MODULE SPECIFICATION

1. Overview

Academic Year (student cohort covered by specification)	2019-20
Module Code	2402
Module Title	Statistical Methods in Epidemiology
Module Organiser(s)	Professor Simon Cousens and Professor Katherine Fielding
Faculty	Epidemiology and Population Health
FHEQ Level	Level 7
Credit Value	CATS	15	ECTS	7.5
HESA Cost Centre	105
HECoS Code	101335 or 101030
Term of Delivery	Term 2
Mode of Delivery	Face to face
Mode of Study	Full time
Language of Study	English
Pre-Requisites	Students need to have a good grasp of the material covered in the Term 1 modules Statistics for EPH (2021) and Extended Epidemiology (2007) in order to benefit from this module. In particular, students should be familiar with the three major epidemiological study designs, with the concepts of confounding and effect modification/ interaction, with the interpretation of confidence intervals and statistical tests, and with the basic data handling commands in STATA. Students who have not attended Term 1 modules in Extended Epidemiology and Statistics for EPH are strongly recommended to review the equivalent distance learning modules EPM101 (Fundamentals of Epidemiology) and EPM102 (Statistics for Epidemiology) prior to the start of this module.
Accreditation by Professional Statutory and Regulatory Body	Not currently accredited by any other body
Module Cap (Maximum number of students)	280 (maximum capacity of computing facilities)
Target Audience	This module is primarily intended for students who have attended the Term 1 modules in Statistics for EPH (2021) and Extended Epidemiology (2007), are familiar with STATA, and who wish to acquire further skills in the analysis and interpretation of epidemiological studies.
Module Description	This module equips students with the skills needed to analyse and interpret data from cohort, case-control and cross-sectional studies. It is aimed at students familiar with STATA who wish to acquire further skills in the analysis and interpretation of epidemiological studies, and is assessed through an analysis and reporting exercise.
Duration	5 weeks at 2.5 days per week
Timetabling slot	Slot C2
Last Revised (e.g. year changes approved)	June 2019

2. Programme(s) that this module is part of

Programme *(Lead programme first)*	Status *(Compulsory/Recommended Option)*
MSc Epidemiology	Compulsory
MSc Medical Statistics	Compulsory
MSc Veterinary Epidemiology	Compulsory
MSc Public Health (General and EH, HE, HP, HSR streams)	Recommended
MSC Public Health for Development	Recommended
MSc Control of Infectious Diseases	Recommended

3. Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • equip students with the skills needed to analyse and interpret data from cohort, case-control and cross-sectional studies, using cross-tabulation, stratification and regression models.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Explain the key statistical and epidemiological concepts which underlie the analysis of epidemiological data 2. Perform analyses of data arising from epidemiological studies, using appropriate computer software (the software used throughout will be STATA) 3. Investigate and assess confounding and effect modification (interaction) in epidemiological data 4. Interpret appropriately the results of these analyses, taking into account study design issues 5. Write a clear report presenting and interpreting the results of an analysis of epidemiological data

4. Indicative Syllabus

Session Content
The module is expected to cover the following topics: • Cohort studies: analysis of rates using stratification to investigate confounding and interaction; simple survival analysis (Kaplan-Meier, log rank test). Introduction to Poisson and Cox regression • Case-control studies: design issues including matching; analysis of studies using stratification to investigate confounding and interaction. • Likelihood theory • Logistic regression for the analysis of case-control, cross-sectional and fixed-length cohort studies • Reporting of results

5. Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Contact time	38.5	26%
Directed self-study	1.5	1%
Self-directed learning	70	47%
Assessment, review and revision	40	27%
Total	150	100%

Teaching and Learning Strategy

The teaching and learning strategy is 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. These include both high and low income country studies. For each practical students are provided with detailed solutions to the tasks set, enabling to them to check that their understanding of the material. Three optional review lectures (in weeks 2-4) cover the material from the previous weeks' lectures and questions raised by students. Towards the end of the taught component of the module students are asked to undertake an analysis of a dataset and prepare an outline of a report (bullet points, dummy tables, key discussion points). These are then discussed in a plenary lecture. The assessment task, which comes at the end of the module and involves analysing a dataset to address an epidemiological research question and writing a brief report of their findings, provides students with an important opportunity to consolidate their learning across the whole module.

Indicative Breakdown of Contact Time

Type of delivery	Total (hours)
Lecture	19
Seminar	3
Tutorial	0
Computer Practical	16.5
Laboratory Practical	0
Fieldwork	0
Project Supervision	0
Total	**38.5**

6. Assessment

Assessment Strategy

For their summative assessment students are asked to undertake a data analysis exercise, similar to that which they undertake towards the end of the taught component of the module. Students are provided with an epidemiological dataset and a specific research question. They are asked to analyse the dataset to address the research question and to prepare a brief report describing their analysis strategy and the results they obtained, and to discuss their results in the light of the methods used to obtain the data. The assessment task requires 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; the ability to interpret their findings appropriately in the light of the study design and research question. The assessment task thus gives students an opportunity to consolidate their learning from 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
Coursework	1400 words of text plus a maximum of 3 tables	100%	1 to 5.
Exam (Papers 1 & 2)			
Group Presentation			
Group Work			
Peer Assessment			
Project			
Practical			
Timed Test (in-module test e.g. MCQ)			
Extended Project			

Resitting assessment

Resits will accord with the LSHTM's Resits Policy

For individual students resitting a group assessment there will be an approved alternative assessment as detailed below.

Assessment being replaced	Approved Alternative Assessment Type	Approved Alternative Assessment Length (i.e. Word Count, Length of presentation in minutes)
Not applicable		

7. Resources

Indicative reading list *(if applicable)*

1. ASA statement on P-values published in 2016

Ronald L. Wasserstein & Nicole A. Lazar (2016) The ASA's Statement on p-Values: Context, Process, and Purpose, The American Statistician, 70:2, 129-133, DOI: 10.1080/00031305.2016.1154108

To link to this article: http://dx.doi.org/10.1080/00031305.2016.1154108

Supplemental material; by various authors can be found at:
http://www.tandfonline.com/doi/full/10.1080/00031305.2016.1154108

2. Comment in Nature on "statistical significance"

Amrhein V, Greenland S, McShane B (2019) Retire statistical significance. Nature 567:305-307. URL:
https://www.nature.com/magazine-assets/d41586-019-00857-9/d41586-019-00857-9.pdf

3. Article giving advice on number of decimal places to use

Cole TJ (2015) Too many digits: the presentation of numerical data. Archives of Diseases of Childhood. URL: http://adc.bmj.com/content/early/2015/04/15/archdischild-2014-307149.short

4. Article on presenting model results in tables

Westreich D & Greenland S (2013) The Table 2 Fallacy: Presenting and Interpreting Confounder and Modifier Coefficients. American Journal of Epidemiology, 177: 292-298. URL:
https://academic.oup.com/aje/article-lookup/doi/10.1093/aje/kws412

5. References on case-control studies

Rodrigues L, Kirkwood BR (1990) Case-control designs in the study of common diseases: updates on the demise of the rare disease assumption and the choice of sampling scheme for controls. International Journal of Epidemiology, 19:205-213. doi: 10.1093/ije/19.1.205

Pearce NE (1993) What does the odds ratio estimate in a case-control study? International Journal of Epidemiology, 22:1189-1192. DOI: 10.1093/ije/22.6.1189

Vandenbroucke JP, Pearce N (2012) Incidence rates in dynamic populations. International Journal of Epidemiology, 41: 1472-1479. doi: 10.1093/ije/dys142

Vandenbroucke JP, Pearce N (2012) Case-control studies: basic concepts. International Journal of Epidemiology, 41: 1480-1489. doi: 10.1093/ije/dys147

8. Teaching for Disabilities and Learning Differences

For all lectures, students are provided with access to lecture notes and copies of the slides used during the lecture prior to the lecture (in pdf format). All lectures are recorded and made available on Moodle as quickly as possible. For all practical sessions students are provided with a set of solutions for the practical. In addition, supplementary materials on Stata are made available via Moodle for those with limited prior experience of using Stata.