UNIVERSITY OF LONDON

Course information 2025-26

MT1174 Calculus

General information

MODULE LEVEL: 4

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

MODE: Locally Taught, Independent Learner Route and Online Taught

Summary

This unit develops a student's proficiency in working with the mathematical methods of calculus, and it investigates some applications to problems in economics, management and related areas. The unit also develops the student's understanding of the theoretical concepts behind these methods.

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 objectives specifically include:

- to enable students to acquire skills in the methods of calculus (including multivariate calculus), as required for their use in further mathematics subjects and economics-based subjects
- to prepare students for further units in mathematics and/or related disciplines

Learning outcomes

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

- use the concepts, terminology, methods and conventions covered in the unit to solve mathematical problems in this subject,
- solve unseen mathematical problems involving understanding of these concepts and application of these methods
- see how calculus can be used to solve problems in economics and related subjects
- demonstrate knowledge and understanding of the underlying principles of calculus.

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.

Binmore, K. and J. Davies Calculus. (Cambridge: Cambridge University Press, 2011) second revised edition [ISBN 978-0521775410]

Anthony, M. and N. Biggs Mathematics for Economics and Finance. (Cambridge: Cambridge University Press, 2024) [ISBN 978-1108459433].

Assessment

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

Syllabus

This unit develops basic mathematical methods and concepts of calculus and will include their applications to problems in economics, management and related areas.

Basics: Revision of basic algebra; powers; sets; functions (including trigonometric functions); graphs; factorisation; inverse and composite functions; exponential and logarithm functions; conic sections; trigonometric identities.

Differentiation: The meaning of the derivative; standard derivatives; Product rule, quotient rule and chain rule; Tangent lines; Taylor series; using derivatives for approximations; marginals; elasticities.

One-variable optimisation: First-order conditions; first and second-order tests for nature of a critical point; convexity and concavity; profit maximisation; the effects of taxation; curve sketching.

Integration: Indefinite integrals; Definite integrals; Standard integrals; Substitution method (including trigonometric substitutions); Integration by parts; Partial fractions; consumer and producer surplus.

Functions of several variables: Contours, principal sections and partial derivatives; chain rule, homogeneous functions, gradient vectors, directional derivatives, tangent planes, Taylor series.

Multivariate optimisation: unconstrained optimisation; convex and concave functions; constrained optimisation; applications of unconstrained and constrained optimisation; the meaning of Lagrange multipliers.

Differential equations: Separable equations; first-order linear equations; homogeneous equations; exact equations; second-order equations with constant coefficients; systems of first-order equations; some applications.