

**City University of Hong Kong  
Course Syllabus**

**offered by Department of Economics and Finance  
with effect from Semester B 2020/21**

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**Part I Course Overview**

<b>Course Title:</b>	<b>Mathematics for Economics &amp; Finance</b>
<b>Course Code:</b>	<b>EF2452</b>
<b>Course Duration:</b>	<b>1 Semester</b>
<b>Credit Units:</b>	<b>3</b>
<b>Level:</b>	<b>B2</b>
<b>Proposed Area:</b> <i>(for GE courses only)</i>	<input type="checkbox"/> Arts and Humanities <input type="checkbox"/> Study of Societies, Social and Business Organisations <input type="checkbox"/> Science and Technology
<b>Medium of Instruction:</b>	<b>English</b>
<b>Medium of Assessment:</b>	<b>English</b>
<b>Prerequisites:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Precursors:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Exclusive Courses:</b> <i>(Course Code and Title)</i>	<b>Nil</b>

## Part II Course Details

### 1. Abstract

This course aims to equip students with a set of fundamental mathematical concepts underlying decision-making in economics and finance.

It also aims to develop students' creativity and originality through various assessment tasks and teaching and learning. The lectures encourage students to develop their discovery ability through in-class discussions, which enhance students' understanding of mathematical concepts.

Students are required to apply fundamental mathematical concepts to solve real world problems in designed scenarios. Only an accurate understanding of the underlying economic concepts can direct which mathematical tools can be applied to the situation. A final interpretation of the numerical solution with economic concepts shows the accomplishment of students' ability to discover and innovate.

### 2. Course Intended Learning Outcomes (CILOs)

*(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)*

No.	CILOs <sup>#</sup>	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Demonstrate proficiency over underlying fundamental mathematical tools in economics and finance. Students are encouraged to discover the underlying economic theory in real world cases and designed scenarios.	40%	√	√	
2.	Identify and apply the requisite quantitative techniques towards investigating decision-making in economics and finance. The attitude and ability to discover and innovate are demonstrated in case studies to derive the mathematical solution from the real-life applications.	50%	√	√	√
3.	Analyze economics and financial issues through a more quantitative approach. The mathematical solutions have to be completed by appropriate economic interpretation. Students are to innovate and broaden their understanding of real world economic issues.	10%		√	√
		100%			

\* If weighting is assigned to CILOs, they should add up to 100%.

# Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

*Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.*

A2: Ability

*Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.*

A3: Accomplishments

*Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.*

### 3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Lectures	Students are encouraged to apply mathematical concepts to solve economic problems. It helps reveal students' attitudes to innovate and apply	√	√		3 hours lecture per week
In-class presentation by students	Instructors will use some mini-projects to motivate and guide students to discover answers to economic problems and ask them to present their findings in class. This will enhance their ability of innovation and increase their accomplishments of solving real world problems.		√	√	
Group discussion and self-learning exercises.	In classes, teachers will raise the question and let students find the answer and solve the problems via group discussion. Teachers can guide the students to compare different concepts (e.g. public goods, optimal tax rate) in different economies and practise model setting with computer software (e.g. set up a matrices model with Excel). Students are to analyse and synthesize mathematical concepts with economic concepts and practise their ability to discover and innovate.			√	

**4. Assessment Tasks/Activities (ATs)**

*(ATs are designed to assess how well the students achieve the CILOs.)*

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: 60%							
<p>Midterm examination</p> <p>The midterm exams will include questions that require students to identify and apply the mathematic tools to solve optimization problems in economics and finance.</p>		√	√			20%	
<p>Assignments, Quizzes, and projects</p> <p>Students will be asked to complete an in-course assessment which may be in the format of multiple choice, short questions, or long questions. Students must exercise and apply their own judgement using the skills taught in class in order to analyse economics and financial issues through a more quantitative approach. The assignments are designed to help students master the mathematical tools and let them better understand the economic intuitions behind mathematical derivation. Projects are assigned to encourage students to solve real world economic problems or analyse contemporary hot issues. This will stimulate students' interest and let them get experienced with practical issues.</p>	√	√	√			40%	

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Examination: 40% (duration: 2 hours, if applicable)							
Final exam  Through innovative scenario questions, students are required to discover their ability to apply mathematical skills into economic concepts. The numerical result of the answer will be completed by an interpretation of their result with appropriate economic concepts.		√	√			40%	
* The weightings should add up to 100%.						100%	

***Students are required to pass both coursework and examination components in order to pass the course.***

## 5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Midterm examination	<p>1.1 Ability to solve mathematical problems such as, first order recurrence, univariate differentiation, univariate optimization, etc.</p> <p>1.2. Ability to solve optimization problems in economic and financial decisions, e.g., monopolistic and competitive firms' profit maximization problem.</p>	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Assignments, Quizzes, and projects	<p>2.1 Capacity to solve mathematical problems such as first order recurrence, derivatives, continuous compounding, minimization and maximization with or without constraints, matrix operation, system of equations.</p> <p>2.2 Ability to use proper mathematical tools to solve economic and financial problems, such as equilibrium prices and quantity, elasticity, cost minimization, profit maximization, utility maximization, asset pricing using net current value, constructing arbitrage portfolios, etc.</p>	High	Significant	Moderate	Basic	Not even reaching marginal levels

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
3. Examination	<p>3.1 Ability to solve mathematical problems such as partial derivatives, multivariate optimization, constrained optimization, matrix operation, linear equations in matrix format, etc.</p> <p>3.2 Ability to convert an economic and financial optimization problem into a tractable mathematical problem and solve it using proper techniques.</p>	High	Significant	Moderate	Basic	Not even reaching marginal levels

**Part III Other Information** (more details can be provided separately in the teaching plan)

**1. Keyword Syllabus**

Mathematical Concepts:  
Linear and Non-Linear Functions  
Systems of Equations  
Matrix and Linear Algebra  
Sequences and Series  
Calculus  
Univariate Optimization  
Optimization in Two Variables  
Constrained Optimization

Applications:  
Consumption Functions  
Production & Costs  
Elasticity, Revenues and Profits  
Supply and Demand  
Discounting and Net Present Value  
Pricing of Risky Assets  
Input-output model

**2. Reading List**

**2.1 Compulsory Readings**

*(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)*

1.	<i>Mathematics for Economics and Finance</i> by Martin Anthony and Norman Briggs, Cambridge University Press.
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**2.2 Additional Readings**

*(Additional references for students to learn to expand their knowledge about the subject.)*

1.	<i>Essential Mathematics for Economic Analysis (2<sup>nd</sup> ed.)</i> by Knut Sydsæter and Peter Hammond, Prentice Hall, 2006.
2.	<i>Mathematics for Economists</i> by Carl P. Simon and Lawrence E. Blume, W.W. Norton, 1994.