



Course information 2018–19

MT3041 Advanced mathematical analysis (half course)

This half course is a course in real analysis, designed for those who already know some real analysis (such as that encountered in course *MT2116 Abstract mathematics*). The emphasis is on functions, sequences and series in n -dimensional real space. The general concept of a metric space will also be studied.

Prerequisite

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

MT2116 Abstract mathematics.

Aims and objectives

The course is designed to enable students to:

- develop further their ability to think in a critical manner
- formulate and develop mathematical arguments in a logical manner
- improve their skills in acquiring new understanding and experience
- acquire an understanding of advanced mathematical analysis.

Essential reading

For full details please refer to the reading list. There is no single textbook which corresponds to the subject exactly as it is treated here.

Please see the subject guide for six recommended textbooks. Three which are particularly useful are:

Bartle, R.G. and D.R. Sherbert *Introduction to Real Analysis*. (John Wiley and Sons: New York)

Binmore, K.G. *Mathematical Analysis: A Straightforward Approach*. (Cambridge University Press: Cambridge)

Bryant, Victor *Yet Another Introduction to Analysis*. (Cambridge University Press: Cambridge)

Learning outcomes

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

- ✓ have a good knowledge of the mathematical concepts in real analysis
- ✓ be able to use formal notation correctly and in connection with precise statements in English
- ✓ be able to demonstrate the ability to solve unseen mathematical problems in real analysis.
- ✓ be able to prove statements and to formulate precise mathematical arguments.

Assessment

This 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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After studying this course, students should be equipped with a knowledge of concepts (such as continuity and compactness) which are central not only to further mathematical courses, but to applications of mathematics in theoretical economics and other areas. More generally, a course of this nature, with the

emphasis on abstract reasoning and proof, will help students to think in an analytical way, and be able to formulate mathematical arguments in a precise, logical manner.

Specific topics covered are:

- series of real numbers;
- series and sequences in n -dimensional real space \mathbb{R}^n ;
- limits and continuity of functions mapping between \mathbb{R}^n and \mathbb{R}^m ;
- differentiation
- the topology of \mathbb{R}^n ;
- metric spaces
- uniform convergence of sequences of functions.