MA180/MA186/MA190: Calculus (Semester II)

Lecturer
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Students are welcome in my office whenever I am there

Lectures: Monday 1.00 IT250, Tuesday 10.00 Anderson Lecture Theatre
Tutorials/Workshops: TBA, will begin in Week 3

Syllabus

The syllabus for Calculus consists of three chapters.
1. Integral Calculus
Definite Integrals and the Fundamental Theorem of Calculus. Techniques of Integration.

Learning Outcomes: You will be able to explain the connection between differential and integral calculus using the Fundamental Theorem of Calculus. You will be able to evaluate definite and indefinite integrals reliably, using a variety of techniques - this takes some practice. You will be able to communicate your ideas in a precise and clear manner.

Syllabus

The syllabus for Advanced Calculus consists of three chapters.
2. The Real Numbers
Properties of $\mathbb{Z}$, $\mathbb{Q}$ and $\mathbb{R}$. Finite and infinite sets. Different kinds of infinities. The order relation on the real numbers. Suprema and Infima. The completeness property of the real numbers.

Learning Outcomes: You will be able to distinguish between finite, countably infinite and uncountable sets of real numbers, explain these distinctions and provide examples to support your explanations. You will be able to explain the meanings of the terms supremum and infimum, analyze boundedness properties of given sets and provide your own examples of sets with prescribed properties. You will be able to write text (in sentences) that explains your understanding of these concepts.

Syllabus

The syllabus for Advanced Calculus consists of three chapters.
3. Sequences and Convergence
Sequences of real numbers. Convergent and divergent sequences. Boundedness and monotonicity.

Learning Outcomes: You will be able to explain the concept of convergence and its importance in mathematics, and discuss and relate various properties of sequences of real numbers. You will be able to determine with proof whether a given sequence of real numbers is convergent, and you will be able to provide your own examples of sequences with certain specified properties. You will be able to explain your ideas in writing.

Assessment

End-of-Semester Examinations:
One two-hour exam in Calculus and Algebra in the Summer Exam session, three questions from Algebra and three from Calculus (one corresponding to each chapter of the calculus course).

Continuous Assessment: A total of six assignments in Semester 2 on the OKUSON system. More details to follow.

Resources

Online resources for this course will be maintained mainly at http://www.maths.nuigalway.ie/∼rquinlan/MA180calculus, linked from the "Calculus Semester 2" sections of the MA180, MA186 and MA190 Blackboard pages. These will include lecture notes which constitute the "text" for the course. You are expected to study the lecture notes, which are more detailed than the slides used in lectures. For further reading, the textbook "Calculus" by James Stewart is recommended, especially for Chapters 1 and 3 of the syllabus.

A Word of Advice

At this advanced level, Mathematics is more about understanding and explaining concepts and their logical connections than about doing calculations or "working out answers". This means that it involves learning a formal and technical language, which takes some practice. Don't be discouraged if it takes you some time to get used to this - your performance so far means that you are capable of it.