F17XA Mathematics for Engineers and Scientists 1

COURSE DETAILS

Course Code: F17XA

Full Course Title: Mathematics for Engineers and Scientists 1

SCQF Level: 7

SCAF Credits: 15

Available as Elective: Yes

DELIVERY LEVEL

Undergraduate: Yes  Postgraduate Taught: No  Postgraduate Research: No

Additional Information:
Course being delivered at the specified campus(es) and also by collaborative partner 4EJ Ocean University of China on BEng Robotics programme.

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:

- Facility with solving and transposing formulae
- Numerical Evaluation of an algebraic expression
- Simplifying and solving expressions containing algebraic fractions
- Understand the definition of logs and exponentials
- Sketch/recognize graphs of logs and exponentials
- Manipulate expressions containing logs and exponentials
- Use log and exp in simple models of radioactive decay, cooling, population growth and chemical reactions
- Recognize and work with hyperbolic functions
- Plot linear data
- Perform simple linear interpolation
- Reduce non-linear equations to linear form for plotting
- Plot log-linear and log-log data
- Understanding of meaning of differentiation
- Ability to differentiate simple functions
- Facility with product, quotient and chain rule
- Carry out multiple derivatives
- Sketch curves
- Obtain maxima and minima
- Solve simple related rate problems
- Understanding of meaning of integration
- Know the fundamental theorem of calculus
- Know rules for evaluating simple integrals
- Evaluate definite and indefinite integrals
- Evaluate infinite integrals
- Understand basic statistical notions (mean, mode, median, variance)
- Apply basic ideas in probability
- Use probability density functions to determine probability of certain ranges
LEARNING OUTCOMES – PERSONAL ABILITIES

- Demonstrate the ability to learn independently
- Demonstrate knowledge of an area of mathematics.
- Manage time, work to deadlines and prioritise workloads

SYLLABUS

Expressions and Equations: Evaluation of an algebraic expression. Definition and evaluation of independent and dependent variables. Manipulating formulae and transposition

Logarithms, Exponentials and Hyperbolic Functions: Definitions and laws of logarithms (log) and exponentials (exp). Graphs of log and exp. Manipulation of expressions involving log and exp. Definition and drawing the graph of hyperbolic functions. Use of identities associated with hyperbolic functions.

Application of linear, log and exponential functions: Applications of the straight line equation. Linear-linear graphs and linear interpolation. Reduction of algebraic equations. Linear graphs of logarithmic functions. Log-linear scales. Log-log scales


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