Course information 2020-21

MT2116 Abstract mathematics

General information

COURSE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

This course 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 provides students with the skills required for more advanced courses in mathematics.

Conditions

Prerequisite: If taken as part of a BSc degree, the following course(s) must be passed before this course may be attempted:

- MT1174 Calculus **OR** MT1186 Mathematical methods **OR** (**BOTH** MT105a Mathematics 1 **AND** 05b Mathematics 2)

Exclusions: You may not register for this course in the same year as:

- MT3095 Further mathematics for economists

Aims and objectives

This course 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.

Learning outcomes

At the end of this course and having completed the essential reading and activities students should:
- have used basic mathematical concepts in discrete mathematics, algebra and real analysis to solve mathematical problems in this subject.
- be able to use formal notation correctly and in connection with precise statements in English.
- be able to demonstrate an understanding of the underlying principle of the subjects.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

- be able to solve unseen mathematical problems in discrete mathematics, algebra and real analysis.
- be able to prove statements and formulate precise mathematical arguments.

Essential reading

For full details, please refer to the reading list

Biggs, Norman L. *Discrete Mathematics.* (Oxford: Clarendon Press, 2003) second edition [ISBN 978-0198507178]

Eccles, P.J. *An Introduction to Mathematical Reasoning; numbers, sets and functions.* (Cambridge University Press, 1997) [ISBN 978-0521597180]

Bryant, Victor. *Yet Another Introduction to Analysis.* (Cambridge University Press, 1990) [ISBN 978-0521388351]

Assessment

This course is assessed by a three-hour unseen written examination.

Syllabus

This course 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 course 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.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.