

## Liverpool John Moores University

Title: BUILDING SERVICES ENGINEERING MATHEMATICS  
Status: Definitive  
Code: **5018BEFD** (114858)  
Version Start Date: 01-08-2011

Owning School/Faculty: Built Environment  
Teaching School/Faculty: Stockport College

Team	Leader
Derek King	Y

**Academic Level:** FHEQ5      **Credit Value:** 12.00      **Total Delivered Hours:** 57.00

**Total Learning Hours:** 120      **Private Study:** 63

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Tutorial	12.000

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	End of module formal examination	50.0	3.00
Technology	AS2	Assignment	50.0	

### Aims

*To provide the students with the fundamental mathematical knowledge and analytical techniques required to support both the other modules of the programme and to enable them to perform routine mathematical and analytical functions in the workplace. The module is intended to enable students studying Building Services programmes to analyse, apply, investigate and evaluate mathematical and analytical techniques for mechanical, electrical and commercial building services situations.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Construct differential equations for the purpose of solving building services engineering problems.
- 2 Explain the properties of trigonometrical functions and relate these to the characteristics of wave forms.
- 3 Analyse and solve problems using statistics and probability.
- 4 Construct and solve algebraic equations representing problems in building services engineering.

## Learning Outcomes of Assessments

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

EXAM	1	2	3	4
TECHNOLOGICAL TASK	1	2	3	4

## Outline Syllabus

*Differential Equations: General and particular solutions. Boundary condition. Equations of the type  $dy/dx=ky$ . Differential equation models in building services engineering.*

*Trigonometrical Functions: Properties of waves: Amplitude, wavelength, frequency, phase difference, etc*

*Graphs:  $\sin(\theta)$ ,  $\cos(\theta)$ ,  $\sin^2(\theta)$ ,  $\sin(\theta)/2$ ,  $\sin^2(\theta)$ , etc.*

*Trigonometrical identities:  $\sin(\theta)/\cos(\theta) = \tan(\theta)$ ,  $\sin^2(\theta) + \cos^2(\theta) = 1$ , compound angle formula, etc.*

*Addition of wave-forms:  $a \sin(\theta) + b \cos(\theta) = R \sin(\theta \pm \alpha)$*

*Statistics and Probability:*

*Data collection and representation: Frequency distributions, bar charts, histograms, cumulative frequency curves, etc.*

*Measures of central tendency: Mean, median, mode, standard deviation, etc.*

*Probability: Mutually exclusive and independent events. Binomial, Poisson and normal distributions.*

*Algebra*

*Equations: Linear, quadratic, cubic and simultaneous equations. Graphical solution of equations.*

*Proportion: Direct and inverse proportion.*

*Matrices: Multiplication, transposition and inversion, applications.*

## Learning Activities

Lectures and tutorials.

## References

<b>Course Material</b>	Book
<b>Author</b>	Croft, A. & Davidson, R.
<b>Publishing Year</b>	2003
<b>Title</b>	Mathematics for Engineers
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Prentice Hall
<b>ISBN</b>	013120193

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## Notes

In common with other disciplines within engineering and construction, mathematics is crucial to all aspects of Building Services Engineering. Understanding key mathematical concepts and applying them successfully to solve problems are vital skills every building services engineering student must acquire. This module teaches, applies and nurtures those skills. The ethos of the module is to build on the skills and knowledge gained at level 1 and to extend this so as to encourage students to engage fully in the problem-solving process at level 2.