



Unit information 2009–10

117 Advanced calculus (half unit)

This half unit 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, units which must be passed before this half unit may be attempted:

05a Mathematics 1
and
05b Mathematics 2.

Exclusion

May not be taken with 95 Further mathematics for economists.

Aims and objectives

The half unit 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 unit is assessed by a two hour unseen written examination.

Learning outcomes

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

- ✓ demonstrate knowledge of the subject matter, terminology, techniques and conventions covered in the subject
- ✓ demonstrate an understanding of the underlying principles of the subject
- ✓ demonstrate the ability to solve problems involving an understanding of the concepts.

Recommended reading

Ostaszewski, A. *Advanced Mathematical Methods*. (Cambridge: Cambridge University Press, 1991) [ISBN 9780521289641].
Binmore, K. and Davies, J. *Calculus: Concepts and Methods*. (Cambridge: Cambridge University Press, 2001) [ISBN 9780521775410].

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 units which are being phased out and students are advised to check unit 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 unit follows on from Mathematics 1 and Mathematics 2, and continues further the study of calculus techniques and theory. The unit 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.