

6502 (Mathematics)

<i>Year:</i>	2007–2008
<i>Code:</i>	MATH6502
<i>Old Code:</i>	MATHE002
<i>Value:</i>	Half unit (= 7.5 ECTS credits)
<i>Term:</i>	1 and 2
<i>Structure:</i>	3 hours per week. Regular assessed coursework.
<i>Assessment:</i>	90% examination, 10% coursework
<i>Normal Pre-requisites:</i>	6501
<i>Lecturer:</i>	Dr H J Wilson and Prof J-M Vanden-Broeck

Course Description and Objectives

The aim of the course is to cover the syllabus required by the relevant departments of engineering. This comprises general mathematics for second year students of biochemical, chemical, civil and other branches of engineering. Topics covered include Laplace transforms, linear algebra, Fourier series and multivariable calculus.

Recommended Texts

Relevant books are: G James, *Advanced Modern Engineering Mathematics* (Pearson Prentice Hall); M Boas, *Mathematical Methods in the Physical Sciences* (5th Edition) published by Wiley; P.V. O’Neil, *Advanced Engineering Mathematics* (Thomson); McQuarrie, *Mathematical Methods for Scientists and Engineers* (University Science Books); Kreyszig, *Advanced Engineering Mathematics* (Harper & Rowe)

Detailed Syllabus

Taylor Series

Fourier Series

Periodic functions, formulae for coefficients, half-range formulae, value of series outside range.

Partial Differential Equations

Heat flow equation in one and two dimensions.

Solution of Linear Algebraic Equations and Matrix Algebra

Determinants, Gauss’s method, homogeneous and non-homogeneous equations. Vectors and matrices. Elementary properties up to notion of an inverse. Eigenvalues and eigenvectors: elementary properties for symmetric matrices (orthogonality). Iterative methods with applications, including finding eigenvalues.

Multivariate Calculus

Revision of partial derivatives and chain rule. Taylor’s theorem for two variables, simple examples of maxima, minima and saddle points. Multiple integration, rule for change of variable.

Elementary Laplace Transforms

Transforms of simple functions. Applications to differential equations, including simultaneous equations.