EF5474: QUANTITATIVE METHODS IN ECONOMICS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Quantitative Methods in Economics

Subject Code
EF - Economics and Finance
Course Number
5474

Academic Unit
Economics and Finance (EF)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate 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 at providing computational, analytical, and empirical tools to graduate students in economics. Particularly, this course provides an introduction to R, Python, Julia and major analytical techniques in optimization and equilibrium analysis. This course will equip students with computational, numerical, and analytical skills to solve real-life business problems and conduct modern economics research.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply the computer programs R, Python and/or Julia to solve problems in economics and finance.	20	x		x
2	Deploy analytical techniques to understand theoretical models in economics and finance.	20	x		
3	Apply computational analytical tools in economics and financial applications.	20	x	x	
4	Deploy empirical tools to analyse and explain observed economics or financial data.	20	x	x	x
5	Apply analytical models in the literature.	20	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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will engage in lectures covering the theories demonstration and applications of various computational, analytical, and empirical tools.	1, 2, 3, 4, 5	
2	Peer Discussion	Students will engage in structured discussion with peers and complete homework assignments to practice and develop programming and analytical skills to understand and solve economics and finance problems.	1, 2, 3, 4, 5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Homework assignments	1, 2, 3, 4, 5	50	For Assignments and Group Project, you can use Generative Artificial Intelligence Tools to help you understand the concepts/ questions/ problems, or analyze data. But the final version must be your own work, e.g., you cannot copy and paste the AI answers as your own answers. You are not allowed to use Generative Artificial Intelligence Tools in mid-term exam(s)/quiz(zes).	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Assessment Rubrics (AR)

Assessment Task

Homework assignment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-) Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

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Marginal

(D) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.

Assessment Task

Homework assignment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Marginal

(B-, C+, C) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Marginal

(B-, C+, C) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.

Part III Other Information

Keyword Syllabus

R programming Python, big dataset, panel data, cross-sectional data, portfolio choices, asset pricing, income risk, inequality, consumption-based models, overlapping generations models, heterogeneous agent models, numerical optimization, and numerical integral.

Reading List

Compulsory Readings

	Title
1	Osborne, M.J. (2023) Mathematical Methods for Economic Theory. University of Toronto.
2	Dayal (2015) An Introduction to R for Quantitative Economics. Springer.
3	Sargent and Stachurski (2023) A First Course in Quantitative Economics with Python.

Additional Readings

	Title
1	Sargent and Stachurski (2024) Intermediate Quantitative Economics with Python.
2	Perla, Sargent and Stachurski (2024) Quantitative Economics with Julia.
3	Dayal (2020) Quantitative Economics with R - A Data Science Approach. Springer.
4	Caraiani (2019) Introduction to Quantitative Macroeconomics Using Julia. Academic Press.
5	Heer and Maussner (2024) Dynamic General Equilibrium Modelling: Computational Methods and Applications, Springer.