MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2021-22
Module Code	2412
Module Title	Advanced Statistical Methods in Epidemiology
Module Organiser(s)	Richard Hayes and Tim Clayton
Faculty	Epidemiology & Population Health
FHEQ Level	Level 7
Credit Value	**CATS:** 15 **ECTS:** 7.5
HECoS Code	101031 : 101335
Term of Delivery	Term 3
Mode of Delivery	For 2021-22 this module is currently planned as a mixture of online and face to face teaching Teaching will comprise a combination of live and interactive activities (synchronous learning) as well as recorded or self-directed study (asynchronous learning).
Mode of Study	Full-time
Language of Study	English
Pre-Requisites	Statistical Methods in Epidemiology is a pre-requisite for this module whether taken face to face (2402) or by distance learning (EPM202).
Accreditation by Professional Statutory and Regulatory Body	Not currently accredited by any other body
Module Cap (indicative number of students)	120 (numbers may be capped due to limitations in facilities or staffing)
Target Audience	This is an advanced module intended for students with a strong grasp of quantitative methods, who have successfully completed the module in Statistical Methods in Epidemiology (2402 or EPM202).
Module Description	This module develops and builds on the material presented in Statistical Methods in Epidemiology to enable students to analyse and interpret data from cohort, case-control and cross-sectional studies. The module will equip students to understand, apply and interpret the results of a range of more advanced techniques for the design and analysis of epidemiological studies. It is aimed at students familiar with the material in

	Statistical Methods in Epidemiology including the use of STATA and is assessed through a written report of the analysis of an epidemiological dataset.
Duration	5 weeks at 2.5 days per week
Timetabling slot	Slot E
Last Revised (e.g. year changes approved)	August 2021

Programme(s) This module is linked to the following programme(s)	**Status**
MSc Epidemiology	Recommended
MSc Medical Statistics	Recommended
MSc Public Health (Health Economics)	Recommended

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 advanced techniques 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 regression methods for the analysis of case-control and cohort studies using appropriate computer software 2. Understand when individual observations are not independent and how to account for this using appropriate statistical methods 3. Plan a strategy of analysis for an epidemiological dataset, using an appropriate choice of statistical methods. 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: **Regression methods for case-control studies**: • Unconditional and conditional logistic regression **Regression methods for cohort studies and survival analysis:** • Stratifying on time • Poisson regression • Cox regression • Further issues in the analysis of cohort studies **Analysis of correlated data**: • Random effects models • Generalised estimating equations • Design and analysis of cluster-randomized trials **Miscellaneous topics**: • Causal diagrams • Attributable fractions • Additive and multiplicative models • Analysis of quantitative data • Missing data • Strategies of analysis

Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Contact time	40	27
Directed self-study	15	10
Self-directed learning	45	30
Assessment, review and revision	50	33
Total	**150**	**100**

Student contact time refers to the tutor-mediated time allocated to teaching, provision of guidance and feedback to students. This time includes activities that take place in face-to-face contexts such as lectures, seminars, demonstrations, tutorials, supervised laboratory workshops, practical classes, project supervision as well as where tutors are available for one-to-one

discussions and interaction by email. Student contact time also includes tutor-mediated activities that take place in online environments, which may be synchronous (using real-time digital tools such as Zoom or Blackboard Collaborate Ultra) or asynchronous (using digital tools such as tutor-moderated discussion forums or blogs often delivered through the School's virtual learning environment, Moodle).

The division of notional learning hours listed above is indicative and is designed to inform students as to the relative split between interactive (online or on-campus) and self-directed study.

Teaching and Learning Strategy
The teaching and learning strategy is similar to Statistical Methods in Epidemiology based on a combination of lectures followed by computer or non-computer practical sessions. In the practical sessions students have the opportunity to apply the concepts and methods covered in the lectures immediately following the lectures. The practicals provide students with "hands on" experience in analysing and interpreting epidemiological data using data sets drawn from research work of staff in the Faculty of Epidemiology & Population Health. Students will be familiar with some datasets from Statistical Methods in Epidemiology but new datasets will also be introduced. These include studies from both high and low income countries. For each practical students are provided with detailed solutions to the tasks set, enabling them to check their understanding of the material. Four review sessions (in weeks 2-5) cover the material from the previous weeks' lectures in response to questions raised by students. These are scheduled for 75 minutes each to allow plenty of time for questions and discussion. The assessment is given out during the first week of the module in which students will undertake an analysis of a dataset to address an epidemiological research question and prepare a report of their strategy of analysis, findings and interpretation. The assessment gives students the opportunity to undertake a detailed analysis of a dataset and gain confidence in undertaking their own analyses in future.

Assessment

Assessment Strategy
For their summative assessment, students are asked to undertake the analysis of an epidemiological dataset. Work on the analysis and preparation of the report continue throughout the module. Students are provided with an epidemiological dataset and questions to guide them through the analysis. They are asked to analyse the dataset to address the research questions and to prepare a report describing their detailed analysis strategy, the results they obtained, and provide a discussion and interpretation of their results. The assessment task requires students to identify an appropriate strategy to analyse the dataset and to select and apply appropriate statistical methods to address the questions raised. The students will need to present their analysis strategy and results appropriately and be able to interpret their findings in the light of the study design and research question. The assessment provides students with the opportunity to apply their learning across the module as well as to consolidate their statistical learning across the year and to gain confidence to undertake their own analysis in the future.

Summative Assessment

Assessment Type	**Assessment Length (i.e. Word Count, Length of presentation in minutes)**	**Weighting** (%)	**Intended Module Learning Outcomes Tested**
Coursework	No more than 5 pages	100	1 – 4

Resitting assessment
Resits will accord with the LSHTM's Resits Policy Resit/deferred/new attempts - The task will be similar to the original assignment but with a different dataset. The next assessment deadline will be during mid/late September of the current academic year.

Resources

Indicative reading list
There is no compulsory textbook for this module, and the online course notes, slides and practicals in addition to the extra resources should provide a thorough coverage of the material. However, the following texts may provide useful supplementary reading:

Clayton D & Hills M, *Statistical Models in Epidemiology,* Oxford University Press, 1993

Rothman KJ, Greenland S & Lash TL *Modern Epidemiology,* 3rd Edition, Lippincott Williams & Wilkins, 2008

Breslow NE & Day NE, *Statistical Methods in Cancer Research,* IARC
Volume 1: The analysis of case-control studies
Volume 2 : The design and analysis of cohort studies

Volume 2 contains the index for both volumes. Although the methods are illustrated with examples from cancer epidemiology, most are applicable to the epidemiological study of any health problem.

Other resources
Detailed and comprehensive material is provided for the module including lecture notes, slides, practicals and solutions. Additional material is also provided in the form of self-directed notes and practicals as well as a comprehensive reading list.

Teaching for Disabilities and Learning Differences

The module-specific site on Moodle gives students access to lecture notes and copies of the slides used during the lecture. Where appropriate, lectures are recorded and made available on Moodle. All materials posted on Moodle, including computer-based sessions, have been made accessible where possible.

LSHTM Moodle is accessible to the widest possible audience, regardless of specific needs or disabilities. More detail can be found in the Moodle Accessibility Statement which can also be found within the footer of the Moodle pages. All students have access to "SensusAccess" software which allows conversion of files into alternative formats.

Student Support Services can arrange learning or assessment adjustments for students where needed. Details and how to request support can be found on the LSHTM Disability Support pages.