EC119-15 Mathematical Analysis

21/22

Department
> Economics

Level
> Undergraduate Level 1

Module leader
> Nicholas Jackson

Credit value
> 15

Module duration
> 10 weeks

Assessment
> Multiple

Study location
> University of Warwick main campus, Coventry

Description

Introductory description

This module provides students with a strong background in pure mathematics, particularly the theory of sets and functions, the real number system, logic and proof, analysis of real-valued functions, and differential equations. This allows the students to develop a fluency with abstract mathematical reasoning, and gives a deeper understanding of techniques used in mathematical economics and econometrics.

[Module web page](#)

Module aims

To give students a more rigorous understanding of the mathematics of real-valued functions. Students will acquire an understanding of basic properties of the field of real numbers, convergence of sequences and series, limits of functions and methods for calculating them, continuity, differentiation, integration, Taylor series, and differential equations.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The module will typically cover the following topics:Set theory (notation, basic concepts), Real numbers (basic properties, interval notation), Functions (injectivity, surjectivity, composition), Sequences and Series (convergence, divergence, boundedness), Limits of functions (basic definitions, the Sandwich Rule, boundedness), Continuity (basic definitions, the Intermediate Value Theorem, numerical methods for solving equations), Differentiation (basic definitions and properties, Rolle's Theorem, the Mean Value Theorem), L'Hopital's Rule (techniques and applications), Taylor's Theorem (generalisation of the Mean Value Theorem, polynomial approximations to functions, convergence criteria), Integration (basic properties, the Newton-Leibniz definition, the Riemann definition, the Fundamental Theorem of Calculus, integration by parts, calculation of improper integrals), Differential equations (first-order separable equations, first- and second-order linear equations)

Learning outcomes

By the end of the module, students should be able to:

- Subject knowledge and understanding: … demonstrate an understanding of basic properties of real numbers, functions, and finite and infinite sets. The teaching and learning methods that enable students to achieve this learning outcome are: Lectures, tutorials, problem sheets, online quizzes and independent study. The assessment methods that measure the achievement of this learning outcome are: Problem sheets, online quizzes and unseen examination.
- Subject knowledge and understanding: … demonstrate an understanding of basic topics in the analysis of real-valued functions, including convergence of sequences and series, limits, continuity, differentiation, Taylor-MacLaurin series, and integration. The teaching and learning methods that enable students to achieve this learning outcome are: Lectures, tutorials, problem sheets, online quizzes and independent study. The assessment methods that measure the achievement of this learning outcome are: Problem sheets, online quizzes and unseen examination.
- Key skills: …understand formal mathematical definitions and theorems, and apply them to prove statements about real-valued functions. The teaching and learning methods that enable students to achieve this learning outcome are: Lectures, tutorials, problem sheets, online quizzes and independent study. The assessment methods that measure the achievement of this learning outcome are: Problem sheets, online quizzes and unseen examination.

Indicative reading list

Please see Talis Aspire link for most up to date list.

[View reading list on Talis Aspire](#)

Subject specific skills

Students will have the opportunity to develop skills in:
Analytical thinking and communication
Analytical reasoning

Critical thinking
Problem-solving
Abstraction

Transferable skills

Students will have the opportunity to develop skills in:
Numeracy and quantitative skills
Written communication
Oral communication
Mathematical, statistical and data-based research skills

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Seminars	9 sessions of 1 hour (6%)
Private study	121 hours (81%)
Total	150 hours

Private study description

'Private study will be required in order to prepare for seminars/classes, to review lecture notes, to prepare for forthcoming assessments, tests, and exams, and to undertake wider reading around the subject.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D3

	Weighting	Study time	Eligible for self-certification
Problem Set 1	5%		No

	Weighting	Study time	Eligible for self-certification
Take home problem set			
Problem Set 2	5%		No
Take home problem set			
Problem Set 3	5%		No
Take home problem set			
Problem Set 4	5%		No
Take home problem set			
Test 1	2%		No
Online quiz worth 2% or 0 depending on whether student achieves 80%			
Test 2	2%		No
Online quiz worth 2% or 0 depending on whether student achieves 80%			
Test 3	2%		No
Online quiz worth 2% or 0 depending on whether student achieves 80%			
Test 4	2%		No
Online quiz worth 2% or 0 depending on whether student achieves 80%			
Test 5	2%		No
Online quiz worth 2% or 0 depending on whether student achieves 80%			
Online Examination	70%		No
A paper which examines the course content and ensures learning outcomes are achieved.			

~Platforms - AEP

- Answerbook provided by department

Assessment group R1

	Weighting	Study time	Eligible for self-certification
Online Examination - Resit	100%		No
A paper which examines the course content and ensures learning outcomes are achieved.			

~Platforms - AEP

- Answerbook provided by department

Feedback on assessment

The Department of Economics is committed to providing high quality and timely feedback to students on their assessed work, to enable them to review and continuously improve their work. We are dedicated to ensuring feedback is returned to students within 20 University working days of their assessment deadline. Feedback for assignments is returned either on a standardised assessment feedback cover sheet which gives information both by tick boxes and by free comments or via free text comments on tabula, together with the annotated assignment. For tests and problem sets, students receive solutions as an important form of feedback and their marked assignment, with a breakdown of marks and comments by question and sub-question. Students are informed how to access their feedback, either by collecting from the Undergraduate Office or via tabula. Module leaders often provide generic feedback for the cohort outlining what was done well, less well, and what was expected on the assignment and any other common themes. This feedback also includes a cumulative distribution function with summary statistics so students can review their performance in relation to the cohort. This feedback is in addition to the individual-specific feedback on assessment performance.

[Past exam papers for EC119](#)

Availability

Pre-requisites

A-level Mathematics or the equivalent

Courses

This module is Core optional for:

- Year 1 of UIPA-L1L8 Undergraduate Economic Studies and Global Sustainable Development

This module is Optional for:

- UECA-3 Undergraduate Economics 3 Year Variants
  - Year 1 of L100 Economics
  - Year 1 of L116 Economics and Industrial Organization
- Year 1 of UECA-LM1D Undergraduate Economics, Politics and International Studies
- Year 1 of UPHA-V7ML Undergraduate Philosophy, Politics and Economics

This module is Option list A for:

- Year 1 of UIPA-L1L8 Undergraduate Economic Studies and Global Sustainable Development