

EF2452: MATHEMATICS FOR ECONOMICS AND FINANCE

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Mathematics for Economics and Finance

Subject Code

EF - Economics and Finance

Course Number

2452

Academic Unit

Economics and Finance (EF)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

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.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-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	x	x	
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	x	x	x
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		x	x

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 real-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.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students are encouraged to apply mathematical concepts to solve economic problems. It helps reveal students' attitudes to innovate and apply	1, 2 3 hours lecture per week
2	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.	2, 3
3	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.	3

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Midterm examination The midterm exams will include questions that require students to identify and apply the mathematic tools to solve optimization problems in economics and finance.	20	

2	Assignments, Quizzes, and projects 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.	1, 2, 3	40	
---	--	---------	----	--

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

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

Assessment Rubrics (AR)**Assessment Task**

1. Midterm examination

Criterion

1.1 Ability to solve mathematical problems such as, first order recurrence, univariate differentiation, univariate optimization, etc.

1.2. Ability to solve optimization problems in economic and financial decisions, e.g., monopolistic and competitive firms' profit maximization problem.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Assignments, Quizzes, and projects

Criterion

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.

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.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

3. Examination

Criterion

3.1 Ability to solve mathematical problems such as partial derivatives, multivariate optimization, constrained optimization, matrix operation, linear equations in matrix format, etc.

3.2 Ability to convert an economic and financial optimization problem into a tractable mathematical problem and solve it using proper techniques.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

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

Reading List**Compulsory Readings**

	Title
1	Mathematics for Economics and Finance by Martin Anthony and Norman Briggs, Cambridge University Press.

Additional Readings

	Title
1	Essential Mathematics for Economic Analysis (2nd ed.) by Knut Sydsaeter and Peter Hammond, Prentice Hall, 2006.
2	Mathematics for Economists by Carl P. Simon and Lawrence E. Blume, W.W. Norton, 1994.