COURSE DETAILS
Course Code: F17XF
Full Course Title: Mathematics for Engineers and Scientists 2
SCQF Level: 7
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: Yes  Postgraduate Taught: No  Postgraduate Research: No
Additional Information:

COURSE AIMS
To provide a sound basis in mathematical topics of relevance to science and engineering and other numerate disciplines.

LEARNING OUTCOMES – SUBJECT MASTERY
By the end of the course, students should be able to:

- calculate Maclaurin and Taylor series in one variable
- calculate integrals by using a substitution
- calculate integrals by using integration by parts
- calculate integrals of rational functions by using partial fractions
- solve first order ODEs of variable separable type
- approximate integrals using the Trapezoidal rule
- define complex numbers
- perform addition, subtraction and multiplication of complex numbers
- perform division of complex numbers
- solve quadratic equations in terms of complex numbers
- understand the Argand diagram
- determine the modulus and argument of a complex number
- understand and compute the polar form of a complex number
- define the exponential function and know its properties
- understand Euler's formula
- find the exponential form of a complex number
- know De Moivre's Theorem
- use De Moivre's Theorem to find powers of complex numbers
- understand and use matrix notation
- add, subtract and multiply matrices
- find the transpose of a matrix
- know and use basic properties of matrix algebra
- evaluate determinants (2x2, 3x3)
- find the inverse of a 2x2 matrix
- solve systems of linear equations using row eliminations

LEARNING OUTCOMES – PERSONAL ABILITIES
SYLLABUS

All of the mathematical topics considered in this module are presented in the context of applications in either engineering or science. The topics covered are:

Advanced Differentiation: Revision of differentiation; Maclaurin and Taylor series.

Applications of Differentiation: Optimisation, Differential equations.

Advanced Integration: Revision of integration; Integration by substitution; Integration by parts; Integration using partial fractions.

Applications of Integration: Area under and between curves; Average value; Curvelength; Separation of variables for 1st order ODEs; Approximate integration (Trapezoidal rule).

Complex Numbers: Definition; Real and imaginary parts; Arithmetic of complex numbers; Solving quadratic equations; The Argand diagram; Modulus and argument; the polar form of a complex number; The exponential form; De Moivre’s theorem.

Matrices: Definition and notation for matrices; Null (zero) matrix; Identity matrix; Trans-pose matrix; Addition and subtraction; Multiplication by a scalar; Matrix multiplication; The 2x2 and 3x3 determinant; The inverse of a 2x2 matrix; Solving systems of linear equations; formulating problems in matrix form.

Pre-requisite: Preferably Higher Mathematics at level “C” or equivalent

COURSE RELATIONSHIPS

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<th>Course Code</th>
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<td>Mathematics for Engineers and Scientists 1</td>
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LOCATION AND ASSESSMENT METHODS

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