

## Liverpool John Moores University

Title: Engineering Mathematics 1a  
Status: Definitive  
Code: **4501USST** (126430)  
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering  
Teaching School/Faculty: University of Shanghai For Science and Technology

| Team            | Leader |
|-----------------|--------|
| Stewart Chidlow | Y      |

**Academic Level:** FHEQ4      **Credit Value:** 10      **Total Delivered Hours:** 46  
**Total Learning Hours:** 100      **Private Study:** 54

### Delivery Options

Course typically offered: Semester 1

| Component | Contact Hours |
|-----------|---------------|
| Lecture   | 22            |
| Tutorial  | 22            |

**Grading Basis:** 40 %

### Assessment Details

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|----------|-------------------|-------------|---------------|---------------|
| Exam     | AS1               | Examination | 100           | 2             |

### Aims

*To provide a foundation in engineering mathematics for its application to the solution of engineering problems*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Use basic algebraic manipulations in the solution of engineering problems
- 2 Apply basic mathematical functions in the solution of engineering problems
- 3 Apply basic trigonometry to describe engineering waves in mechanical and electrical systems
- 4 Apply basic complex numbers in the solution of engineering problems
- 5 Apply exponentials and logarithms to solve relevant engineering problems.
- 6 Apply complex numbers in the solution of engineering problems.
- 7 Apply mathematical software to the solution of engineering mathematics problems

## Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

|             |   |   |   |   |   |   |   |
|-------------|---|---|---|---|---|---|---|
| Examination | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------|---|---|---|---|---|---|---|

## Outline Syllabus

*Revision of basic algebraic techniques:*

*Substitution, simplification, factorisation, indices, evaluation and transposition of formulae, fractions and partial fractions. Linear and quadratic equations, linear simultaneous equations*

*Functions: Notation, types of function, composite and inverse, graphs.*

*Trigonometry: Angles and circular measure. Trigonometric ratios for right-angled triangles. Sine and cosine rules. Trigonometric functions and their graphs, simple trigonometric identities and equations. Engineering waves in mechanical and electrical problems.*

*Exponential function: Properties and graph. Natural logarithm as inverse of exponential function, graph and properties. Definitions and calculation of hyperbolic functions including inverse functions.*

*Complex numbers: Complex arithmetic, complex conjugate, Argand diagram.*

*Rectangular, polar forms. Magnitude and phase. Very basic treatment of Euler's formula.*

*Introduction to calculus: Limits, continuity, derivative by first principles ; Derivative rules including chain rule, product rule, quotient rule; Derivatives of implicit functions and inverse functions.*

## Learning Activities

A combination of lectures and tutorials.

## Notes

This module provides a foundation in pre-calculus for level four students in mechanical and electrical engineering, to enable them to apply this to the solution of engineering problems.