UoD MODULE SPECIFICATION FOR Analysis

MODULE SPECIFICATION: PART 1. OUTCOMES

Code/Title	MA3201 - Analysis
Faculty	Faculty of Engineering and Physical Sciences
Department/School	Division of Mathematics

Aims

Calculus is basic to much of mathematics and its applications but a non-rigorous approach to calculus can lead to confusion and contradictions. In this module concepts from calculus are defined precisely and results are proved rigorously. In many cases these topics are placed in a much more general context, so that results have broad application and proofs are not cluttered by unnecessary detail. The module also illustrates the logical development of an area of mathematics.

Learning outcomes

By the end of the module you should know and understand the following –

- the precise definitions of various concepts related to metric spaces, differentiation, integration and convergence,
- enough of proofs of certain results about these concepts to enable you to construct rigorous proofs of them.

You should also be able to

- determine whether certain entities satisfy the given definitions,
- apply the given general results to particular cases.

Indicative content

Supremum, Completeness Axiom	[2 lectures]
Definitions and examples of normed and metric spaces, convergence of sequences, continuity, closed sets (in terms of limit points)	[5 lectures]
Cauchy sequences, completeness and relation to closed sets, Banach's contraction mapping theorem	[3 lectures]
Differentiation, Mean Value Theorem	[2 lectures)
Definition and properties of the Riemann integral, Fundamental Theorem of Calculus	[3 lectures]
Uniform convergence of sequences of functions	[2 lectures]
Series: ratio test, Weierstrass M-test	[2 lectures]
Power series, Taylor series (mention of Taylor's theorem)	[3 lectures]

Delivery mode

The principal modes of delivery are lectures and workshops.

Duration / Period of teaching

[B]

SCOTCAT Credit rating

15 credits at Level 3

Pre-requisites

MA2101 and MA2201

Prohibited Combinations

None.

Assessment

Assessed Coursework:	20%
Examination at the Degree Examination Diet:	80%

Examinations

One examination (duration: 2 hours) at the Degree Examination Diet.

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Exemption scheme
None

Module leader/co-ordinator
Dr Fordyce A. Davidson
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MODULE SPECIFICATION: Part 2. TEACHING, LEARNING and ASSESSMENT

Methods of Teaching, Learning and Assessment.
There will be two lectures and one tutorial each week. Students will be required to do homework exercises and to discuss their solutions in tutorials.
For this Module, there will be Assessed Coursework and an examination at the Degree Examination Diet.

Module Organisation and Structure

Contact time

- Lectures: 22 at 2 a week
- Workshops: 11 at 1 a week

Students are expected to attend all lectures, workshops, class tests and the class examination, and to attempt all the homework exercises.
They should arrange their time so that each week they devote about 10 hours of study time, including timetabled hours, to this Module.

Staff resources
One lecturer.

Learning resources
Lecture notes, sheets of problems for tutorials, books for background reading.

MODULE SPECIFICATION: Part 3. STUDENT GUIDANCE

Staff contact details
Dr Fordyce Davidson, room 23/2/4, 23 Perth Road. Email: fdavidso@maths.dundee.ac.uk

Summary of Assessment

Assessed Coursework	20%
2 hour examination at the Degree Examination Diet	80%

Student comment and feedback
At appropriate times of the year the opportunity will be given to complete questionnaires regarding the content of the course and its presentation. Relevant matters may also be brought to the attention of the Mathematics Staff-Student Committee through the class representative. Pressing issues of concern about the course should be brought to the attention of the lecturer. In particular, a student who is having difficulties of any kind with the course should not delay seeking help: the class lecturer should be the first contact point.

Primary references
There is no suitable book that covers the whole course. For the rigorous approach to calculus there are many books in section 26A. Relatively easy introductions are Haggarty, *Fundamentals of Mathematical Analysis*, and Stirling, *Mathematical Analysis, a Fundamental and Straightforward Approach*. A good reference is Bartle and Sherbert, *Introduction to Real Analysis*, while for further reading I suggest Spivak, *Calculus*. For the abstract part, an elementary book is Bryant, *Metric Spaces*, while a good reference is Copson, *Metric Spaces*.