

6101 (Elementary Mathematics 1)

<i>Year:</i>	2014–2015
<i>Code:</i>	MATH6101
<i>Level:</i>	First
<i>Value:</i>	Half unit (= 7.5 ECTS credits)
<i>Term:</i>	1
<i>Structure:</i>	3 hour lectures and 1 hour problem class per week. Weekly assessed coursework
<i>Assessment:</i>	90% examination, 10% coursework
<i>Normal Pre-requisites:</i>	GCSE Mathematics or A-level Mathematics Grade E
<i>Lecturer:</i>	Mr R Sánchez Galán
<i>Problem class teacher:</i>	Mr AJ Nadim

Course Description and Objectives

This module aims to give students lacking A-level Mathematics the basic knowledge and methods required to use mathematics in other disciplines. Topics covered include quadratic equations, logs, exponentials, the binomial theorem, trigonometric functions, complex numbers and differentiation with applications. However, the course does not cover integration or related topics such as differential equations. MATH6013 covers the same material, plus integration, differential equations and some other topics, at a more rapid pace.

Recommended Texts

K. A. Stroud, *Engineering Mathematics*, Palgrave.

Detailed Syllabus

- Basic algebra: laws of algebra, powers, brackets, factorisation, modulus, factorial, inequalities, binomial theorem for positive integral exponent.
- Functions and graphs: Definitions of functions, sequences, composition of functions, inverse functions, graphs.
- Linear equations: gradient and intercept, line between two points, normal to a line, intersection of two lines, shortest distance from a point to a line.
- Quadratic equations: factorisation, completing the square, maxima and minima of quadratic expressions, finding roots of quadratic equations, graphing quadratics, intersection of graphs.
- Further equations and functions: polynomial equations, factorising polynomials, odd and even functions, equation of a circle.
- Limits: convergence of sequences, algebra of limits, e , continuity, one-sided limits.
- Differential calculus: tangents to and gradients of curves, examples of first derivatives, higher derivatives, rules for differentiating sum, product, quotient and chain rule, L'Hôpital's rule, Maclaurin series, stationary points and extrema, shortest distance from a point to a line (revisited).

- Trigonometry: radians, sine, cosine and tangent, series definitions and properties, π , other trigonometric functions, double angle formulae, inverse trigonometric functions, solving trigonometric equations.
- Exponentials and logarithms: definitions and properties, bases other than e .
- Complex numbers: basics, Argand diagram, polar representation, Euler's formula, De Moivre's theorem.