

MA552 Analysis

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Please bookmark this module's web page:

<http://www.kent.ac.uk/ims/personal/elm2/MA552>

Basic outline of the module

Sequences and their convergence. The convergence of bounded monotonic sequences. Series and their convergence: the comparison test, the ratio test, absolute and conditional convergence, the alternating series test. Continuous functions: the boundedness theorem, the intermediate value theorem. Differentiable functions: the Mean Value Theorem, l'Hôpital's rule and Taylor expansions. Riemann integration and (time permitting) improper integrals.

Timetable This module is 2 hours a week throughout the teaching year. Lecture time in weeks 23 and 24 will be devoted to revision for the examination.

Lectures will consist of an introduction to the concepts, discussion of theorems and solutions to typical assignment and exam problems, including templates for routine answers. Lectures do not replace diving deeply into the textbooks.

Recommended texts

These two texts are at precisely the required standard. Knowing what is in the various textbooks can considerably ease the burden of note-taking.

Guide² Analysis, M Hart, Palgrave Mathematical Guides, Second edition, 2001.

A First Course in Mathematical Analysis, David Brannan, CUP, 2006.

Both may be purchased from Blackwells (follow the links on the module home-page) or borrowed from the Library.

Reading List

There are many, many books on real analysis to supplement your reading. You need to find one that “speaks” to you. The following seem both useful and accessible.

Introduction to real analysis, RG Bartle and DR Sherbert, Wiley 1982.

Mathematical analysis, a straightforward approach, K.G. Binmore, CUP, 1982.

Analysis, PE Kopp, Modular Mathematics Series, Arnold, 1996.

Elementary Analysis, K Ross, Springer, 1980

Olden but golden:

Calculus, Lipman Bers, Holt, Rinehart and Winston., 1969

Calculus, Michael Spivak, Benjamin Inc., 1967

Introduction to Analysis and Calculus, Vol. 1, R Courant and F John, Wiley, 1965

Further reading, recommended to aid philosophical understanding:

The mathematical experience, PJ Davis and R Hersh, Penguin, 1983, in particular the section entitled “Algorithmic vs Dialectic mathematics”.

Assessment will be 80% by a 2 hour closed book examination at the end of the year, 5% by two in-class tests, one in each semester, and 15% by three take-home, open book, problem based assignments. There will be a practice in-class test. A comprehensive guide to the examination will be made available from the module web page in due course. The pass mark is 40/100 overall (exam and coursework together). Pass by compensation is at the convenor's discretion and will not be awarded to students whose have failed to show they have achieved the learning outcomes.

Points to note:

- Understanding Analysis is one of the hallmarks of professional mathematical scientists. You need a professional approach to success, which involves doing, not just reading. In particular, an exam strategy of “memorizing and mimicking” will lead only to poor results. **You need to get yourself to the point where you can successfully solve an unseen problem in exam conditions.** For this reason, solutions to past examinations will be discussed in class and office hours but will **not** be made available either as a handout or on the web -- because you cannot learn to solve problems if you have the solutions to hand.
- Students are strongly advised to make full use of office hours as and when questions or difficulties arise. Students who cannot make a scheduled office hour for any reason need to make an appointment to prevent disappointment.
- Students who scored less than 100% on the first year calculus exam are strongly advised to keep practising algebraic simplification, correct use of the chain rule, quotient rule, integration by parts etc.
- A tutorial service will be available before the May/June examination.
- *No tutorial help will be made available over the summer vacation nor immediately prior to the resit examinations. It is your responsibility to obtain complete and correct notes, assignment solutions and so forth during the normal teaching year.*

Anti-social behaviour

Following multiple complaints from students regarding anti-social behaviour in lectures and classes, the policy in this module is:

- 1) Mobile phones must be switched to “off”. Mobile phones can, and will, be confiscated.
- 2) No talking in class while the lecturer is speaking.
- 3) No eating crisps etc.

Interfering with others' concentration will not be tolerated. Students choosing not to abide by these rules may be asked to leave the lecture room.