UNIVERSITY OF LONDON

Course information 2024-25

EC3120 Mathematical Economics

General information

MODULE LEVEL: 6

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

MODE: Locally Taught and Independent Learner Route (not available for Online Taught students)

Summary

Mathematical modelling is particularly helpful in analysing a number of aspects of economic theory. The course content includes a study of several mathematical models used in economics. Considerable emphasis is placed on the economic motivation and interpretation of the models discussed.

Conditions

Please refer to the relevant programme structure in the EMFSS Programme Regulations to check:

- where this course can be placed on your degree structure; and
- details of prerequisites and corequisites for this course.

You should also refer to the Exclusions list in the EMFSS Programme Regulations to check if any exclusions apply for this course.

Aims and objectives

The course is specifically designed to:

- Demonstrate to the student the importance of the use of mathematical techniques in theoretical economics.
- Enable the student to develop skills in mathematical modelling.

Learning outcomes

At the end of this course and having completed the essential reading and activities students should be able to:

- Use and explain the underlying principles, terminology, methods, techniques, and conventions used in the subject.
- Solve economic problems using the mathematical methods described in the subject.
- Discuss the main types of risks faced by banks, and use the main techniques employed by banks to manage their risks.

Employability skills

Below are the three most relevant employability skills that students acquire by undertaking this course which can be conveyed to future prospective employers:

1. Complex problem solving
2. Decision making
3. Adaptability and resilience

Essential reading

For full details please refer to the reading list.

Dixit, Avinash K. Optimization in Economics Theory. (Oxford University Press, 1990) second revised edition [ISBN 978-0198772101]

Sydsæter, Knut, Peter Hammond, Atle Seierstad and Arne Strom Further Mathematics for Economic Analysis. (Pearson Prentice Hall, 2008) second edition [ISBN 978-0273713289]

Assessment

This course is assessed by a three-hour and fifteen-minute closed-book written examination.

Syllabus

Techniques of constrained optimisation. This is a rigorous treatment of the mathematical techniques used for solving constrained optimisation problems, which are basic tools of economic modelling. **Topics include:** Definitions of a feasible set and of a solution, sufficient conditions for the existence of a solution, maximum value function, shadow prices, Lagrangian and Kuhn Tucker necessity and sufficiency theorems with applications in economics, for example General Equilibrium theory, Arrow-Debreu securities and arbitrage.

Intertemporal optimisation. Bellman approach. Euler equations. Stationary infinite horizon problems. Continuous time dynamic optimisation (optimal control). Applications, such as habit formation, Ramsey-Kass-Coopmans model, Tobin's q, capital taxation in an open economy, are considered.

Tools for optimal control: Ordinary differential equations. These are studied in detail and include linear 2nd order equations, phase portraits, solving linear systems, steady states, and their stability.