MODULE SPECIFICATION

Part 1: Information			
Module Title	Mathematical Biology		
Module Code	UFMFJH-15-M	Level	Level 7
For implementation from	2019-20		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Dynamical Systems 2019-20		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: The overarching theme of the module is to apply techniques from dynamical systems theory to model, analyse, interpret and predict the behaviour of important phenomena in biology. No previous expertise in biology is assumed or required.

Educational Aims: See Learning Outcomes.

Outline Syllabus: The following list of `bio-themes' is intended to be indicative. These themes may change from year to year depending on current trends in research (e.g. evolution of bacterial resistance), topics of current national/international importance (e.g. outbreak of recent epidemics like Ebola or Foot and Mouth) or the specialisms of academic staff.

Population Genetics and Evolution:

Genotype, phenotype, alleles and frequency; Hardy-Weinberg Law; survival, selection, mutation, evolution; Fisher-Haldane-Wright Equation; fitness.

Ecological Population Dynamics:

Growth rate, environmental carrying capacity; competition, predation, cooperation; extinction, coexistence, permanence, diversity; sustainability.

Dynamics of Infectious Diseases:

SI, SIS, SIR, SIRS compartment models; epidemics, endemics; control, eradication, public health.

Teaching and Learning Methods: The module syllabus is delivered by means of lectures, to introduce and develop new material and provide context.

Problems Classes/Workshops will be used to go through solutions to homework exercises or consolidate/contextualise material.

Tutorials will offer mathematical support, guidance and feedback. Students will have the opportunity to ask individual questions about problems they may be having with homework exercises, lecture material, assessment preparation, etc. This may also include some computer lab sessions.

Part 3: Assessment

The assessment will be a single 3 hour examination consisting of a combination of partially seen and unseen questions.

The learning outcome relating to the description and critique of the use of mathematical models in a biological context of current/recent interest or importance will be assessed using the partially seen question(s). Such question(s) will be based on reading/resources identified by the lecturer during teaching delivery and students will have the opportunity to engage with this material well in advance of the examination. As an illustrative example, students might be asked to prepare a short essay on the predictions of particular mathematical model used by a government agency to model a recent epidemic; or provide a critique of several classes of models used in recent years to investigate the evolution of bacterial resistance.

The unseen question(s) will assess the learning outcomes relating to key mathematical (subject specific) skills involved in the analysis and interpretation of mathematical models in a variety of biological contexts (see Outline Syllabus). The assessment method (wholly by examination) will prevent plagiarism and is aligned with the programme's assessment strategy to enable students to manage coursework workloads effectively.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Examination 3 hours
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Examination 3 hours

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Describe and interpret the structure of mathematical models used in a variety of biological contexts	MO1
Apply appropriate mathematical techniques to determine the qualitative behaviour of models used in a variety of biological contexts	MO2
Interpret the results of mathematical analyses in a variety of biological contexts	MO3
Critically describe and interpret the strengths and limitations of mathematical models used in a variety of biological contexts	MO4
Describe and critique the use of mathematical models in a biological context of current/recent interest or importance	MO5

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/index.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study: