MODULE SPECIFICATION

Academic Year	2026-27
Module Code	EPM304
Module Title	Advanced Statistical Methods in Epidemiology
Module Organiser(s)	Sian Floyd, Sanni Ali, Lucas Malla
Contact	For students studying University of London Awards (initial registration 2025/2026 and prior years: Enquiries may be made via their Student Advice Centre at: Student Advice Centre. For students studying LSHTM awards (registration in 2026/2027 and onwards): Enquiries should be emailed to: EPsupport@lshtm.ac.uk
Faculty	Epidemiology and Population Health
FHEQ Level	Level 7
Credit Value	**CATS** 15 **ECTS** 7.5
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	**Epidemiology students** must have passed EPM101 *Fundamentals of Epidemiology* and EPM102 *Statistics for Epidemiology* and should have studied and have an understanding of EPM103 *Practical Epidemiology*, EPM105 *Writing and Reviewing Epidemiological Papers* and **EPM202 *Statistical Methods in Epidemiology* 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. Epidemiology students may choose to study CTM208 *Further Statistical Methods in Clinical Trials* in place of EPM304, but must apply to the Programme Director for approval, and must not register for and must not study both EPM304 *Advanced Statistical Methods in Epidemiology* and CTM208. **Clinical Trials students** may choose to study EPM304 in place of CTM208 *Further Statistical Methods in Clinical Trials*,

	but must **not** register for and must **not** study both CTM208 *Further Statistical Methods in Clinical Trials* and EPM304. Clinical Trials students wishing to study EPM304 must also ensure that they have studied CTM207 *Design and Analysis of Epidemiological Studies* or EPM101 *Fundamentals of* Epidemiology 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. **Students studying this module as an individual module** must have basic epidemiological knowledge and skills equivalent to EPM101 *Fundamentals of Epidemiology*, EPM102 *Statistics for Epidemiology*, EPM103 *Practical Epidemiology*, EPM105 *Writing and Reviewing Epidemiological Papers* and EPM202 *Statistical Methods in Epidemiology*.
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	This is an advanced module intended for students with a strong grasp of quantitative methods, who have previously completed the module in Statistical Methods in Epidemiology.
Module Description	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 statistical software 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.
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 until 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 2025

For students studying UoL awards (initial registration in 2025/2026 and prior years)

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

For students studying LSHTM awards (registration in 2026/2027 and onwards)

Programme(s) This module is linked to the following programme(s)	**Status**
PGDip Epidemiology (Distance Learning)	Elective
MSc Epidemiology (Distance Learning)	Elective

Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • enable students to understand, apply, and interpret the results of, a range of relatively advanced methods for the design and analysis of epidemiological studies.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. 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. 2. Understand when individual observations are not independent, and how to account for this by using statistical methods that account for such correlations. 3. Plan a strategy of analysis for an epidemiological dataset, using an appropriate choice of statistical methods.

Module Intended Learning Outcomes
4. Write a clear report presenting and interpreting the results of an analysis of epidemiological data.

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 Analysis of quantitative data AS14 Causal Inference These sessions are followed by one optional session: AS15 Missing data

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
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.

Teaching and Learning Strategy
• 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. • 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 requires students to apply their learning across the whole of the module.

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 Chapter 8b of the LSHTM Academic Manual.

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

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

2. Journal articles

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

Greenland S, Pearl J, Robins M. Causal Diagrams for Epidemiologic Research. Epidemiology, 10(1), 1999 01, 37 – 48

Hernán et al. Causal knowledge as a prerequisite for confounding evaluation: an application to birth defects epidemiology. American Journal of Epidemiology 2002; 155: 176-184

Greenland S and Pearce N. Statistical Foundations for Model-Based Adjustments. Annual Review of Public Health 2015; 36: 89–108

Greenland S, Daniel R, Pearce N. Outcome modelling strategies in epidemiology: traditional methods and basic alternatives. International Journal of Epidemiology 2016; 45: 565–575

Pocock S et al. Survival plots of time-to-event outcomes in clinical trials: good practice and pitfalls. Lancet 2002; 359: 1686–9.

Hanley J, Negassa A, Edwardes M, Forrester J. Statistical Analysis of Correlated Data Using Generalized Estimating Equations: An Orientation. American Journal of Epidemiology, 157(4), 2003 364 – 375.

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 studying University of London Awards (initial registration 2025/2026 and prior years:
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: Inclusive practice and Access arrangements | University of London

For Students Studying LSHTM awards (registration 2026/2027 and onwards):
For students who require learning or assessment adjustments and support this can be arranged through the Student Support Services – details and how to request support can be found on the LSHTM Disability Support pages.