

# MTH5105 Differential and Integral Analysis 2010-2011

## Syllabus

1. Differentiable functions: Definition of differentiability. Algebra of derivatives, chain rule. Derivative of inverse function. Rolle's Theorem, Mean Value Theorem and applications. Taylor's Theorem.
2. Integration: Darboux definition of Riemann integral, simple properties. Continuous functions are integrable (via uniform continuity). Fundamental Theorem of the calculus, integral form of the Mean Value Theorem and of the remainder in Taylor's Theorem; applications to some well known series (log, arctan, binomial). Improper integrals.
3. Sequences of functions: pointwise and uniform convergence. Weierstraß M-test. Term-by-term integration of power series.

## Learning Outcomes

On completion of this course students will be expected to be able to

1. define the derivative and state the properties of the derivative including the chain rule and inverse function rule;
2. state and use key theorems concerning differentiable functions, such as Rolle's Theorem, the Mean Value Theorem and Taylor's Theorem;
3. define the Riemann integral, and state its properties;
4. apply Taylor's Theorem to some well known functions;
5. distinguish pointwise and uniform convergence.

## Warnings

1. The above is intended as a MINIMAL list to be mastered in order to be reasonably sure of PASSING the examination.
2. Just because knowledge of a particular definition, formula or statement of a theorem is in the list of 'Learning Outcomes' above does not guarantee that it will be on the examination paper. However, a good proportion will be, so they are worth knowing well.

## Examination

The examination lasts for 2 hours. The rubric will state:

*You should attempt all questions. Marks awarded are shown next to the questions. Calculators are NOT permitted in this examination. The unauthorised use of a calculator constitutes an examination offence.*

Overall credit on this course will be computed using the algorithm:

20% for test, plus 80% for final exam.

If you missed the test with a valid excuse then the algorithm is modified to:

100% for final exam.

Submitted coursework will be marked for feedback, and will not count towards the overall assessment.