

Analytical Mathematics

Module Information

2022.01, Approved

Summary Information

Module Code	5500ICBTEG
Formal Module Title	Analytical Mathematics
Owning School	Engineering
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
International College of Business and Technology

Learning Methods

Learning Method Type	Hours
Lecture	45
Practical	9
Tutorial	6

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
APR-PAR	PAR	April	12 Weeks

JAN-PAR	PAR	January	12 Weeks
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	The module is designed to extend the student's expertise in engineering mathematics to analyse the scientific and engineering problems. Specially, statistics, numerical methods matrix methods and series are studied.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Examine complex numbers, infinite series and solve related problems
MLO2	2	Demonstrate ability to perform matrix manipulations which arise in engineering problems
MLO3	3	Identify the role of probability and statistics.
MLO4	4	Demonstrate the knowledge of SPSS software for statistical analysis.

Module Content

Outline Syllabus	<p>1. Matrices, Determinants and vectors 1.1. Cramer's rule 1.2. Gaussian elimination 1.3. Eigen vectors and Eigen values 2. Complex Algebra 1.1. De Moivre's theorem 1.2. Nth root theorem 1.3. Locus of complex numbers 3. Numerical methods 3.1. Method of variation of parameters and Applications 3.2. Numerical solutions of 1st order ODEs: (Euler, Improved Euler and Runge-Kutta Methods) 4. Statistics 4.1. Random variables and Probability distributions 4.2. Discrete random variables, Binomial, Poisson distributions and their application 4.3. Continuous random variables, Exponential and Normal distributions 4.4. Basic statistical indicators in data analysis 4.5. Introduction of SPSS statistical software 4.6. Confidence intervals and Goodness-of-fit tests 4.7. Sampling distributions and central limit theorem 4.8. Confidence intervals from mean and variance 4.9. Chi-squared test for goodness of fit 5. Infinite sequence and series 5.1. Definition of a sequence, Monotonic sequences, Bounded sequences, Convergent sequences 5.2. Definition of an infinite series Geometric series convergence/Divergence of series, Algebra of convergent series 5.3. Convergence/Divergence test 5.4. Comparison Test, Limit Comparison Test, Cauchy Criterion for Convergent Series, Cauchy Condensation Test, The Ratio Test, The Root Test 5.5. Alternating series, Power series, Taylor series, Absolutely Convergent Series, Rearrangement of series, Conditionally Convergent Series 6. Statistical analysis using SPSS.</p>
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Examination	70	2	MLO1, MLO2, MLO3
Artefacts	Coursework	30	0	MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Karl Jones	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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