Liverpool John Moores University

Title: ANALYTICAL METHODS
Status: Definitive
Code: **4015BEHN** (102287)
Version Start Date: 01-08-2016

Owning School/Faculty: Applied Mathematics
Teaching School/Faculty: Applied Mathematics

Team	Leader
Paul Strickland	Y

Academic Level:	FHEQ4	**Credit Value:**	12	**Total Delivered Hours:**	39
Total Learning Hours:	120	**Private Study:**	81		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	24
Tutorial	12

Grading Basis: BTEC

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Closed book	70	3
Report	AS2	Assignment	30	

Aims

To provide the student with the fundamental mathematical knowledge and analystical techniques needed to successfully complete the core and specialist optional units in this qualification. This module has been designed to enable students to use fundamental mathematical processes in the solution of Civil Engineering problems.

Learning Outcomes

After completing the module the student should be able to:

1   Apply analytical methods to the management and production of civil engineering processes and operations.
2   Apply analytical methods to surveying, testing and control problems in civil engineering.
3   Analyse and model construction situations using statistics and probability.
4   Apply analytical methods to analyse structural systems and supply appropriate design solutions.

Learning Outcomes of Assessments

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

EXAM   1   2   3   4

CW   1   2   4

Outline Syllabus

Analytical methods - management and production:
Algebra, linear, simultaneous and quadratic equations, laws of indices and logarithms, common and Naparian logarithms, indicial equations, direct and inverse proportion, inequalities, functional notation and manipulation of algebralic problems.
Graphical representation: functions, points of intersection between two graphs, graph sketching (straight line, polynomial, exponential and logarithmic), fit lines to experimental data using least squares method.
Space, time and motion: plot space/time and velocity/time diagrams, determine displacement, velocity and acceleration. Laws of motion, momentum, impulse and projectiles.
Matrices: multiplication, transposition and inverson, applications.
Analytical methods - surveying, testing and control.
Trigonometry: basic trigometric ratios and their inverses, trigometric ratios for the four quadrants, solution of triangles, calculation of areas and volumes of solids. Determination of co-ordinates in 2-d and 3-d geometry.
Trapezoidal and Simpson's rule.
Statistics and probability: tabular and graphical form: data collection methods, histograms, bar charts, line diagrams, cumulative frequency diagrams, scatter plots.
Central tendency and dispersion: introduction to the concept of central tendency and variance measurement, mean, median, mode, standard deviation, variance and interquartile range, application to construction and civil engineering.
Probability: interpretation of probability, probabilistic models, empirical variability, events and sets, mutually exclusive events, independent events.
Analytical methods: analysis of structural engineering systems,
Trigonometric methods: to solve problems susch as static forces, relative motion, frameworks, metrology, friction torque, electrical and mechanical energy problems.
Calculus: to differentiate and integrate simple equations and demonstrate applications of calculus.

Learning Activities

Lectures, tutorials and problem solving sessions.

Notes

This module should provide the mathematical tools to the student to enable them to successfully complete a Higher National Certificate or Diploma.