Module Specification

ABOUT THIS DOCUMENT

This module specification applies for the academic year 2018-19

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GENERAL INFORMATION

Module name	**Modelling & the Dynamics of Infectious Diseases**
Module code	2464
Module Organisers	Prof Richard White, Dr Emilia Vynnycky and Dr Adam Kucharski
Contact email	Richard.White@lshtm.ac.uk or Emilia.Vynnycky@lshtm.ac.uk or Adam.Kucharski@lshtm.ac.uk
Home Faculty	Epidemiology & Population Health
Level	Level 7 (postgraduate Masters 'M' level) of the QAA Framework for Higher Education Qualifications in England, Wales & Northern Ireland (FHEQ).
Credit	15 credits
Accreditation	Not currently accredited by any other body.
Keywords	Infectious Disease Modelling, [measles, mumps, rubella and influenza, STI/HIV, tuberculosis, vector-borne diseases and applications in veterinary epidemiology, Viral, Disease prevention & control, Research (in general), Epidemiology (incl. surveillance), Quantitative methods.

AIMS, OBJECTIVES AND AUDIENCE

Overall aim	To introduce students to key methods for setting up models of the transmission dynamics of infectious diseases and their application.
Intended learning outcomes	By the end of this module, students should be able to: • Understand the basic methods for setting up deterministic and stochastic infectious disease models • Understand some of the host and pathogen factors determining variation in infectious diseases over time and how to incorporate these into models • Analyse seroprevalence data using models to estimate age and time-dependent transmission rates and their application for understanding control of childhood infections • Understand the applications of modelling in infectious disease epidemiology and of some of the insights that models have provided, including describing the time-course of outbreaks and predicting the impact of control strategies

	• Understand the application of modelling to measles, mumps, rubella and influenza, STI/HIV, tuberculosis, vector-borne diseases and applications in veterinary epidemiology • Critically read and interpret modelling papers
Target audience	The module aims to bring a conceptual understanding of mathematical models and their applications in infectious disease research to individuals who have not had any advanced training in mathematics. It is also suitable for individuals with a background in mathematical disciplines who wish to obtain an understanding of the broad range of applications of mathematical models in infectious disease epidemiology and who may wish to specialize in this area in the future.
CONTENT	
Session content	The module is expected to include sessions addressing the following topics: • Basic methods and motives for developing infectious disease models • Analysis and applications of seroprevalence data: methods for elucidating age (and time-) dependent transmission; application for designing models for predicting the impact of control strategies • Additional methods and dynamics - stochastic and network modelling, model-fitting and sensitivity analyses • Applications of modelling
TEACHING, LEARNING AND ASSESSMENT	
Study resources provided or required	Module Information can be found on the Virtual Learning Environment (Moodle) containing information about each session and key references for the module.
Teaching and learning methods	A variety of teaching methods are employed including lectures, computer practicals, small group work and paper discussions. The module will introduce participants to the use of mathematical models for analysing a wide range of problems involving many different pathogens, and will equip participants with the skills to build and analyse simple models for their own area of interest. We use periodic review sessions to consolidate and expand on concepts covered during the module. Paper discussion sessions are included to enhance understanding of modelling papers and to encourage critical thinking of model structures and the underlying assumptions.
Assessment details	The assessment consists of two components: a data analysis/modelling exercise that students carry out in small groups (20%) and a timed MCQ exam (80%). Resit/deferred/new attempts - The resit task will be an individual MCQ exam.
Assessment dates	The groupwork assessment is carried out during the 3rd or 4th week of the module. The MCQ occurs in the final week of the module Resit/deferred/new attempts - the next assessment deadline will be during mid/late September of the current academic year.
Language of study and assessment	English (please see 'English language requirements' below regarding the standard required for entry).

TIMING AND MODE OF STUDY	
Duration	5 weeks at 2.5 days per week
Dates	Monday morning to Wednesday lunchtime
Timetable slot	Term 2 - slot **D1**
Mode of Study	The module is taught face-to-face in London. Both full-time and part-time students follow the same schedule.
Learning time	The notional learning time for the module totals 150 hours, consisting of: • Contact time ≈ 60 hours • Directed self-study ≈ 35 hours • Self-directed learning ≈ 25 hours • Assessment, review and revision ≈ 30 hours
APPLICATION AND ADMISSION	
Pre-requisites	This module builds on and consolidates many of the themes covered in the module on the Epidemiology & Control of Communicable Diseases (2437), and attendance at that module (or equivalent knowledge) is beneficial, but not required. Students will need to have an understanding of basic epidemiology. Students will benefit from reading the first chapter of the book "An Introduction to Infectious Disease Modelling" by E Vynnycky and RG White before the start of the module. They may also find it helpful to work through the exercises in the basic maths chapter of this book or through the maths refresher that will be posted on Moodle before the module. Familiarity with the spreadsheet package Excel is important (those with no experience should attend introductory courses). Training in the modelling package *Berkeley Madonna* is provided. Specialist mathematical training is not required as the emphasis is on developing a conceptual understanding of the basic methods and their practical application. Students who have attained the equivalent of a good high school mathematics training have generally been able to benefit from the module.
English language requirements	A strong command of the English language is necessary to benefit from studying the module. Applicants whose first language is not English or whose prior university studies have not been conducted wholly in English must fulfil LSHTM's English language requirements.
Student numbers	40-70 (numbers may be capped due to limitations in facilities or staffing)
Student selection	Preference will be given to LSHTM MSc students and LSHTM research degree students. Other applicants meeting the entry criteria will usually be offered a place in the order applications are received, until any cap on numbers is reached. Applicants may be placed on a waiting list and given priority the next time the module is run. Full Registration (full participation) by LSHTM research degree students is required for this module.