UNIVERSITY OF LONDON | INTERNATIONAL PROGRAMMES

# Course information 2019–20
# 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 course may not be taken with
*MT1174 Calculus*
*MT1186 Mathematical methods*

## 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.

## Learning outcomes

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

- ☑ 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

## 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.

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.