

Introduction to Modelling

Module Information

2022.01, Approved

Summary Information

Module Code	4100MATHS
Formal Module Title	Introduction to Modelling
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
Lecture	33
Workshop	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	To introduce students to the concept of mathematical and statistical modelling of real-world problems. To give students experience of building mathematical and statistical models.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Apply basic principles of the modelling process to build their own mathematical and statistical models.
MLO2	2	Interpret the solution of mathematical and statistical models in a real-world context.
MLO3	3	Evaluate the performance of mathematical and statistical models and determine whether they are successful at providing insight into a given problem.
MLO4	4	Clearly communicate their ideas to an audience using a variety of media.

Module Content

Outline Syllabus	1. The modelling process: • The modelling cycle • Model refinement 2. Fitting models to data: • Building empirical models • Least squares regression • Consideration of outliers • Forecasting (predictability/unpredictability) • Appropriateness of different models • Coefficient of determination (R^2) for comparison of models 3. Continuous and discrete models 4. Mathematical modelling using differential equations: • Derivation using laws of physics • Newton's law of cooling • Population Dynamics • Modelling the spread of disease 5. Applications of linear algebra • PageRank algorithm • Leslie matrix models
Module Overview	
Additional Information	This is an integrative module to give students proficiency and confidence in the use of fundamental mathematical tools. Students will gain confidence and experience in collecting, analysing and interpreting statistical data, and will use software that is taught in 4112MATHS and 4100STATS to help visualise the solution of real problems.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Portfolio	100	0	MLO1, MLO2, MLO3, MLO4

Module Contacts