

# MA271-10 Mathematical Analysis 3

**24/25**

**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

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## 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, an introduction to multivariable calculus and Complex Analysis.

[Module web page](#)

### Module aims

1. Continuity, differentiability and integral of the limit of a uniformly convergent sequence of functions.
2. An introduction to Multivariable calculus.
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
- Continuity in several variables
- Partial derivatives and differentiability in several variables
- 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

## 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
- understand derivatives of functions in several variables as linear maps

## Subject specific skills

- Working knowledge of series and sequences, including the development of the notions of convergence and uniform converge for sequences and series of functions.
- Working understanding of the notion of differentiability is higher dimensions
- 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	30 sessions of 1 hour (30%)
Seminars	9 sessions of 1 hour (9%)
Total	100 hours

Type	Required
Private study	61 hours (61%)
Total	100 hours

## Private study description

61 hours private study, revision for exams, and assignments

## Costs

No further costs have been identified for this module.

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## Assessment

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

### Assessment group D1

	Weighting	Study time	Eligible for self-certification
Assignment	15%		No
Examination	85%		No

- Answerbook Pink (12 page)

### Assessment group R1

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No

- Answerbook Pink (12 page)

## Feedback on assessment

Support classes, marked assignments and exam feedback.

[Past exam papers for MA271](#)

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## Availability

## Courses

This module is Core for:

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

- Year 2 of UMAA-GV17 Undergraduate Mathematics and Philosophy

This module is Option list A for:

- Year 2 of USTA-G302 Undergraduate Data Science
- Year 2 of UCSA-G4G1 Undergraduate Discrete Mathematics
- Year 2 of UCSA-G4G3 Undergraduate Discrete Mathematics
- Year 2 of USTA-GG14 Undergraduate Mathematics and Statistics (BSc)

This module is Option list B for:

- Year 3 of USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
- USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics
  - Year 2 of Y602 Mathematics, Operational Research, Stats, Economics
  - Year 3 of Y602 Mathematics, Operational Research, Stats, Economics

This module is Option list C for:

- Year 3 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)