

6500 (Elementary Mathematics for Engineers)

<i>Year:</i>	2014–2015
<i>Code:</i>	MATH6500
<i>Level:</i>	First
<i>Value:</i>	Half unit (= 7.5 ECTS credits)
<i>Term:</i>	1
<i>Structure:</i>	3 hours and 1 hours of problem class per week. Weekly assessed coursework.
<i>Assessment:</i>	90% examination, 10% coursework
<i>Normal Pre-requisites:</i>	Grade C, D at A-level Maths
<i>Lecturer:</i>	Mr G Benincasa
<i>Problem class teacher:</i>	Mr R Perez Carrasco

Course Description and Objectives

This course provides a fairly rapid introduction to calculus. Calculus underlies almost all areas of mathematics and a great deal of science and engineering. The aim of the course will be to provide a solid grounding in this fundamental branch of mathematics for students who have a limited mathematical background.

Most of the course material occurs in A-level mathematics: the treatment here will be slightly more advanced. The course is suitable for students with good GCSE mathematics (or a weak A-level pass).

Recommended Texts

Croft, Davison and Hargreaves, *Introduction to Engineering Mathematics* (Addison-Wesley)

Detailed Syllabus

1. **Functions and graphs.**

- (a) Polynomials.
- (b) Indices and algebraic functions.
- (c) Trigonometric functions. Revision of basic trigonometry. Quadrants. Angles of any size. Graphs of $\sin \theta$, $\cos \theta$.
- (d) Circular Measure. Radians. Small angles.
- (e) Coordinates. Cartesian, polar.

2. **Differentiation:** Rates of change. Gradients.

- (a) Differentiation of x^n from first principles.
- (b) Rules for differentiation. Chain rule. Product rule. Quotient rule.
- (c) Differentiation of trigonometric functions.
- (d) 2nd differentials. Velocity, acceleration. Stationary points. Maxima. Minima.

3. **Exponential functions:** Growth and decay.

4. **Logarithmic functions:** Rules for logarithms.

5. **Integration** (a) Opposite of differentiation. (b) As an area (c) As a summation. Standard forms. Methods of changing integrals into standard form.

6. **Approximate or numerical integration.** Trapezoidal approximation.

7. **Simple differential equations and application.**