UNIVERSITY OF LONDON

Course information 2020-21
MT105b Mathematics 2 (half course)

General information

MODULE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

This half course develops further the basic mathematical methods introduced in *MT105a Mathematics 1*, and also demonstrates further applications in economics, finance and management.

Conditions

Co-requisite: Students can only take MT105b Mathematics 2 at the same time as or after MT105a Mathematics 1, not before.

Exclusions: This half course may not be taken with the following.

- MT1173 Algebra
- MT1174 Calculus
- MT1186 Mathematical Methods

Aims and objectives

This half course is designed to:

- enable students to acquire further skills in the methods of calculus and linear algebra (in addition to those in 05a Mathematics 1), as required for their use in economics-based subjects
- prepare students for further courses in mathematics and/or related disciplines.

Learning outcomes

At the end of this half course and having completed the essential reading and activities students should have:

- used the concepts, terminology, methods and conventions covered in the half course to solve mathematical problems in this subject.
- the ability to solve unseen mathematical problems involving understanding of these concepts and application of these methods.
- seen how mathematical techniques can be used to solve problems in economics and related subjects

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

Essential reading

For full details, please refer to the reading list.

Anthony, M. and N. Biggs *Mathematics for Economics and Finance*. (Cambridge: Cambridge University Press, 1996) [ISBN 978-0521559133]

Assessment

This half course is assessed by a two-hour unseen written examination.

Syllabus

This course develops further the basic mathematical methods introduced in Mathematics 1, and also demonstrates further applications in economics, finance and management.

New techniques are also developed, particularly for linear algebra, differential equations and difference equations, and applications of these techniques are investigated.

Note: Mathematics 2 builds on Mathematics 1. Everything in the Mathematics 1 syllabus is needed for Mathematics 2. Thus, the Mathematics 2 syllabus includes the Mathematics 1 syllabus.

***Further differentiation and integration*:** Mathematics 1 material on differentiation and integration; Using derivatives for approximations; Elasticities; Taylor's theorem; the effects of taxation; Definite integrals and the calculation of areas; Further economic applications of integration: includes consumer and producer surplus.

Functions of several variables: Mathematics 1 material on functions of several variables; Homogeneous functions and Euler's theorem; Review of constrained optimisation; Constrained optimisation for more than 2 variables; Further applications of constrained optimisation.

***Linear Algebra*:** Mathematics 1 material on matrices and linear equations; Supply and demand, and the imposition of excise and percentage tax; Consistency of linear systems; Solving systems of linear equations using row operations, in the case where there are infinitely many solutions; Determinants and Cramer's rule; Calculation of inverse matrices by row operations; Economic applications of systems of linear equations, including input-output analysis; Eigenvalues and eigenvectors; Diagonalisation of matrices.

***Differential equations*:** Exponential growth; Separable equations; Linear differential equations and integrating factors; Second-order differential equations; Coupled equations, including the use of matrix diagonalisation; Economic applications of differential equations.

***Difference Equations*:** Solving first-order difference equations; Application of first-order difference equations to financial problems; The cobweb model; Second-order difference equations; Coupled first-order difference equations, including the use of matrix diagonalisation; Economic applications of second-order difference equations.

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