



## MODULE SPECIFICATION

<b>Academic Year (student cohort covered by specification)</b>	2022-23
<b>Module Code</b>	EPM304
<b>Module Title</b>	Advanced Statistical Methods in Epidemiology
<b>Module Organiser(s)</b>	Schadrac Agbla, Sian Floyd, Daniel Grint
<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:  <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  <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 : 101030 : 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> must have passed EPM101 <i>Fundamentals of Epidemiology</i> and EPM102 <i>Statistics for Epidemiology</i> and should have studied and have an understanding of EPM103 <i>Practical Epidemiology</i>, EPM105 <i>Writing and Reviewing Epidemiological Papers</i> and <b>EPM202 <i>Statistical Methods in Epidemiology</i></b> prior to studying this module. If students wish to study both EPM202 and EPM304 in the same year, they are recommended to have achieved at least a grade 3 in EPM102.</p> <p>Epidemiology students may choose to study CTM208 <i>Further Statistical Methods in Clinical Trials</i> in place of EPM304, but must apply to the Programme Director for approval, and must not</p>

	<p>register for and must not study both EPM304 <i>Advanced Statistical Methods in Epidemiology</i> and CTM208.</p> <p><b>Clinical Trials students</b> may choose to study EPM304 in place of CTM208 <i>Further Statistical Methods in Clinical Trials</i>, but must <b>not</b> register for and must <b>not</b> study both CTM208 <i>Further Statistical Methods in Clinical Trials</i> and EPM304. Clinical Trials students wishing to study EPM304 must also ensure that they have studied CTM207 <i>Design and Analysis of Epidemiological Studies</i> or EPM101 <i>Fundamentals of Epidemiology</i> before studying EPM304 or must obtain Programme Director approval before registration. Students can register for both EPM304 and EPM101 in the same year but should first study the material for EPM101.</p> <p><b>Students studying this module as an individual module</b> must have basic epidemiological knowledge and skills equivalent to EPM101 <i>Fundamentals of Epidemiology</i>, EPM102 <i>Statistics for Epidemiology</i>, EPM103 <i>Practical Epidemiology</i>, EPM105 <i>Writing and Reviewing Epidemiological Papers</i> and EPM202 <i>Statistical Methods in Epidemiology</i>.</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>	This is an advanced module intended for students with a strong grasp of quantitative methods, who have previously completed the module in <i>Statistical Methods in Epidemiology</i> .
<b>Module Description</b>	This module equips students with the skills needed to analyse and interpret data from matched case-control studies, cohort studies, studies in which there is correlation among observations (with examples from cohort and cross-sectional studies), and cluster-randomised trials. An overall framework for analysis strategy, building from univariable to multivariable modelling, is provided. An introduction to causal inference, to key concepts in thinking about accounting for missing data, and to additive versus multiplicative models, is provided. The module is aimed at students familiar with Stata who wish to build on existing quantitative analysis skills to broaden and deepen their understanding of key analytical methods, and is assessed through a data analysis and reporting exercise.
<b>Duration</b>	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

	<p>material until completion of their assessment (made available in early January).</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

<b>Overall aim of the module</b>
<p>The overall module aim is to:</p> <ul style="list-style-type: none"> <li>enable students to understand, apply, and interpret the results of, a range of relatively advanced methods for the design and analysis of epidemiological studies.</li> </ul>

<b>Module Intended Learning Outcomes</b>
<p>Upon successful completion of the module a student will be able to:</p> <ol style="list-style-type: none"> <li>Select, apply and interpret the results of regression methods for the analysis of matched case-control studies, cohort studies, and cross-sectional studies, using appropriate computer software.</li> <li>Understand when individual observations are not independent, and how to account for this by using statistical methods that account for such correlations.</li> <li>Plan a strategy of analysis for an epidemiological dataset, using an appropriate choice of statistical methods.</li> <li>Write a clear report presenting and interpreting the results of an analysis of epidemiological data.</li> </ol>

## Indicative Syllabus

### Session Content

The module is expected to cover the following topics:

AS01	Framework for regression modelling
AS02	Strategies of analysis
AS03	Conditional logistic regression
AS04	Stratifying on time for cohort studies
AS05	Further Poisson regression
AS06	Cox regression
AS07	Further issues for Cox regression
AS08	Additive and multiplicative models
AS09	Analysis of correlated data
AS10	Cluster-randomised trials
AS11	Population attributable fractions
AS12	Meta-analysis and systematic reviews
AS13	Quantitative analysis
AS14	Causal Inference

These sessions are followed by one optional session:

AS15	Missing data
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## Teaching and Learning

### Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Directed self-study	75	50
Self-directed learning	25	17
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 paper-based materials which support the learning in the CAL sessions.
- Completing paper and computer-based practical exercises.
- Accessing academic support which is available from the module tutors through the web-based discussion forums and occasional online webinars in which students are encouraged to participate.
- Completing the formative assignment and reflecting on written feedback from module tutors.

## Teaching and Learning Strategy

- Completing the assessed assignment and reflecting on written feedback from module tutors.

## Assessment

### Assessment Strategy

Formal assessment of the module will be by one assessed assignment contributing 100% of module marks. The assessed assignment will be made available in early January. If a student fails the module overall, they are allowed one further attempt at the assignment.

For both their formative and summative assessments, students are asked to analyse a dataset to address a research question and to prepare a brief report describing their analysis strategy and the results they obtained, discussing their results in the light of the methods used to obtain the data. The assessment tasks require students to demonstrate: the ability to select and apply appropriate statistical methods to a specific problem, including the investigation of confounding and effect modification; the ability to present their analysis strategy and results in an appropriate way; and the ability to interpret their findings appropriately in the light of the study design and research question. The formative assessment task enables students to prepare for their summative assessment, as both have a similar format, but may cover different epidemiological study designs. The assessment tasks thus give students an opportunity to consolidate their learning and require students to apply their learning across the whole of the module.

Any student who registered for EPM304 prior to 2019/20 should contact the Module Organiser to discuss their individual assessment requirements.

### Summative Assessment

Assessment Type	Assessment Length (i.e. Word Count, Length of presentation in minutes)	Weighting (%)	Intended Module Learning Outcomes Tested
Assessed Assignment	1,500 words of text and 3-4 tables or figures	100	1 - 4

### 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 30<sup>th</sup> 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

#### 1. Textbook:

Kirkwood, B.R. and Sterne, J.A.C. *Essential Medical Statistics*. Blackwell Science, 2003

#### 2. Journal articles relating to analysis and reporting

Altman, D. and Bland, M. Absence of evidence is not evidence of absence. *BMJ* 1995; 311:485

Sterne, J.A.C. and Davey Smith, G. Sifting the evidence – what’s wrong with significance tests? Another comment on the role of statistical methods. *BMJ* 2001; 322:226-31

#### 3. Journal articles relating to strategies of analysis

Victora, C., Huttly S.R., Fuchs, S.C., Olinto, M.T.A. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. *IJE* 1997; 26:224-227

Greenland, S. Modeling and variable selection in epidemiologic analysis. *AJPH* 1989; 79:340-9

### Other resources

The Moodle Virtual Learning Environment (VLE) contains the key materials and resources for EPM304 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 are also available to download.
- Workbook (contain practical exercises to work through using the statistical software Stata)
- Readings (via the LSHTM online library)
- Discussion forums
- Assignments
- Past examination papers and examiner reports.

The following is also provided (if not previously provided for other EPM or CTM modules):

- Stata software
- E-book: *Essential Medical Statistics* (Kirkwood, Sterne).

Moodle can be accessed from the first week of October, after module registration. Students who are taking this as an individual module or as part of the MSc CT programme also have online access to the EPM1 and EPM2 computer-based sessions (this access will exclude tutor support and associated readings/workbooks/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. 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>