Liverpool John Moores University

Title:	MATHEMATICAL BIOLOGY
Status:	Definitive
Code:	**6110MATHS** (124207)
Version Start Date:	01-08-2021
Owning School/Faculty:	Computer Science and Mathematics
Teaching School/Faculty:	Computer Science and Mathematics

Team	Leader
Robert Wilkinson	Y

Academic Level:	FHEQ6	**Credit Value:**	20	**Total Delivered Hours:**	57
Total Learning Hours:	200	**Private Study:**	143		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	33
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Case studies that explore real-world applications of biological modelling	30	
Exam	AS2	Examination	70	2

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.

Learning Outcomes

After completing the module the student should be able to:

1	Recognise the importance of applications to real biological problems and be able to interpret the biological significance of terms in the mathematical models
2	Develop simple models based upon particular biological systems
3	Analyse the behaviour of solutions to the differential equations that arise in models for biological systems
4	Determine steady states, their stability and produce phase plane portraits.
5	Understand and analyse simple infectious disease models and the concepts of epidemic, endemic and disease-free states.
6	Analyse travelling wave solutions of PDEs
7	Analyse pattern forming solutions of PDEs

Learning Outcomes of Assessments

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

Coursework	1	2	3	4	5		
Examination	1	2	3	6	7	4	5

Outline Syllabus

Single species population models
Multi species population models
Mathematical 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

Learning Activities

Lectures, tutorials, directed reading.

Notes

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.