

Course ID 009210

## **Sequences and Series**

Unit coordinator: John Stafford

**MATH 10242**

**Credit rating 10**

*ECTS credits 5*

**Semester 2**

**School of Mathematics**

*Undergraduate*

**Level 1**

**FHEQ level ' First part HE study/Bachelors'**

### **Marketing course unit 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.

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### **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.

### **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'Hôpital'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.

## Assessment methods

Other	20%
Written exam	80%

Coursework; Weighting within unit 20%

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

## Feedback methods

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

## Requisites

MATH10101	Foundations of Pure Mathematics A	Pre-Requisite	Compulsory
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Available as free choice? N

## Recommended reading

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

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

## Scheduled activity hours

Lectures	22
Tutorials	11

Independent study hours 67 hours