

MA271-10 Mathematical Analysis 3

23/24

Department

Warwick Mathematics Institute

Level

Undergraduate Level 2

Module leader

Vedran Sohinger

Credit value

10

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This is the third module in the series Analysis 1, 2, 3 that covers rigorous Analysis. It covers convergence of functions and its applications to Integration, Fourier Series and Complex Analysis.

[Module web page](#)

Module aims

1. Continuity, differentiability and integral of the limit of a uniformly convergent sequence of functions.
2. Fourier series and their convergence.
3. Foundations of Complex Analysis.

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.

- Uniform convergence of sequences and series of functions; Weierstrass M-test
- Application to integration: integrals of limits and series, differentiation under the integral sign
- Fourier series: convergence, Parseval, and Gibbs phenomenon (differentiability and rate of

- decay of coefficients)
- Complex power series and classical functions (exponential, logarithm, sine and cosine, including periodicity)
- Complex integration, contour integrals and Cauchy's Theorem
- Applications of Cauchy's formula to evaluate real integrals
- Laurent series, Calculus of residues

Learning outcomes

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

- Learn how to compute contour integrals: Cauchy's integral formulas and applications
- Understand uniform and pointwise convergence of functions together with properties of the limit function
- Learn the continuity, differentiability and integral of the limit of a uniformly convergent sequence of functions
- Develop working knowledge of complex differentiability (Cauchy-Riemann equations) and complex power series
- Develop understanding of Fourier Series including Gibbs phenomenon

Subject specific skills

- Working knowledge of series and sequences, including the development of the notions of convergence and uniform convergence for sequences and series of functions.
- Good understanding of Fourier series, including their convergence, Parseval's identity and Gibbs phenomenon.
- Working knowledge of Complex Analysis, including power series, exponential and circular maps, contour integration.
- Mastery of applications of Cauchy's formula to compute integrals in \mathbb{R} .

Transferable skills

Students will acquire key reasoning and problem solving skills which will empower them to address new problems with confidence.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (20%)
Tutorials	9 sessions of 1 hour (9%)
Total	100 hours

Type	Required
Private study	71 hours (71%)
Total	100 hours

Private study description

71 hours private study, revision for exams, and assignments

Costs

No further costs have been identified for this module.

Assessment

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

Assessment group D

	Weighting	Study time
Assignment	15%	
Examination	85%	

- Answerbook Pink (12 page)

Assessment group R

	Weighting	Study time
In-person Examination - Resit	100%	

- Answerbook Gold (24 page)

Feedback on assessment

Support classes, marked assignments and exam feedback.

[Past exam papers for MA271](#)

Availability

Courses

This module is Core for:

- Year 2 of UMAA-GV19 Undergraduate Mathematics and Philosophy with Specialism in Logic and Foundations
- UPXA-GF13 Undergraduate Mathematics and Physics (BSc)
 - Year 2 of GF13 Mathematics and Physics
 - Year 2 of GF13 Mathematics and Physics
- UPXA-FG31 Undergraduate Mathematics and Physics (MMathPhys)
 - Year 2 of FG31 Mathematics and Physics (MMathPhys)
 - Year 2 of FG31 Mathematics and Physics (MMathPhys)

This module is Optional for:

- Year 3 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics

This module is Core option list A for:

- UMAA-GV17 Undergraduate Mathematics and Philosophy
 - Year 2 of GV17 Mathematics and Philosophy
 - Year 2 of GV17 Mathematics and Philosophy
 - Year 2 of GV17 Mathematics and Philosophy

This module is Option list A for:

- USTA-G302 Undergraduate Data Science
 - Year 2 of G302 Data Science
 - Year 2 of G302 Data Science
- UCSA-G4G1 Undergraduate Discrete Mathematics
 - Year 2 of G4G1 Discrete Mathematics
 - Year 2 of G4G1 Discrete Mathematics
- Year 2 of UCSA-G4G3 Undergraduate Discrete Mathematics
- USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
 - Year 2 of GG14 Mathematics and Statistics
 - Year 2 of GG14 Mathematics and Statistics
- USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics
 - Year 2 of Y602 Mathematics, Operational Research, Stats, Economics
 - Year 2 of Y602 Mathematics, Operational Research, Stats, Economics

This module is Option list B for:

- USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics
 - Year 3 of Y602 Mathematics, Operational Research, Stats, Economics
 - Year 3 of Y602 Mathematics, Operational Research, Stats, Economics

This module is Option list E for:

- Year 3 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics