# LIVERPOOL JOHN MOORES UNIVERSITY

# Module Proforma

**Approved, 2022.02**

## Summary Information

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|---|---|
| **Module Code** | 4514USST |
| **Formal Module Title** | Engineering Mathematics 1a |
| **Owning School** | Engineering |
| **Career** | Undergraduate |
| **Credits** | 10 |
| **Academic level** | FHEQ Level 4 |
| **Grading Schema** | 40 |

## Module Contacts

### Module Leader

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|
| Dante Matellini | Yes | N/A |

### Module Team Member

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|

### Partner Module Team

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|

## Teaching Responsibility

| LJMU Schools involved in Delivery |
|---|
| LJMU Partner Taught |

## Partner Teaching Institution

| Institution Name |
| --- |
| University of Shanghai For Science and Technology |

## Learning Methods

| Learning Method Type | Hours |
| --- | --- |
| Lecture | 22 |
| Tutorial | 11 |

## Module Offering(s)

| Offering Code | Location | Start Month | Duration |
| --- | --- | --- | --- |
| SEP-PAR | PAR | September | 12 Weeks |

## Aims and Outcomes

| 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:**

| Code | Description |
| --- | --- |
| MLO1 | Use basic numeric and algebraic manipulations in the solution of engineering problems. |
| MLO2 | Use basic mathematical functions including trigonometric, exponential and logarithmic functions in the solution of engineering. |
| MLO3 | Use basic complex numbers in the solution of engineering problems. |
| MLO4 | Use and apply mathematical software to the solution of engineering mathematics problems. |

# Module Content

<table>
<tr><td><strong>Outline Syllabus</strong></td></tr>
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Introduction of the use of a computer algebra system (for example MATLAB or similar). Use of the software applied to the syllabus items below.

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.

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**Module Overview**

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<tr><td><strong>Additional Information</strong></td></tr>
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This module provides a foundation in pre-calculus for level 4 students in mechanical and electrical engineering to enable them to apply this to the solution of engineering problems.

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# Assessments

| Assignment Category | Assessment Name | Weight | Exam/Test Length (hours) | Learning Outcome Mapping |
| --- | --- | --- | --- | --- |
| Exam | Exam | 100 | 2 | MLO1, MLO2, MLO3, MLO4 |