

Summary Information

Module Code	6110MATHS
Formal Module Title	Mathematical Biology
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Robert Wilkinson	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
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Partner Module Team

Contact Name	Applies to all offerings	Offerings
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Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
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Lecture	33
Tutorial	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	This course will teach the application of mathematical models to a variety of problems in biology and medicine. The aims of the course are: To introduce mathematical models of biological systems and techniques for analysing them. To enable students to appreciate and understand how mathematics can be used to model biological systems.
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Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Recognise the importance of applications to real biological problems and be able to interpret the biological significance of terms in the mathematical models.
MLO2	Develop simple models based upon particular biological systems.
MLO3	Analyse the behaviour of solutions to the differential equations that arise in models for biological systems.
MLO4	Determine steady states, their stability and produce phase plane portraits.
MLO5	Understand and analyse simple infectious disease models and the concepts of epidemic, endemic and disease-free states.
MLO6	Analyse travelling wave solutions of PDEs.
MLO7	Analyse pattern forming solutions of PDEs.

Module Content

Outline Syllabus
Single species population models Multi species population modelsMathematical models of ecological systems Epidemiological models Evolution and evolutionary game theory ODE models in biology and medicine Reaction kinetics Biological movement and pattern formation Travelling waves Delay differential equations

Module Overview

This module will teach the application of mathematical models to a variety of problems in biology and medicine. The aims of the module are to introduce mathematical models of biological systems and techniques for analysing them.

Additional Information

It will show the application of differential and difference equations to simple biological, ecological and medical problems. It will provide an understanding of the mathematical modelling methods that describe population dynamics, epidemiological processes and evolutionary processes in ecological systems. It will also show the use of mathematical modelling in biochemical reactions, the application of partial differential equations in describing spatial processes such as cancer growth and pattern formation in embryonic development, and the use of delay-differential equations in physiological processes.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Coursework	30	0	MLO3, MLO4, MLO5, MLO1, MLO2
Centralised Exam	Examination	70	2	MLO3, MLO4, MLO5, MLO1, MLO7, MLO2, MLO6