

# MA143-10 Calculus 2

**23/24**

**Department**

Warwick Mathematics Institute

**Level**

Undergraduate Level 1

**Module leader**

Vasily Gelfreykh

**Credit value**

10

**Module duration**

10 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

Mathematical Analysis is the heart of modern Mathematics. Calculus usually stands for Analysis, focused on calculations rather than proving theorems. This module is the second in a series of modules where the subject of Analysis is developed with a focus on calculations.

### Module aims

The principal aim is to develop Analysis in dimension 1, with much greater precision and rigour than the students had at school. While the high-school Analysis is focusing on problem solving methods, the university-level Analysis is switching the focus to the mathematical concepts and clarity of thought.

### 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.

- Differentiability
- Taylor's Theorem
- Taylor's Series
- Riemann Integral

- Methods of integration
- Fundamental Theorem of Calculus
- Improper integrals

## Learning outcomes

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

- learn differentiability, including higher derivatives and properties of differentiable functions
- develop the working knowledge of Taylor's series and theorem, ultimately understanding representability of a function by a power series
- develop general understanding of the construction of the Riemann integral
- understand and apply the fundamental properties of the integral such as integrability of continuous functions on bounded intervals or the Fundamental Theorem of Calculus

## Indicative reading list

M. Hart, Guide to Analysis, Macmillan.

M. Spivak, Calculus, Benjamin. R.G Bartle and D.R Sherbert, Introduction to Real Analysis (4th Edition), Wiley (2011)

L. Alcock, How to think about Analysis, Oxford University Press (2014)

[View reading list on Talis Aspire](#)

## Subject specific skills

Calculus gives first-year undergraduates a first excursion in to pure mathematics. The students will gain a new perspective and a deeper understanding of familiar mathematics which they have seen in school (e.g. real numbers, functions and differentiation). In Calculus, these concepts are developed with mathematical rigour, which characterises much of university mathematics to follow.

## Transferable skills

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

## Study

### Study time

Type	Required
Lectures	20 sessions of 1 hour (48%)
Online learning (independent)	9 sessions of 1 hour (21%)
Total	42 hours

<b>Type</b>	<b>Required</b>
Private study	13 hours (31%)
Total	42 hours

### **Private study description**

Working on assignments, going over lecture notes, text books, exam revision.

### **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.

Students can register for this module without taking any assessment.

#### **Assessment group D**

	<b>Weighting</b>	<b>Study time</b>
Assignments	15%	20 hours
In-person Examination	85%	38 hours

- Answerbook Pink (12 page)

#### **Assessment group R**

	<b>Weighting</b>	<b>Study time</b>
In-person Examination - Resit	100%	

- Answerbook Pink (12 page)

### **Feedback on assessment**

Marked homework (both assessed and formative) is returned and discussed in smaller classes. Exam feedback is given.

[Past exam papers for MA143](#)

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### **Availability**

## Courses

This module is Core for:

- USTA-G302 Undergraduate Data Science
  - Year 1 of G302 Data Science
  - Year 1 of G302 Data Science
- Year 1 of USTA-G304 Undergraduate Data Science (MSci)
- UCSA-G4G1 Undergraduate Discrete Mathematics
  - Year 1 of G4G1 Discrete Mathematics
  - Year 1 of G4G1 Discrete Mathematics
- Year 1 of UCSA-G4G3 Undergraduate Discrete Mathematics
- Year 1 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- USTA-Y602 Undergraduate Mathematics,Operational Research,Statistics and Economics
  - Year 1 of Y602 Mathematics,Operational Research,Stats,Economics
  - Year 1 of Y602 Mathematics,Operational Research,Stats,Economics