



Unit information 2009–10

116 Abstract mathematics

This unit is an introduction to formal mathematical reasoning, in which proof is central. It introduces fundamental concepts and constructions of mathematics and looks at how to formulate mathematical statements in precise terms. It then shows how such statements they can be proved or disproved. It provide students with the skills required for more advanced units in mathematics.

Prerequisite

If taken as part of a BSc degree, units which must be passed before this 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

This unit is designed to enable students to:

- develop their ability to think in a critical manner
- formulate and develop mathematical arguments in a logical manner
- improve their skill in acquiring new understanding and expertise
- acquire an understanding of basic pure mathematics and the role of logical argument in mathematics.

Essential reading

Biggs, Norman L. *Discrete Mathematics*.

(Oxford: Clarendon Press, 2003) second edition [ISBN 9780198507178].

Eccles, P.J. *An Introduction to Mathematical Reasoning; numbers, sets and functions*.

(Cambridge University Press, 1997) [ISBN 9780521597180]

Bryant, Victor. *Yet Another Introduction to*

Analysis. (Cambridge University Press, 1990) [ISBN 9780521388351].

Learning outcomes

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

- ✓ have a knowledge of basic mathematical concepts in discrete mathematics, algebra, and real analysis
- ✓ be able to use formal notation correctly and in connection with precise statements in English
- ✓ be able to solve mathematical problems in discrete mathematics, algebra, and real analysis
- ✓ be able to find and formulate simple proofs.

Assessment

This unit is assessed by a three hour unseen written examination.

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 is an introduction to mathematical reasoning. Students are introduced to the fundamental concepts and constructions of mathematics. They are taught how to formulate mathematical statements in precise terms, and how such statements can be proved or disproved.

The unit is designed to enable students to:

- develop their ability to think in a critical manner
- formulate and develop mathematical arguments in a logical manner

- improve their skill in acquiring new understanding and expertise
- acquire an understanding of basic pure mathematics, and the role of logical argument in mathematics.

Topics covered are: Logic, integers, sets and functions, prime numbers, relations, real and complex numbers, greatest common divisor and modular arithmetic, infimum and supremum, sequences, limits of sequences, functions and limits of functions, continuity, groups.