	Presentation (cont'd)
10	Problem formulation, solution concepts	4, 5	Lecture, presentation and discussion	Quiz 4
11	Graphical solution methods	3, 4,5	Lecture, Exercise	
12	Scalarization methods Seminar 3	4,5	Lecture, Presentation, Discussion	Assignment 3 Presentation
13	Some optimization models in finance	3,5	Presentation, Discussion, Revision	Quiz 5
14	Some optimization models in finance 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. 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	
<input type="checkbox"/> General	<input type="checkbox"/> Fundamental
<input checked="" type="checkbox"/> Specialization (required)	<input type="checkbox"/> Specialization (elective)
<input type="checkbox"/> Project/ Internship/ Thesis	<input type="checkbox"/> Others : .....
Number of credits:	3
Lecture:	3
Laboratory:	0
Precourses:	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, Wiley, 2001.
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 components of the portfolio. Apply analytic tools in pricing bonds and illustrate the effects of interest rate risk	d	T, U
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**

### 36. FINANCIAL ECONOMETRICS

Course ID: **MAFE314IU**

#### 1. General information

Course designation	<p>The course will provide students with an understanding and applications of basic econometric methods to effectively analyze financial data, to estimate and test selected financial models in practice.</p> <p>This course will focus on investigating the relationship between financial variables, modeling and forecasting time series of financial variables, as well as analyzing long-term relationship.</p>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Nguyen Phuong Anh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, laboratory session, exercise, project presentation, discussion
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload: 70</p> <p>Contact hours (lecture, laboratory session, exercise, project presentation, discussion): 45</p> <p>Private study including examination preparation, specified in hours<sup>21</sup>: 25</p>
Credit points	3
Precourses	MAFE316IU Statistics
Course objectives	<p>The course aims to provide students with knowledge and skills including:</p> <p>An understanding of the techniques and applications of classical linear regression models, long-term relationship, modeling and forecasting financial time series.</p> <p>The use of an econometric software package (<i>R</i>)</p> <p>The ability to undertake a project in finance.</p>

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<sup>21</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	<p>CLO1. Understand the basic econometric tools and techniques. (Program outcomes: a, b; Level 2)</p> <p>CLO2. Identify and apply basic econometric methods and approaches to answer practical questions regarding the relationship between variables and modeling time series from the financial world (Program outcomes: a, d; Level 4-applying)</p>
	Skill	<p>CLO3. Demonstrate the ability to use an econometric software such as R to analyze data, to interpret the results and discuss the results relating to the real world (Program outcomes: c; level 4)</p> <p>CLO4. Examine the relationship between variables using regression models, to conduct diagnostic tests to produce robust results. Investigating long-term relationship between variables when applicable. Applying basic time series models to find the best-fit models and conduct diagnostic tests. Analyzing and evaluating the methods used. (Program outcomes: h, j; level 4)</p>
	Attitude	<p>CLO5. Effectively work and communicate within a team in a responsible environment (Program outcome: e, f, g)</p> <p>CLO6. Articulate applicability of econometric methods to improve activities in business context, develop a life-long learning attitude (Program outcome: i, k)</p>

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Review of Statistical Concepts	2	T, U
	Introduction to Econometrics Classical linear regression model	2	I, T
	Multiple linear regression model Diagnostic Tests	3	T, U
	Univariate Time Series: modeling and forecasting AR, MA, ACF, PACF, ARMA, ARIMA models Stationarity and Unit Root Test	3	I, T
	Modeling long-term relationship with cointegration	2	I, T
	How to undertake a project in finance	1	T, U
	Revision and Project presentation	2	T, U
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Chris Brook, Introductory Econometrics for Finance, 4th Edition, Cambridge University Press, 2019. 2. Frank Westhoff, An introduction to Econometrics, The MIT Press, 2013. 3. Stan Hurn, Vance Martin, Peter Phillips, Jun Yu, Financial Econometric Modeling, Oxford University Press, 2020. 4. John Y. Campbell, Andrew W. Lo, A. Craig MacKinlay, The Econometrics of Financial Markets, Princeton University Press, 2007. 5. Fumio Hyashi, Econometrics, Princeton University Press, 2011.		

## 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								
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	4			4				4			
3			4								
4								4		4	
5					3	3	3				
6									4		4

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Basic Statistical Concepts	1,2	Quiz	Lecture and exercises
2	Basic Statistical Concepts	1,2	Quiz	Lecture and exercises
3	Introduction to Econometrics Classical linear regression model	1,2,5	HW	Lectures and exercises
4	Introduction to Econometrics Classical linear regression model	1,2,3,4	Quiz	Lecture and lab session

5	Multiple linear regression model Diagnostic Tests	1,2,4,5	HW	Lecture and exercises
6	Multiple linear regression model Diagnostic Tests	1,2,4	Quiz	Lecture and exercises
7	Multiple linear regression model Diagnostic Tests	1,2,3,4,5	HW	Lab session
8	Univariate Time Series: modeling and forecasting AR, MA, ACF, PACF, ARMA, ARIMA models Stationarity and Unit Root Test	1,2,4,5	HW	Lectures and exercises
Midterm Exam				
9	Univariate Time Series: modeling and forecasting AR, MA, ACF, PACF, ARMA, ARIMA models Stationarity and Unit Root Test	1,2,4	Quiz	Lectures and exercises
10	Univariate Time Series: modeling and forecasting AR, MA, ACF, PACF, ARMA, ARIMA models Stationarity and Unit Root Test	1,2,3,4,5	HW	Lab session
11	Modeling long-term relationship with cointegration	1,2,4,5	HW	Lectures and exercises
12	Modeling long-term relationship with cointegration	1,2,3,4,5	Quiz, HW	Lab session
13	How to undertake a project in finance	4,5,6		Lectures and exercises
14	Revision	1,2,4,6		
15	Project presentation	1,2,3,4,5 ,6	Group presentation	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**



### 37. FINANCIAL MATHEMATICS 2

Course ID: **MAFE401IU**

#### 1. General information

Course designation	This course provides and helps students to understand notions and tools in Mathematics to price derivatives: apply partial differential, integral equations, probability, random processes to solve the pricing problems in 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	Elective
Teaching methods	Lecture, lesson, assignment, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 Private study including examination preparation, specified in hours <sup>22</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	Financial Mathematics 1, MAFE302IU-Random process,

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<sup>22</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The purpose of this course is to provide students with different types of options: vanilla options, barrier options, exotic options, perpetual options. The course offers the probabilistic approach to price options: probability distribution, expectation, variance. The Monte Carlo method is used to solve the pricing problems. Furthermore, the Binomial method is utilized to solve the pricing problems.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Apply different types of options: vanilla options, barrier options, exotic options, perpetual options (Program outcome: a)
		CLO2. Demonstrate using the probabilistic approach to price options: probability distribution, expectation, variance, integral computation skills are reviewed and developed. (Program outcome: a)
	Skill	CLO3. Apply the Monte Carlo method to solve the pricing problems(Program outcomes: d) CLO4. Employ Binomial methods to solve the pricing problems (Program outcomes: e)
Attitude	CLO5. Articulate applicability of conducting advanced tools in financial mathematics for pricing options. Develop a life-long learning attitude (Program outcome: h, j)	

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Stochastic calculus review	3	I, T
	Pricing European options using probabilistic approach	3	T, U
	Pricing European options using Monte Carlo method	2	I, T, U
	Pricing European digital options	3	I, T, U
Pricing American digital and perpetual options	4	I, T, U	
Pricing European barrier options	3	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	Steven E. Shreve, <i>Stochastic calculus for finance II: Continuous-time model</i> , Springer, 2000  Eric Chin, Dian Nel and Sverrir Ólafsson, <i>Problems and Solutions in Mathematical Finance</i> , Volume 1: stochastic calculus, 2014 John Wiley & Sons, Ltd  Eric Chin, Dian Nel and Sverrir Ólafsson, <i>Problems and Solutions in Mathematical Finance</i> , Volume 2: equity derivatives, 2017 John Wiley & Sons, Ltd  Mondher Bellalah, Derivatives, <i>Risk management and value</i> , World Scientific Publishing Co. Pte. Ltd., 2010.  Matthew J. Hassett, Donald G. Stewart - <i>Probability for Risk Management</i> -ACTEX Publications (2006)		

## 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	

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

### 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Stochastic calculus review, Pricing European options using probabilistic approach (Part A, B)	1,2		Lectures and discussions
3, 4	Pricing European options using probabilistic approach (Part C, D, E, F)	1,2	HW1	Lectures and HW/ discussions
5, 6	Pricing European options using Monte Carlo method (Part A, B, C, D)	1,2, 3	Exercises	Lectures and exercises
7, 8	Pricing European options using Monte Carlo method (Part E, F), Pricing European digital options	1,2,3	HW2/project	Lectures and HW
Midterm Exam				
9,10	Pricing American digital options, Pricing Asset or Nothing options	1,2,3,4	HW3/Quiz	Lectures and Quiz /homework
11, 12	Pricing European barrier options (Part A,B, C, D)	1,2,3, 5	HW/project	Lecture/exercise

13, 14	Pricing European barrier options (Part E,F) Pricing American perpetual options (Part A, B)	1,2,3,4, 5	HW4/Group presentation	Lectures and exercises /homework
15	Pricing American perpetual options (Part C, D)	1,2,3,4, 5	HW5/Group presentation	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 70%Pass	HW2 70%	HW3 70%Pass	HW4 70%Pass	HW5 60%Pass
Midterm exam (30%)	Q1 80%Pass	Q2 80%Pass	Q3 70%Pass	Q4 60%Pass	Q5 60%
Final exam (40%)	Q1 80%Pass	Q2 80%Pass	Q3 70%Pass	Q4 60% 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**

### 38. PORTFOLIO MANAGEMENT

Course ID: **MAFE402IU**

#### 1. General information

Course designation	The course will provide students with an introduction to modern portfolio theories and portfolio management strategies, pricing models of financial instruments, evaluation of portfolio risk and return compared to the benchmarks, Capital Asset Pricing Model (CAPM), and other issues in finance.
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 <sup>23</sup> : 25
Credit points	3
Required and recommended prerequisites for joining the course	Financial Management
Course objectives	The course aims to provide students with a broad overview of investment management and to provide conceptual foundation for the purpose of undertaking investment analysis for securities as well as portfolios.

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<sup>23</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	<b>Competency level</b>	<b>Course learning outcome (CLO)</b>
	Knowledge	CLO1. Understand the conceptual foundations of portfolio management and its applications in securities analysis and portfolio valuation. (Program outcomes: a, b)
	Skill	CLO2. Perform valuation of securities by applying pricing models and other techniques (Program outcomes: d)  CLO3. Construct optimized portfolio with the skills to measure portfolio risk and evaluate portfolio performance (Program outcomes: d)
	Attitude	CLO4. Display the effective work and communication within a team in a responsible environment (Program outcome: h, j)  CLO5. Articulate applicability of portfolio management concepts and techniques to their specific business problems, develop a life-long learning attitude (Program outcome: i, k)

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Investment Setting and Measuring Investment Return and Risk	1	T, U
	2A – Asset Allocation and a Review of Portfolio Management Process	1	T, U
	2B – Security Market Indicator Series		
	Introduction to Portfolio Theory	1	T, U
	Introduction to Portfolio Theory (Cont.) Introduction to Solver in conducting assignment of asset allocation	1	T, U
	Asset Pricing Models: Capital Asset Pricing Model (CAPM) and Other Models	1	I, T
	Security Analysis and Stock Valuation Models	1	I, T
	Stock Portfolio Management Strategies	1	I, T
	Bond Analysis and Bond Valuation Models	1	T, U
	Bond Portfolio Management Strategies	1	T, U
	Portfolio Performance Evaluation	1	T,U
	Capital Market Efficiency	1	T,U
Fundamental vs. Technical Analysis	1	T,U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1]. Relley, F. K. and Brown, K. C. (2006), Investment Analysis and Portfolio Management, 8th edition, Thomson South-Western. (RB) [2]. Bodie, Z., Kane, A., and Marcus, A.J. (2006), Investments, 7th edition, McGraw-Hill. (BKM).		



## 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							
3				x							
4								x		x	
5								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				

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Investment Setting and Measuring Investment Return and Risk	1,2	Quiz	Lecture and exercises
2	2A – Asset Allocation and a Review of Portfolio Management Process	1,2	HW	Lecture and exercises

	2B – Security Market Indicator Series model with Panel Data			
3	Introduction to Portfolio Theory	1,2,3,5	Quiz, HW	Lecture
4	Introduction to Portfolio Theory (Cont.)  Introduction to Solver in conducting assignment of asset allocation	1,2,3	HW	Lecture
5	Asset Pricing Models: Capital Asset Pricing Model (CAPM) and Other Models	1,2,3,4, 5	Quiz, HW	Lecture and exercises
6	Security Analysis and Stock Valuation Models	1,2,3	HW	Lecture and exercises
7	Stock Portfolio Management Strategies	1,2,3,5	Quiz, HW	Lecture and exercises
Midterm Exam				
8	Bond Analysis and Bond Valuation Models	1,2,5	HW	Lectures and exercises
9	Bond Portfolio Management Strategies	1,2,3,5	Quiz, HW	Lecture and exercises
10	Portfolio Performance Evaluation	1,2,5	Quiz, HW	Lecture and exercises
11	Capital Market Efficiency	1,2,4,5	HW	Lecture and exercises
12	Fundamental vs. Technical Analysis	1,2,3,4, 5	Quiz, HW	Lecture and exercises
13	Revision	1,2,4,5		Lecture

Final Exam	1,2,3,4, 5		
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#### 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
Final exam (40%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass		Q4 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**

### 39. RESEARCH METHODS IN FINANCE

Course ID: **MAFE403IU**

#### 1. General information

Course designation	<p>The course will provide students with an understanding and applications of advanced econometric and quantitative methods, to design and conduct empirical research, to answer questions from the real financial world.</p> <p>More specifically, this course will focus on the complex relationship between financial variables using panel regression, limited dependent variable models and simultaneous equations. Volatility and correlation between financial variables, as well as simulation techniques are also investigated. A roadmap of research methodologies is also provided.</p>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Nguyen Phuong Anh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, laboratory session, exercise, project presentation, discussion
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload: 70</p> <p>Contact hours (lecture, laboratory session, exercise, project presentation, discussion): 45</p> <p>Private study including examination preparation, specified in hours<sup>24</sup>: 25</p>
Credit points	3
Required and recommended prerequisites for joining the course	Financial Econometrics

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<sup>24</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	<p>The course aims to provide students with knowledge and skills including:</p> <p>An understanding of the techniques and applications of panel regression, limited dependent variable models, simultaneous equations, volatility and correlation modeling, simulation methods.</p> <p>The effective use of an econometric and quantitative software package (<i>such as R</i>)</p> <p>The ability to design and conduct empirical research to answer questions from the financial world.</p>
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Course Learning Outcomes	Upon the successful completion of this course students will be able to:	
	<b>Competency level</b>	<b>Course learning outcome (CLO)</b>
	Knowledge	<p>CLO1. Understand the advanced econometric and quantitative tools and techniques. (Program outcomes: a, b; level 2)</p> <p>CLO2. apply advanced econometric and quantitative methods to empirically answer research questions from the financial world regarding complex relationships between variables (panel regression, limited dependent variable models, simultaneous equations), volatility modeling, simulation methods (Program outcomes: a, b, d, level 3)</p>
	Skill	<p>CLO3. Demonstrate the ability to design research, effectively use an econometric software such as R to analyze data, to interpret the results, and discuss the results relating to the real world (Program outcomes: c, h)</p> <p>CLO4. Examine the complex relationship between variables using panel regression models, limited dependent variable models, simultaneous equations; to conduct diagnostic tests and produce robust results. Applying volatility models and simulation methods. Analyzing and evaluating the methods used. (Program outcomes: h, j)</p>
	Attitude	<p>CLO5. Display the effective work and communication within a team in a responsible environment (Program outcome: e, f, g)</p> <p>CLO6. Articulate applicability of research methods to improve activities in a business context, develop a life-long learning attitude (Program outcome: i, k)</p>

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Review of Econometrics	1	T, U
	Classical linear regression model with Panel Data	2	T, U
	Limited Dependent Variable Models	2	T, U
	Multivariate Models: simultaneous equations and VAR	2	T, U
	Modeling volatility and correlation	2	I, T
	Switching and State Space Models	1	I, T
	Simulation Methods: Monte-Carlo and Bootstrapping	2	I, T
	Design and conduct empirical research in finance	1	T, U
	Revision and Project presentation	2	T, U
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Chris Brook, Introductory Econometrics for Finance, 4th Edition, Cambridge University Press, 2019. 2. A. Bell, C. Brook, M. Prokopczuk, Handbook of Research Methods and Applications in Empirical Finance, Edward Elgar, 2013. 3. W. K. Härdle, C. Chen, L. Overbeck, Applied Quantitative Finance, Edition 3, Springer, 2017. 4. Ryan, Bob, Robert W. Scapens, Michael Theobald, and Viv Beattie, Research Methods and Methodology in Finance and Accounting, Cengage Learning, 2002.		

## 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	Review of Econometrics	1,2	Quiz	Lecture and exercises
2	Classical linear regression model with Panel Data	1,2	HW	Lecture and exercises



3	Classical linear regression model with Panel Data	1,2,3,5	Quiz, HW	Lectures and lab session
4	Limited Dependent Variable Models	1,2,4	HW	Lecture and exercises
5	Limited Dependent Variable Models	1,2,3,5	Quiz, HW	Lecture and lab session
6	Multivariate Models	1,2,4	HW	Lecture and exercises
7	Multivariate Models	1,2,3,5	Quiz, HW	Lecture and lab session
8	Modeling volatility and correlation	1,2,4	HW	Lectures and exercises
Midterm Exam				
9	Modeling volatility and correlation	1,2,3,5	Quiz, HW	Lecture and lab session
10	Switching and State Space Models	1,2,5	Quiz, HW	Lecture and exercises
11	Simulation Methods: Monte-Carlo and Bootstrapping	1,2,4,5	HW	Lecture and exercises
12	Simulation Methods: Monte-Carlo and Bootstrapping	1,2,3,4,5	Quiz, HW	Lecture and lab session
13	Design and conduct empirical research in finance	4,5,6		Lectures and discussion
14	Revision	1,2,4,6		Lecture

15	Project presentation	1,2,3,4, 5,6	Group presentation	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**

**40. FERM Elective #3****40.1 FINANCIAL RISK MANAGEMENT 2**Course ID: **MAFE404IU****1. General information**

Course designation	This course provides students with advancements in statistical and mathematical tools for quantitative risk management at banking, financial institutions, and insurance. The course aims to utilise state-of-the-art analytics for financial risk management. The course begins with an overall introduction to statistical characterizations of the return of an asset. The course then evolves to discuss volatility modelling and predictive models using time series analysis. It will also discuss Extreme value theory and multivariate risk systems e.g copulas theory for risk assessment. The last topic of the course is mostly dedicated to Analytical value-at-Risk for bonds and options.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Dr. Ta Quoc Bao
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, assignment, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 Private studies including examination preparation, specified in hours <sup>25</sup> : 25
Credit points	3

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<sup>25</sup> 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.

Required and recommended prerequisites for joining the course	Financial Risk Management 1, Statistics	
Course objectives	The purpose of this course is to provide students with an in-depth knowledge of Statistical and Mathematical tools that are used in financial risk management and fixed income securities, financial derivatives. These tools are mostly used in banking and financial institutions. The course concentrates on learning to build statistical models (GARCH, EVT, and Copula models) aiming to help a bank, insurance, and other financial institution from losses, insolvency, or uncertainty resulting from market risk and interest risk.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Describe the overall statistical characterizations of returns. (PLO (a); level 1)
		CLO2. Comprehend general concepts and definitions of advanced statistical models. Implement risk forecast. Distinguish analytical tools used in financial risk for bond and options (Program outcomes: (a); level 2)
		CLO3. Demonstrate advanced techniques for univariate and multivariate risk systems, and Utilise state-of-art data science libraries for risk modelling. Employing predictive models for risk assessment (Program outcomes: b; level 3)
Skill	CLO4. Assemble advanced techniques and models for quantifying risks of multiple assets and portfolios. Apply analytic tools in evaluating Value-at-Risk of bonds and financial derivatives (Program outcomes: j; level 4)	
Attitude	CLO5. Integrate the applicability of conducting advanced statistical and mathematical models for quantifying risks in financial institutions. Formulate a life-long learning attitude (Program outcome: i, k; level 4)	

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

[illegible]

3		3									
4										4	
5									4		4

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

### 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Prices and returns	1,2		Lectures and discussions
3, 4	Statistical properties of returns	1,2	HW1	Lectures and HW/ discussions
5, 6	Univariate Volatility Modelling	1,2, 3	In class exercises	Lectures and exercises
7, 8	Implementing risk forecasts	1,2,3	HW3/project	Lectures and HW
Midterm Exam				
9,10	Extreme Value Theory	1,2,3,4	HW4/Quiz	Lectures and Quiz /homework
11, 12	Copula and Dependence	1,2,3, 5	HW4/project	Lecture/exercise
13, 14	Analytical value-at-Risk for bonds and options	1,2,3,4, 5	HW5/Group presentation	Lectures and exercises /homework
15	Course revision	1,2,3,4, 5		Discussions/ presentations
Final Exam		1,2,3,4, 5		

**4. Assessment plan**

<b>Assessment Type</b>	<b>CLO1</b>	<b>CLO2</b>	<b>CLO3</b>	<b>CLO4</b>	<b>CLO5</b>
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 70% Pass	HW2 70%	HW3 65% Pass	HW4 65% Pass	HW5 60% Pass
Midterm exam (30%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass	Q5 50%
Final exam (40%)	Q1 80% Pass	Q2 80% Pass	Q3 70% Pass	Q4 60% Pass	Q5 40%

*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**

## 40.2 PARALLEL COMPUTING

Course ID: **MAFFE406IU**

### 1. General information

Course designation	<p>- For third or fourth year students in Financial Engineering and Risk Management.</p> <p>The course familiarize students with the jargon of parallel computing, memory architecture, different programming model: threads model, Message Passing model, data parallel model.</p>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Lecturer from Faculty of Computer Science
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload: 150</p> <p>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures)</p> <p>Private study including examination preparation, specified in hours<sup>26</sup>: 90</p>
Credit points	4
Required and recommended prerequisites for joining the course	None

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<sup>26</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.



Course objectives	<p>This course provides students an overview of the architectures and communication networks employed in parallel computers.</p> <p>The course covers the foundations for the development of efficient parallel algorithms, including examples from relatively simple numerical problems, sorting, and graph problems.</p>									
Course learning outcomes	<p>Upon the successful completion of this course students will be able to:</p> <table><tr><td>Competency level</td><td>Course learning outcome (CLO)</td></tr><tr><td>Knowledge</td><td>CLO1. Comprehend the architectures and communication networks employed in parallel computers (Program outcome: a)</td></tr><tr><td>Skill</td><td>CLO2. Project management, and development of efficient parallel algorithms (Program outcome: e) CLO3. Apply algorithms to special computer architectures (Program outcome: f)</td></tr><tr><td>Attitude</td><td>CLO4. Develop life-long learning attitude (Program outcome: h)</td></tr></table>		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Comprehend the architectures and communication networks employed in parallel computers (Program outcome: a)	Skill	CLO2. Project management, and development of efficient parallel algorithms (Program outcome: e) CLO3. Apply algorithms to special computer architectures (Program outcome: f)	Attitude	CLO4. Develop life-long learning attitude (Program outcome: h)
Competency level	Course learning outcome (CLO)									
Knowledge	CLO1. Comprehend the architectures and communication networks employed in parallel computers (Program outcome: a)									
Skill	CLO2. Project management, and development of efficient parallel algorithms (Program outcome: e) CLO3. Apply algorithms to special computer architectures (Program outcome: f)									
Attitude	CLO4. Develop life-long learning attitude (Program outcome: h)									

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Introduction to parallel computing	2	I, T
	Performance Metrics, Granularity, and its Effect and Data Mapping on Performance,	2	T, U
	Programming Shared Address Space Platforms ,API, Synchronization Primitives in POSIX,	2	T,U
	Parallel Programming, Programming Message Passing Platforms, Message Passing Interface	2	T, U
	MPI) Basics, Topologies, and Embedding, Overlapping Communication with Computation	2	T, U
Collective Communication and Computation Operations, Groups and Communicators, Static	2	I,T, U	
Distributions: Block, Cyclic, and Block-Cyclic, Unstructured Communication	3	T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1]. Vipin Kumar, Ananth Grama, Anshul Gupta, George Karpis, Introduction to Parallel Computing: Design and Analysis of Parallel Algorithms		

## 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:

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

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Introduction to parallel computing	1		Lecture and practice
3,4	Introduction to process, processor, thread, Granularity, Concurrency Decomposition Techniques, Parallel Algorithm Models	1,2	task1	Lectures and discussion
5	Performance Metrics, Granularity, and its Effect and Data Mapping on Performance,	1,2	task 2	Lecture and practice
6	Scalability Issue, Time Cost Analysis, Asymptotic Analysis.	2,3	Personal project 1	Lectures
7,8	Programming Shared Address Space Platforms, API, Synchronization Primitives in POSIX,	2,3		Lectures and presentation
Midterm Exam				
10,11	Controlling Thread and Synchronization Attributes, Composite Synchronization Constructs,	2,3	Task 3	Lecture and practice
11,12	Tips for Designing Asynchronous Programs, OpenMP: A Standard for Directive Based Parallel Programming, Programming Message Passing Platforms, Message Passing Interface	1,2		Lectures

13,14	(MPI) Basics, Topologies and Embedding, Overlapping Communication with Computation, Collective Communication and Computation Operations, Groups and Communicators, Static	2, 3	Min-project	Lectures and discussion
15	Distributions: Block, Cyclic, and Block-Cyclic, Unstructured Communication	2, 3,4	Personal Project 2	Lecture and practice
Final Exam		1, 2, 3, 4, 5		

#### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class tests/ (10%)	Task1 80% Pass	Task2 80%Pass	Task 3 70% Pass	
Personal tasks (20%)	Personal project 1 80%		Personal project 2 75% Pass	Min-project 75% Pass
Midterm exam (30%)	Q1, 80% Pass	Q2, 80% Pass	Q3 70% Pass	Q4 70% Pass
Final exam (40%)	Q1, 80% Pass	Q2 70%Pass	Q3, 70% Pass	Q4 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**

### 40.3 INTRODUCTION TO OPERATIONS RESEARCH

**1. Name of course: Introduction to Operations Research**

**2. Course ID: MAFE411IU**

**3. Course type:**

☐ Specialization

☒ Core

☐ Requirement

☒ Elective

**4. Number of credits: 3 credits**

- Theory: 2 credits
- Practice: 1 credit

**5. Prerequisite:**

Optimization I

**6. Parallel teaching in the course: None**

**7. Course Description:** The course supply some basic knowledge on Operations research with some applications to finance: Advance network flow problems, decision analysis, introduction to game theory, and Project management with applications to economics, business and especially finance.

**8. Course objectives:**

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

1. Master mathematical models and methods for network flow problems, decision analysis, introduction to game theory, and Project management.
2. Realize problems in management that can be modeled as the mentioned problems and have ability to model corresponding problems to the models: network follow problems, decision analysis, game theory, and Project management.
3. Realize problems in the mathematical models we formulated (in case the models are not exactly like the ones in the course) and possess ability to modify the algorithm, theory to deal with the new situation.

**9. Textbooks and references:**

**Textbooks:**

1. Hillier/Lieberman, Introduction to Operations Research, 10<sup>th</sup> Edition, McGraw-Hill, 2015.

**References:**

1. H. A. Taha, Operations Research, An Introduction, Pearson Edition Limited, 2017.

2. G. Cornuejols, R. Tutuncu, Optimization methods in Finance, Cambridge University Press, 2007.

### 10. Learning outcomes

	Course Learning outcome	Program Learning outcome
Knowledge	1. Master mathematical models and methods for network flow problems, decision analysis, introduction to game theory, and Project management (Program outcome: b)	PLO (a); level 3
Skill	2. Realize problems in management that can be modeled as the mentioned problems and have ability to model corresponding problems to the models: network flow problems, decision analysis, game theory, and Project management. (Program outcome: j)	PLO (j), level 4
Attitude	3. Realize problems in the mathematical models we formulated (in case the models are not exactly like the ones in the course) and possess ability to modify the algorithm, theory to deal with the new situation. 4.	PLO k, level 4

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

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

### 11. Course implementation

- a. **Time:** *Theory*: 15 weeks, 03 periods per week; *Practice*: 8 weeks, 04 periods per week
- b. **Teaching and learning activities**
  - Classroom activities: Lectures, discussions, exercises/quizzes, presentations

- Self-learning: Reading, homework
- Team work: Project assignment

## 12. Course outline

Week	Topics
1	Network flow problems (review)
2	Duality for network optimization models
3	Algorithm with negative-cost cycles
4	Extensions and models in finance.
5	Decision analysis
6	Decision Making without Experimentation
7	Decision Making with Experimentation
8	Decision trees and Practical Application of Decision Analysis
9	Mid-term Exam
10	Game theory- Formulation of two-person, zero-sum game.
11	Solving simple games
12	Games with mixed strategies, Graphical solution procedure,
13	Project Management with PERT/CPM
14	Scheduling a Project with PERT
15	Dealing with Uncertain Activity Durations
16	Extension
17	Final exam

## 13. Course Assessment:

### 13.1. Grading:

- One midterm exam: 30%
- In-class quizzes, exercises, class participation, Project assignment: 20%
- One comprehensive final exam: 50%

### 13.2. Assessment Plan

No .	Assessment tasks	Assessment criteria	Level of cognitive Domain												Weight (%)
			Applying			Analyzing			Evaluating			Creating			
			M C Q	W Q	P	M C Q	W Q	P	M C Q	W Q	P	M C Q	W Q	P	
1	- Midterm exam  - Quiz, exercises	Master mathematical models and methods for network flow problems,	X	X		X	X		X	X		X	X		20

	- Project assignment	decision analysis, introduction to game theory, and Project management												
2	- Final exam - Quiz, exercises - Project assignment	Realize problems in management ability to model corresponding problems to the models: network follow problems, decision analysis, game theory, and Project management	X  X	X X		X	X		X	X X		X	X	30
3	- Final exam - exercises, - project assignment	Realize problems in the mathematical models and possess ability to modify the algorithm, theory to deal with the new situation.	X	X		X	X		X	X		X	X	30



	Total														100

**Note:** MCQ: Multiple choice questions ; WQ: Writing questions; P: Presentation

#### 14. Student responsibility & Policies:

- *Student responsibility:* Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
- *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, students may re-take the tests.)

Developed by:	Last updated: Aug 2019
Prof Nguyen Dinh, Instructor	
Department of Mathematics	
Email: ndinh@hcmu.edu.vn	

Ho Chi Minh City, 06/05/2024

**HEAD OF DEPARTMENT OF MATHEMATICS**

**Prof. Dr. Pham Huu Anh Ngoc**

**41. FERM Elective #4****41.1 MATHEMATICAL ECONOMICS**Course ID: **MAFE407IU****1. General information**

Course designation	<ul style="list-style-type: none"> <li>- For 2nd or 3rd year students in Financial Engineering and Risk Management.</li> <li>- Main contents: nonlinear optimization, consumption set, use function, welfare market, theory of demand, competitive equilibrium and optimal growth.</li> </ul>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours <sup>27</sup> : 60
Credit points	4
Required and recommended prerequisites for joining the course	Analysis 2

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<sup>27</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The purpose of this course is to provide students with the fundamentals of variational calculus and optimization. We will also study competitive economic models, economic balance and stability, and the theory of optimal economic growth.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Have basic knowledge of the fundamentals of variational calculus and optimization. (Program outcome: a)  CLO2. Have basic knowledge of the fundamentals of optimization. (Program outcome: a)
	Skill	CLO3. Able to analyze competitive economic models and their balance and stability (Program outcome: b, d)  CLO4. Able to optimize economic growth. (Program outcome: b, d)
	Attitude	CLO5. Develop life-long learning attitude (Program outcome: j, k)

Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (4 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
	Topic	Weight	Level
	Convex programming, Non constrain maximization, Saddle points, Arrow-Hurwicz-Uzawa Theorem	1	I, T
	Quasiconvex programming, Multi-target maximization, Global form, second-level conditions Applications,	1	T, U
	Second order condition, relative statics, Hicks-Slutzski equation	1	T,U
	Consumption set, quasi order, preferred order, usage function Two classic theorems on welfare market, core theory, Deubreu-Scarf Theorem	1	T, U
	Theory of demand, semi-continuity, theorem on maximum	1	T, U
	Existence of competitive balance: basic knowledge, proof of McKenzie Pareto optimization	1	T, U
	More on differential equations Classical foundation of competitive equilibrium	1	T, U
	Global stability, three items case Global stability, n items case	1	T, U
	Tatonnement and non-Tatonnement processes Second Lyapunov method	1	I, T
	Frobenius theorem	1	I, T
	Diagonally dominant matrices	1	T, U
	Application: input-output analysis, multinational investment, Leontiev dynamic model, stable of competitive equilibrium	1	T, U

	Variational calculus, Euler equation	1	T, U
	Function spaces, optimization, Euler condition		
	Neoclassical aggregate growth model	1	T, U
	Optimal growth problem structure		
	Discrete time model of optimal growth	1	T, U
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. A. Takyama, Mathematical Economics, Cambridge University Press-Amazon, 1997. 2. K. Lancaster, Mathematical Economics, Dover Publication, New York, 1987. 3. D.W. Hands, Introductory Mathematical Economics, Oxford University Press, 2003		

## 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:

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

## 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Convex programming, Non constrain maximization, Saddle points, Arrow-Hurwicz-Uzawa Theorem	1,3		Lecture
2	Quasiconvex programming,	1,3	Quiz	Lectures and Quiz

	Multi-target maximization, Global form, second-level conditions Applications,			
3	Second order condition, relative statics, Hicks-Slutzski equation	3, 5	Quiz	Lectures and Quiz
4	Consumption set, quasi order, preferred order, usage function Two classic theorems on welfare market, core theory, Deubreu- Scarf Theorem	3, 5	HW1	Lectures and HW
5	Theory of demand, semi- continuity, theorem on maximum	3, 5	Quiz	Lectures and Quiz
6	Existence of competitive balance: basic knowledge, proof of McKenzie Pareto optimization	3, 5	HW2	Lectures and HW
7	More on differential equations Classical foundation of competitive equilibrium	3, 5	Quiz	Lectures and Quiz
8	Global stability, three items case Global stability, n items case	3, 5	HW3	Lectures and HW
Midterm Exam				
9	Tatonnement and non- Tatonnement processes Second Lyapunov method	2, 4	Quiz	Lectures and Quiz
10	Frobenius theorem	2, 4	Quiz	Lectures and Quiz
11	Diagonally dominant matrices	4, 5	HW4	Lectures and HW
12	Application: input-output analysis, multinational investment, Leontiev dynamic model, stable of competitive equilibrium	2, 4	Quiz	Lectures and Quiz
13	Variational calculus, Euler equation Function spaces, optimization, Euler condition	4, 5	Quiz	Lectures and Quiz
14	Neoclassical aggregate growth model Optimal growth problem structure	2, 4, 5	HW5	Lectures and HW
15	Discrete time model of optimal growth	1, 2, 3, 4, 5	Exercises	
Final Exam		1, 2, 3, 4, 5		

#### 4. Assessment plan

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

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

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**



**Prof. Dr. Pham Huu Anh Ngoc**

## 41.2 EXCHANGE RATES AND INTERNATIONAL FINANCE

Course ID: **MAFE410IU**

1. **Name of Course (Code):** Exchange rates and International Finance (MAFE408IU)
2. **Number of Credits:** 3
3. **Lecturers:** Nguyen Kim Thu, PhD; Cao Minh Man, PhD
4. **Responsible Department:** Department of Mathematics
5. **Prerequisite:** Macroeconomics
6. **Overall Educational Objectives/ Learning Outcomes:**

Provide students necessary knowledge and skills, including:

- Basic knowledge of exchange rates and international financial market
- International linkages between macroeconomic variables
- Economics models of exchange rate determination

### 7. **Course Description:**

International Finance plays an important role in the economy, both at macro and micro level. This course provides a thorough foundation of the key concepts in international finance, ranging from exchange rate, foreign exchange market to the balance payments and the world's history of exchange rate regimes. It then moves to cover very important preliminaries including the concept of purchasing power parity and interest rate parity to set the scene for some models of exchange rate determinations, such as the Mundell-Fleming model and Dornbusch model. The course ends with the discussion about optimum currency areas and monetary union, taking the European Monetary Union (EMU) as a typical example.

### **Course's Content:**

Week	Contents	Number		
		Lecture	Practice	Assignment
1	International Finance: Introduction Exchange rate and the market for foreign currency The balance of payments A brief history of exchange rates since World War II	6		
2	Prices in the Open Economy: Purchasing Power Parity The Law of One Price Purchasing power parity	3		



3	Financial markets in the open economy Uncovered interest rate parity Covered interest rate parity Purchasing power parity revisited	3		
4	Open economy macroeconomics IS-LM model of aggregate demand Aggregate supply	3		
5	Flexible prices: the monetary model The simple monetary model of a floating exchange rate The simple monetary model of a fixed exchange rate Interest rates in the monetary model	6		
6	Fixed prices: the Mundell-Fleming model Monetary expansion with a floating exchange rate Fiscal expansion with a floating exchange rate Monetary expansion with a fixed exchange rate Fiscal expansion with a fixed exchange rate Comparison between monetary model and the Mundell-Fleming model	6		
7	Sticky prices: the Dornbusch model Outline of the model Monetary expansion Empirical test: the Frankel model	3		
8	Portfolio balance and the current account Specification of asset markets Short-run equilibrium Long-run and current account equilibrium	3		
9	Currency substitution The model Evidence on currency substitution	3		
10	General equilibrium models The Redux model Extension of Redux Evidence	3		
11	Optimum currency areas and monetary union Benefits of monetary union Costs of monetary union Other considerations Currency boards	3		
12	Review	3		

Total		45		
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**8. Textbook:**

Laurence Copeland, Exchange Rates and International Finance, 2009

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

Competency level	Course learning outcome (CLO)
Knowledge	CLO1. Comprehend basic knowledge of exchange rates and international financial market (Program outcomes: a, b; level 3)
Skill	CLO2. Evaluate the international linkages between macroeconomic variables (Program outcomes: i, h; level 4)
Attitude	CLO3. Demonstrate confidence when dealing with economics models of exchange rate determination (Program outcome: k; level 3)

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	3	3									
2								4	4		
3											3

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

**9. Required Teaching Equipment:****10. Score Scale:** 100**11. Learning Assessment:**

Activity	Number	Percentage
Exercise, Practice, Assignment		30%
Mid – term Exam		25%
Final Exam		45%

**12. Other Learning Resources, Support and Information:**

- a. Lecture notes and supporting documents will be available on IU website.
- b. Discussed topics are hosted on online forums or through email.

Designed by: Nguyen Kim Thu, PhD

Last Updated: 05/7/2015

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**



**Prof. Dr. Pham Huu Anh Ngoc**

### 41.3 FINANCIAL STATEMENT ANALYSIS AND BUSINESS EVALUATION

**1. Name of course:** Financial Statement Analysis and Business Evaluation

**2. Course ID:** MAFE412IU (previous code **BA190IU**)

**3. Course type:**

☐ Specialization

☐ Core

☐ Requirement

☒ Elective

**4. Number of credits:** 3 credits

- Theory: 3 credits

- Practice: 0 credit

**5. Prerequisite:** Financial Management

**6. Parallel teaching in the course:** None

**7. Course Description:**

- The course draws on concepts from financial economics, business strategy, accounting, and other business disciplines for evaluating business decisions in a variety of contexts. It will be useful to students planning careers in investment banking, securities analysis, credit analysis, consulting, public accounting, and corporate management.
- The course emphasizes practical applications. Consequently, the majority of the course will be spent analyzing and discussing cases involving real financial statements in real decision contexts. This is supplemented by lecture and discussion of material from the text and articles from the financial press.

**8. Course objectives:**

1. The objective of the course is to provide hands-on experience in financial statement analysis.
2. Students will be exposed to general tools of financial analysis, theoretical concepts, and practical valuation issues.

**9. Textbooks and references:**

**Textbooks:**

[1]. Business Analysis and Valuation Using Financial Statement, K. Palepu, P. Healy, and V. Bernard., 3rd edition (South-Western Publishing Co., 2004).

**References:**

[1]. Financial Statement Analysis -8th edition, John J. Wild, 2004, McGraw-Hill

**10. Learning outcomes:**

By the end of the course, students should become comfortable with using financial statements to evaluate performance and provide a basis for making reasonable valuation estimates.

	Course Learning outcome	Program Learning outcome
Knowledge	1. to provide hands-on experience in financial statement analysis	Program outcome: a
Skill	2. Students will be exposed to general tools of financial analysis, theoretical concepts, and practical valuation issues.	Program outcome: b, c
Attitude	3. Work effectively on multidisciplinary teams for financial-based projects. 4. Develop life-long learning attitude on analysis and business evaluation	Program outcome: e Program outcome: k

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

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

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

#### 11. Course implementation:

- Lecture: 3 hrs/ week
- Lab: none
- Homework, Assignment: 3 hrs/ week

#### 12. Course outline:

Topics	Content	Duration
1	Introduction to Business Analysis and Valuation	2w
2	Business Strategy Analysis	2w
3	Accounting Analysis	1w
4	Financial Analysis	2 w
5	Prospective Analysis	1 w
6	Equity Security Analysis	1 w
7	Merger and Acquisitions	2 w
8	Review	1 w

### 13. Course Assessment:

#### 13.1. Grading:

- In-class quizzes, class participation and learning attitude: 20% - 40%
- Midterm test: 20-40%
- Final exam: 40-60%

#### 13.2. Assessment Plan

No.	Assessment tasks	Assessment criteria	Level of cognitive Domain												Weight (%)
			Applying			Analyzing			Evaluating			Creating			
			M CQ	W Q	P	M CQ	WQ	P	M CQ	W Q	P	M CQ	W Q	P	
1	- Midterm exam  - Final exam  - Homework/ Exercises/ Quizzes	The objective of the course is to provide hands-on experience in financial		X  X  X			X  X			X X					50

		statement analysis													
2	- Midterm exam - Final exam - Homework/ Exercises/ Quizzes	Students will be exposed to general tools of financial analysis, theoretical concepts, and practical valuation issues.		X			X								50
	Total														100

**Note:** MCQ: Multiple choice questions ; WQ: Writing questions; P: Presentation

#### 14. Student responsibility & Policies:

- *Student responsibility:* Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
- *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, students may re-take the tests.)

Developed by:	Last updated: Aug 2019
Dr. Vuong Hung Cuong, Instructor	
School of Business	
Email: vhcuong@hcmiu.edu.vn	

## 42. SOFTWARE ENGINEERING

Course ID: **MAFE309IU**

### 1. General information

Course designation	<p>- For third or fourth year students in Financial Engineering and Risk Management.</p> <p>Fundamental software project management knowledge: plan-driven and agile methodologies, estimating techniques: wide-band, Delphi, parametric estimating; work-breakdown-structure, costs and budgeting, change management; risk management; earned value management, quality, monitoring and control; measurements and metrics, relationship and people issues, project close-out</p>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Lecturer from Faculty of Computer Science
Language	English
Relation to curriculum	Elective
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload: 150</p> <p>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures)</p> <p>Private study including examination preparation, specified in hours<sup>28</sup>: 90</p>
Credit points	3

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<sup>28</sup> 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.



Required and recommended prerequisites for joining the course	None	
Course objectives	The purpose of this course is to provide students all the aspects in software development. Apply foundations in software engineering to adapt readiness management context.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Comprehend software development process (Program outcome: a)
	Skill	CLO2. Project management, and Object-oriented design (Program outcome: e) CLO3. Verification and validation by using Software testing, Architectural design (Program outcome: f)
	Attitude	CLO4. Develop life-long learning attitude (Program outcome: h)

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Software development process	2	I, T
	Project management	2	T, U
	Requirement identification	2	T,U
	Architectural design	2	T, U
	Object-oriented design	2	T, U
	User interface design	2	I,T, U
Software testing	2	T, U	
Software cost estimation	1	I,T, U	
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.  Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1]. Ian Sommerville, Software Engineering, 7th Edition, Addison Wesley, 2004, ISBN 0-321-21026-3		

## 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	3										
2					4						
3						3					
4								3			

### 3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1, 2	Software development process	1		Lecture and practice
3,4	Project management	1,2	task1	Lectures and discussion
5	Requirement identification	1,2	task 2	Lecture and practice
6	Architectural design	2,3	Personal project 1	Lectures
7,8	Object-oriented design	2,3		Lectures and presentation
Midterm Exam				
10,11	User interface design	2,3	Task 3	Lecture and practice
11,12	Verification and validation	1,2		Lectures
13,14	Software testing	2, 3	Min-project	Lectures and discussion
15	Software cost estimation	2, 3,4	Personal Project 2	Lecture and practice
Final Exam		1, 2, 3, 4, 5		

### 4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class tests/ (10%)	Task1 80% Pass	Task2 80%Pass	Task 3 70% Pass	
Personal tasks (20%)		Personal project 1	Personal project 2 75% Pass	Min-project 75% Pass

		80%		
Midterm exam (30%)	Q1, 80% Pass	Q2, 80% Pass	Q3 70% Pass	Q4 70% Pass
Final exam (40%)	Q1, 80% Pass	Q2 70%Pass	Q3, 70% Pass	Q4 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**

### 43. SUMMER INTERNSHIP

Course ID: **MAFE313IU**

#### 1. General information

Course designation	This syllabus includes an overview of the process of obtaining academic credit for an internship through IU and an Industry company. It includes information on eligibility, registration, and requirements. Summer Internship is the requirement course for the BSc. degree in Applied Mathematics (FERM). It is supervised academically by a faculty member and professionally by an 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	<ol style="list-style-type: none"> <li>1. The student must maintain a minimum cumulative GPA of 50 or higher.</li> <li>2. The student must have a minimum of accumulative credits of 90 credits.</li> </ol> <p>Students will work one-on-one with their university coordinator to identify times that they will meet and create a plan for completing the internship.</p>

<b>Internship objectives</b>	<ol style="list-style-type: none"><li>1. Critical Thinking/Problem Solving: Based on industrial project or training exercise, one can analyze issues, make decisions, and overcome problems.</li><li>2. Oral/Written Communications: Articulate thoughts and ideas clearly and effectively in written and oral forms. Students are able to express ideas to others; and can write/edit memos, letters, and reports clearly and effectively.</li><li>3. Teamwork/Collaboration: Build collaborative relationships with industrial colleagues and customers representing diverse cultures, ages, genders, religions, lifestyles, and viewpoints.</li><li>4. Leadership and Career Management: Leverage the strengths of others to achieve common goals and use interpersonal skills to coach and develop others. Identify and articulate one's skills, strengths, knowledge, and experiences relevant to the position desired and career goals and identify areas necessary for professional growth.</li><li>5. Professionalism/Work Ethic: Demonstrate effective work habits, e.g., punctuality, working productively with many others, and time workload management.</li><li>6. Global/Intercultural Fluency: Value, respect, and learn from diversity of cultures, ages, genders, sexual orientations, and religions. The individual demonstrates, openness, inclusiveness, sensitivity, and the ability to interact respectfully with all people and understand individuals' differences.</li></ol>
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Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO 1. Analyze issues, make decisions, and overcome problems using their mathematical background in financial modeling and risk management (PLO: a, d, level 4)
	Skill	<p>CLO 2. Articulate thoughts and ideas clearly and effectively with colleagues and customers in written reports and oral forms. (PLO h, level 5)</p> <p>CLO 3. Demonstrate effective work habits, e.g., punctuality, working productively with many others, and time workload management. (PLO j, level 5)</p> <p>CLO 4. Build the financial/risk models for industrial projects using logical thinking and mathematical modelling techniques (PLO c, h, level 6)</p>
	Attitude	<p>CLO 5. Show a good ability to communicate effectively in a diversity environment (PLO e, f, level 5)</p> <p>CLO6. Adhere professional and ethical, legal, and responsibilities (PLO g, level 5)</p> <p>CLO 7. Formulate their professional development and lifelong learning (PLO k, level 4)</p>
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>	

## 2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-10) 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	4			4							
2								5			
3										5	
4			5					5			
5					5	5				6	
6							5				
7											4

### 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 the 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
<b>I</b>	<b>Attitude and Manner at working place (Thái độ và tác phong làm việc)</b>					
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)					
<b>II</b>	<b>Professional Abilities (năng lực chuyên môn)</b>					
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
<b>Internship report</b>	90% Pass	90% Pass	80% Pass	90% Pass	80% Pass	80% Pass	90% Pass

<b>Performance In Company</b>	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.*

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**



**Prof. Dr. Pham Huu Anh Ngoc**

## 44. GRADUATION THESIS

Course ID: **MAFE409IU**

### 1. General information

Course designation	Thesis fulfills the research requirement for the BSc. degree in Applied Mathematics (FERM). 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 <sup>29</sup> : 525
Credit points	12
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 accumulative credits of 120 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.

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<sup>29</sup> When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	This thesis graduation is to create, to do, and to complete a capstone project. Student needs 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.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	<p>CLO 1. Analyze problems using their mathematical background in financial modeling and simulations (PLO: a,b,d, level 4)</p> <p>CLO 2. Evaluate a financial product or a risk management strategy to meet needs and constraints of industry (PLO: a, b,d, level 5)</p>
	Skill	<p>CLO 3. Build the models using logical thinking and mathematical modelling techniques (PLO c, h, level 6)</p> <p>CLO 4. Integrate knowledge of modern financial models and/or risk management techniques. (PLO h, level 4)</p> <p>CLO 5. Adapt the broad knowledge to adjust applied mathematics solutions on a specific problem in data science, economics, finance, and societal problem. (PLO j, level 6)</p>
	Attitude	<p>CLO 6. Perform effectively on professional collaborate with advisor and other students in a seminar group. (PLO e, level 4)</p> <p>CLO 7. Show an good ability to communicate effectively with audiences (PLO f, level 5)</p> <p>CLO8. Adhere professional and ethical, legal, and responsibilities (PLO g, level 5)</p> <p>CLO9. Form scientific worldview, logical and independent thinking (PLO i, level 5)</p> <p>CLO 10. Formulate their professional development and lifelong learning (PLO k, level 4)</p>

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>
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### 3. 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 an 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.
2. Literature review. Review of relevant research
3. Background
4. Methodology
5. Simulations and results
6. Discussion and conclusion.

### 4. 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

<i>Grading scheme</i>	<b>Needs Work</b>	<b>Maximum score</b>	<b>Suggested scores</b>
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	
<b>Total</b>		<b>10</b>	

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

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8	CLO9	CLO 10
Thesis proposal	70% Pass	70% Pass	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	90% Pass	90% Pass
Thesis presentation	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass	

*Ho Chi Minh City, 06/05/2024*

**HEAD OF DEPARTMENT OF MATHEMATICS**

**Prof. Dr. Pham Huu Anh Ngoc**