MATH10242

Sequences and Series

Unit code:	MATH10242
Credit Rating:	10
Unit level:	Level 1
Teaching period(s):	Semester 2
Offered by	School of Mathematics
Available as a free choice unit?:	N

Requisites

Prerequisite

- MATH10101 - Sets, Numbers and Functions A (Compulsory)

Aims

The aims of this course are to develop an understanding of convergence in its simplest setting. To explain the difference between a sequence and a series in the mathematical context. To lay foundations for further investigation of infinite processes, in particular differential and integral calculus.

Overview

The notion of limit underlies the differential and integral calculus, a central topic in Mathematics. A good understanding of this concept was developed in the early nineteenth century, many years after the calculus was first used, and this is essential for more advanced calculus. The main purpose of this course is to provide a formal introduction to the concept of limit in its simplest setting: sequences and series.

Assessment methods

- Other - 20%
- Written exam - 80%

Assessment Further Information

- Coursework; Weighting within unit 20%
- Two hours end of semester examination; Weighting within unit 80%

Learning outcomes

On successful completion of this module students will be able to

know the definition of the limit of a sequence.

be able to find the limit of a wide class of sequences.

be able to decide on convergence or divergence of a wide class of series.

know that a power series has a radius of convergence, and know how to find it.

Future topics requiring this course unit

Second year courses: Real and Complex Analysis, Applied Analysis courses, Numerical Analysis courses.

Syllabus

1.Convergent sequences, properties of the class of convergent sequences, including Algebra of Limits. Sequences diverging to infinity, the Reciprocal Rule, subsequences and the subsequence strategy. Ratio Test, L'Hpital's Rule. The Monotone Convergence Theorem.

2.Convergent series, the geometric series and the harmonic series. Series with non-negative terms, the Comparison Test, the Ratio Test and the Integral Test. The Alternating Series Test, absolute and conditional convergence of series, power series and radius of convergence.

Recommended reading

R. Haggerty, Fundamentals of Mathematical Analysis, Addison Wesley, 1993

V. Bryant. Yet Another Introduction to Analysis, C.U.P, 1990.

Feedback methods

Tutorials will provide an opportunity for students' work to be discussed and to provide feedback on their understanding.

Study hours

- Lectures - 22 hours
- Tutorials - 11 hours
- Independent study hours - 67 hours

Teaching staff

John Stafford - Unit coordinator