



## MODULE SPECIFICATION

<b>Academic Year (student cohort covered by specification)</b>	2022-23
<b>Module Code</b>	EPM302
<b>Module Title</b>	Modelling and the Dynamics of Infectious Diseases
<b>Module Organiser(s)</b>	Tom Sumner, Finn McQuaid, Gwen Knight
<b>Contact</b>	<p>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:</p> <p><a href="https://london.ac.uk/contact-us">https://london.ac.uk/contact-us</a></p> <p>(Enquiries from London-based LSHTM MSc or research students regarding study of DL modules should be emailed to <a href="mailto:distance@lshtm.ac.uk">distance@lshtm.ac.uk</a>)</p>
<b>Faculty</b>	<p>Faculty of Epidemiology and Population Health London School of Hygiene &amp; Tropical Medicine</p> <p><a href="http://www.lshtm.ac.uk/eph/">http://www.lshtm.ac.uk/eph/</a></p>
<b>FHEQ Level</b>	Level 7
<b>Credit Value</b>	<b>CATS</b> 15 <b>ECTS</b> 7.5
<b>HECoS Code</b>	101335 : 100402 : 100962
<b>Mode of Delivery</b>	Distance Learning
<b>Mode of Study</b>	Directed self-study, through online materials via the Virtual Learning Environment
<b>Language of Study</b>	English
<b>Pre-Requisites</b>	<p><b>Epidemiology students</b> wishing to study this module:</p> <ul style="list-style-type: none"> <li>• will have passed EPM101 <i>Fundamentals of Epidemiology</i> and EPM102 <i>Statistics for Epidemiology</i> as core modules</li> <li>• should have good mathematical skills, equivalent to UK A-level; students should be willing to revisit some concepts relevant to the module</li> <li>• will need access to a computer that has Microsoft Excel 2007 (or later version) installed</li> <li>• are expected to be capable of carrying out basic functions using Excel software.</li> </ul> <p><b>Clinical Trials students</b> should have basic epidemiological knowledge and skills before studying this module.</p>

<b>Accreditation by Professional Statutory and Regulatory Body</b>	Not currently accredited by any other body.
<b>Module Cap (Maximum number of students)</b>	There is no cap on the number of students who can register for this distance learning module.
<b>Target Audience</b>	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.
<b>Module Description</b>	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 examination.
<b>Duration</b>	<p>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 until the start of the June examinations (although assessment submission deadlines which are earlier than this must be observed).</p> <p>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.</p>
<b>Last Revised (e.g. year changes approved)</b>	March 2022

<b>Programme(s)</b>	<b>Status</b>
This module is linked to the following programme(s)	
PGCert/PGDip/MSc Epidemiology (Distance Learning - University of London Worldwide)	Elective
PGDip/MSc Clinical Trials (Distance Learning - University of London Worldwide)	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 $R_0$ 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
<b>Total</b>	<b>150</b>	<b>100</b>

### 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 includes a two-hour unseen written examination with 15 minutes' additional reading/planning time (70%) and an assessed assignment (30%).

If students fail the module overall, they are allowed one further attempt at the failed element (examination and/or 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 5 pages plus up to 5 tables/figures	30	1-4
Exam	2hrs 15mins	70	All

Timed examinations for DL modules are held once a year, in June (including resits). Examinations in 2022/23 will either be taken in a student's country of residence in one of over 650 [examination centres worldwide](#) or will be held online. If the June 2023 module exam is held at a local examination centre, a local fee will be payable direct to the exam centre. This fee will be in addition to the module fee and is set by, and paid directly to, the individual examination centre. The level of local examination centre fees varies across the world and neither the University of London nor the LSHTM have any control over the fee amount. If the June 2023 module exam is held online, no additional exam entry fee will be payable. (Note that for those resitting module assessments, a fee will be payable.)

### **Resitting assessment**

Resits will accord with the LSHTM's [Resits Policy](#)

### **Assessment submission deadlines**

The Formative Assignment must be submitted by 14<sup>th</sup> February.

The Assessed Assignment must be submitted no later than 31<sup>st</sup> March.

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 Worldwide website at <https://london.ac.uk/applications/how-it-works/inclusive-practice-access-arrangements>.