MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2024-25
Module Code	EPM302
Module Title	Modelling and the Dynamics of Infectious Diseases
Module Organiser(s)	Tom Sumner, Finn McQuaid, David Hodgson
Contact	The LSHTM distance learning programmes and modules are run in collaboration with the University of London. Enquiries may be made via their Student Advice Centre at: https://london.ac.uk/contact-us (Enquiries from London-based LSHTM MSc or research students regarding study of DL modules should be emailed to distance@lshtm.ac.uk)
Faculty	Faculty of Epidemiology and Population Health London School of Hygiene & Tropical Medicine http://www.lshtm.ac.uk/eph/
FHEQ Level	Level 7
Credit Value	**CATS** 15 **ECTS** 7.5
HECoS Code	101335 : 100402 : 100962
Mode of Delivery	Distance Learning
Mode of Study	Directed self-study, through online materials via the Virtual Learning Environment
Language of Study	English
Pre-Requisites	Students wishing to study this module: • should have good mathematical skills, equivalent to UK A-level; students should be willing to revisit some concepts relevant to the module • will need access to a computer that has Microsoft Excel 2007 (or later version) installed • are expected to be capable of carrying out basic functions using Excel software. • Epidemiology students should have passed EPM101 *Fundamentals of Epidemiology* and EPM102 *Statistics for Epidemiology* as core modules • Clinical Trials students should have basic epidemiological knowledge and skills

Accreditation by Professional Statutory and Regulatory Body	Not currently accredited by any other body.
Module Cap (Maximum number of students)	There is no cap on the number of students who can register for this distance learning module.
Target Audience	The module aims to bring a conceptual understanding of mathematical models and their applications in infectious disease research to individuals who have some prior mathematical training (equivalent to UK A-level). It is also suitable for individuals with a more advanced 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.
Module Description	This module provides an introduction to the use of mathematical modelling of infectious diseases. It provides students with an introduction to the theory of infectious disease modelling, illustrates applications of models in infectious disease research and provides the skills to develop and apply simple models of infectious diseases. It is aimed at students with some prior mathematical training and is assessed through a practical model building exercise and a written assessment.
Duration	Students may start their studies at any time from access/receipt of study materials (made available annually usually in October, depending on date of registration) and work through the material completion of their assessment (made available in January). Students registering after September (continuing and individual module students only) should note that introductory messages, and some online activities (for example discussion forums and/or real-time welcome sessions) may have already taken place before they get access to the Virtual Learning Environment (Moodle). All such messages and recordings (where applicable) will be available to access throughout the study year.
Last Revised (e.g. year changes approved)	March 2024

Programme(s) This module is linked to the following programme(s)	**Status**
PGCert/PGDip/MSc Epidemiology (Distance Learning - University of London)	Elective
PGDip/MSc Clinical Trials (Distance Learning - University of London)	Elective

Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • introduce you to the mathematical modelling of infectious diseases.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Understand the basic methods for setting up deterministic and stochastic infectious disease models and identify appropriate model structures/key epidemiological parameters to describe the dynamics of infectious diseases. 2. Describe some of the host and pathogen factors determining variation in infectious diseases over time and adapt simple models to incorporate these factors. 3. Design simple mathematical models to apply to infectious disease epidemiological data, incorporating appropriate control strategies and analyse and interpret the results. 4. Critically read modelling papers to identify their strengths and limitations.

Indicative Syllabus

Session Content	
The module is expected to cover the following topics:	
MD01	Basic modelling methods I: an introduction to difference equations
MD02	Basic modelling methods II: an introduction to differential equations
MD03	The natural dynamics of infectious diseases
MD04	Applying modelling techniques to analyse seroprevalence data
MD05	Modelling the impact of rubella vaccination in high and low transmission settings
MD06	Methods for incorporating non-random (heterogeneous) mixing into models
MD07	Calculating R0 for non-randomly mixing populations
MD08	Modelling HIV and STIs
MD09	An introduction to stochastic modelling and its applications.

Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Directed self-study	70	47
Self-directed learning	30	20
Assessment, review and revision	50	33
Total	**150**	**100**

Teaching and Learning Strategy
Learning is self-directed against a detailed set of learning objectives using the materials provided. The key learning methods are: • reading and reflecting on CAL (computer-assisted learning) materials which introduce, explain and apply the principles and methods covered in the module • reading and reflecting on other resources which support the learning in the CAL sessions • completing practical exercises • accessing academic support which is available from the module tutors through the web-based discussion fora and occasional online webinars in which students are encouraged to participate • completing the formative assignment and reflecting on written feedback from module tutors. • completing the assessed assignment and reflecting on written feedback from module tutors.

Assessment

Assessment Strategy
Formal assessment of this module will be by one assessed assignment contributing 100% of module marks. The assessed assignment will be made available in January. If students fail the module overall, they are allowed one further attempt at the failed element (either assessment, or, if registered prior to 2024/25, the time limited assessment (exam); see below for details) Students who enrolled on this module prior to 2024/25 and who need to resit or who are partially through the existing method of assessment (i.e. having sat the time limited assessment (exam) but not the AA or vice versa) will be required to complete the previous method of assessment (an assessed assignment (30%) and a formal unseen, time limited assessment (70%)). Note that the unseen time limited assessment (70%) will only be available to take in 2024/25 and 2025/26. After this time, students who have not completed both forms of module assessment must transfer to the new method of assessment (100% assessed assignment).

Summative Assessment

Assessment Type	**Assessment Length (i.e. Word Count, Length of presentation in minutes)**	**Weighting** (%)	**Intended Module Learning Outcomes Tested**
Assessed Assignment	Written report of maximum 2500 words (not including figures and tables)	100	All
Time-limited assessments for DL modules are held once a year, mostly in June (including resits). Assessments are held in accordance with University of London's annual guidance but in 2024/25 they are likely to be accessed online. Please note that a separate assessment fee may be payable in addition to the module fee. Further details will be communicated as soon as the final decisions are known.			

Resitting assessment
Resits will accord with the LSHTM's Resits Policy

Assessment submission deadlines
The Formative Assignment must be submitted by 14th February. The Assessed Assignment must be submitted no later than 30th April. Both the FA and the AA can be submitted only once and must be submitted via the online Assignment Management System.

Resources

Indicative reading list

- *An Introduction to Infectious Disease Modelling* (Vynnycky and White).

Other resources

The Moodle Virtual Learning Environment (VLE) contains the key materials and resources for EPM302 as follows:

- Interactive study material, referred to as Computer Assisted Learning (CAL), which is the key learning material for the module. The CAL sessions are accessible online and available to download also.
- Discussion forums
- Readings (via the LSHTM online library)
- Assignments
- Past examination papers and examiner reports.

Moodle can be accessed from the first week of October, after module registration.

The following is also provided:

- Berkeley Madonna software
- E-book: *An Introduction to Infectious Disease Modelling* (Vynnycky and White).

Students will need access to a computer that has Microsoft Excel 2007 (or later version) installed.

Students who are taking this as an individual module also have online access to the EPM1 computer-based sessions (this access will exclude tutor support and associated readings / textbooks).

Teaching for Disabilities and Learning Differences

The module-specific site on Moodle provides students with access to the module learning materials, including a study guide and online reading list (containing both essential and recommended readings), and additional resources including supplementary exercises and optional lecture recordings. All materials posted up on Moodle areas, including computer-based sessions, have been made accessible where possible (this includes an accessible printable version of each session). The LSHTM Moodle has been made accessible to the widest possible audience, using a VLE that allows for up to 300% zoom, permits navigation via keyboard and use of speech recognition software, and that allows listening through a screen reader. All students have access to "SensusAccess" software which allows conversion of files into alternative formats.

For students with special needs, reasonable adjustments and support can be arranged – details and how to request support can be found on the University of London website at https://london.ac.uk/applications/how-it-works/inclusive-practice-access-arrangements.