



## Course information 2011–12

### MT2117 Advanced calculus (half course)

This half course provides students with useful techniques and methods of calculus and enables students to understand why these techniques work. Throughout, the emphasis is on the theory as much as on the methods.

#### Prerequisite

If taken as part of a BSc degree, courses which must be passed before this half course may be attempted:

MT1174 Calculus *or*  
MT105a Mathematics 1 *and* MT105b Mathematics 2.

#### Exclusion

May not be taken with MT3095 Further mathematics for economists.

#### Aims and objectives

The half course is designed to:

- enable students to acquire further skills in the techniques of calculus
- enable understanding of the principles underlying the subject of calculus
- prepare students for further courses in mathematics and/or related disciplines (e.g., economics, actuarial science).

#### Assessment

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

#### Learning outcomes

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

- ✓ use the concepts, terminology, methods and conventions covered in the half unit to solve mathematical problems in this subject.
- ✓ demonstrate an understanding of the underlying principles of the subject.
- ✓ solve unseen mathematical problems involving understanding of these concepts and application of these methods.

#### Recommended reading

For full details, please refer to the reading list

Ostaszewski, A. *Advanced Mathematical Methods*. (Cambridge: Cambridge University Press)  
Binmore, K. and Davies, J. *Calculus: Concepts and Methods*. (Cambridge: Cambridge University Press)

Students should consult the *Programme Regulations for degrees and diplomas in Economics, Management, Finance and the Social Sciences* that are reviewed annually. The Prerequisites, Exclusions, and Syllabus are subject to confirmation in the *Regulations*. Notice is also given in the *Regulations* of any courses which are being phased out and students are advised to check course availability.

## Syllabus

This is a description of the material to be examined, as published in the *Regulations*. 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.

This course follows on from Mathematics 1 and Mathematics 2, and continues further the study of calculus techniques and theory. The course will develop further the theory of functions, and will also include some new practical skills, such as how to evaluate multiple integrals, and how to use Laplace transforms to solve differential equations.

Topics included are: Functions of several variables, linear approximations and tangent planes, directional derivatives and the gradient, Edgeworth box and contract curves, concave and convex functions, inverse functions, local inverses and critical points, the Riemann integral, multiple integration, improper integrals, manipulation of integrals, introduction to the Laplace transform.