UNIVERSITY OF LONDON | INTERNATIONAL PROGRAMMES

Course information 2017–18
MT105a Mathematics 1 (half course)

This half course develops basic mathematical methods and will emphasise their applications to problems in economics, management and related areas.

Exclusion
This half course may not be taken with *MT1174 Calculus*

Aims and objectives
The objectives specifically include:

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

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)

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

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

Students should consult the appropriate *EMFSS Programme Regulations*, which are reviewed on an annual basis. The *Regulations* provide information on the availability of a course, where it can be placed on your programme's structure, and details of co-requisites and prerequisites.

Syllabus

This is a description of the material to be examined. On registration, students will receive a detailed subject guide which provides a framework for covering the topics in the syllabus and directions to the essential reading

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***Basics*:** Basic algebra; Sets, functions and graphs; Factorisation (including cubics); Inverse and composite functions; Exponential and logarithm functions; Trigonometrical functions.

***Differentiation*:** The meaning of the derivative; Standard derivatives; Product rule, quotient rule and chain rule; Optimisation; Curve sketching; Economic applications of the derivative: marginals and profit maximisation.

***Integration*:** Indefinite integrals; Definite integrals; Standard integrals; Substitution method; Integration by parts; Partial fractions; Economic applications of integration: determination of total cost from marginal cost, and cumulative changes.

***Functions of several variables*:** Partial differentiation; Implicit partial differentiation; Critical points and their natures; Optimisation; Economic applications of optimisation; Constrained optimisation and the Lagrange multiplier method; The meaning of the Lagrange multiplier; Economic applications of constrained optimisation.

***Matrices and linear equations*:** Vectors and matrices, and their algebra; Systems of linear equations and their expression in matrix form; Solving systems of linear equations using row operations (in the case where there is a unique solution); Some economic/managerial applications of linear equations.

***Sequences and series*:** Arithmetic and Geometric Progressions; Some Financial application of sequences and series.