MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2022-23
Module Code	2475
Module Title	Robust Statistical Methods
Module Organiser(s)	Dr Matthew Smith and Dr Clémence Leyrat
Faculty	Epidemiology & Population Health
FHEQ Level	Level 7
Credit Value	**CATS:** 5 **ECTS:** 2.5
HECoS Code	101031
Term of Delivery	Term 1
Mode of Delivery	For 2022-23 this module will be delivered by predominantly face-to-face teaching modes. Where specific teaching methods (lectures, seminars, discussion groups) are noted in this module specification these will be delivered by predominantly face-to-face sessions. There will be 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	Knowledge of basic statistics and statistical programming using R (as taught on Foundations of Medical Statistics) will be assumed. Students should be familiar with the notions of a p-value, confidence interval, t-test, Pearson's correlation coefficient and – by the final lecture of the module – linear regression.
Accreditation by Professional Statutory and Regulatory Body	None
Module Cap (indicative number of students)	25-35 (numbers may be capped due to limitations in staffing)
Target Audience	This module is compulsory for the MSc Medical Statistics.
Module Description	This module introduces a set of statistical methods robust to the violation of some hypotheses required for standard

	statistical techniques (such as t-test, linear regression, etc.). The module comprises 5 sessions, consisting of a recorded lecture, a live Q&A session (online) - and a computer practical using R (on campus or online).
Duration	5 weeks at 0.5 days per week
Timetabling slot	Second half of Term 1
Last Revised (e.g. year changes approved)	August 2022

Programme(s) This module is linked to the following programme(s)	**Status**
MSc Medical Statistics	Compulsory

Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • introduce the basic principles of robust statistical methods.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Understand, describe, and decide when it is, and when it is not, appropriate to use robust methods 2. Understand and describe the strengths and limitations of a range of robust methods 3. Apply these techniques appropriately in several simple settings

Indicative Syllabus

Session Content
The module is expected to cover the following topics: • A revision of standard statistical procedures and the assumptions underlying them • Non-parametric and rank-based procedures (including the sign test, the Wilcoxon signed-rank test, the Wilcoxon rank-sum test/Mann-Whitney U test, and the Spearman rank correlation coefficient) • Randomisation and permutation procedures • The non-parametric bootstrap • Sandwich-style estimators of standard errors

Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Contact time	13	26
Directed self-study	10	20
Self-directed learning	7	14
Assessment, review and revision	20	40
Total	**50**	**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 practical classes and Q&A session, as well as where tutors are available for one-to-one discussions and interaction by email.

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

Teaching and Learning Strategy
Learning will be based on a lecture followed by a relevant practical with all practicals involving the use of computers. An assessment will be given as part of the practical work. A little over half the contact time will be spent in the form of practicals.

Assessment

Assessment Strategy
The assessment for this module has been designed to measure student learning against the module intended learning outcomes (ILOs) as listed above. The grade for summative assessment(s) only will go towards the overall award GPA. The assessment for this module in term 1 will be online.

Summative Assessment

Assessment Type	**Assessment Length (i.e., Word Count, Length of presentation in minutes)**	**Weighting** (%)	**Intended Module Learning Outcomes Tested**
Coursework	One-sided A4 report	See 8a.6.22 in Chapter 8a	1, 2 & 3
Exam (Papers 1 & 2)	1 question in Paper 1	See 8a.6.22 in Chapter 8a	1, 2 & 3

Resitting assessment
Resits will accord with the LSHTM's Resits Policy Resit/deferred/new attempts – Students will take a new Paper 1 written examination. The assignment will be different (but similar in nature) to the original task set. Paper 1 written examinations will take place early/mid-June in the following academic year. Assignments will be assessed during mid/late September of the current academic year.

Resources

Indicative reading list

Altman, D. (1991). Practical Statistics for Medical Research. Chapman and Hall.

Sprent P. and Smeeton N.C. (2007) Applied Nonparametric Statistical Methods. Fourth edition. Chapman & Hall/CRC.

Good, P. (2005). Permutation, Parametric, and Bootstrap Tests of Hypotheses. Third Edition. Springer.

Other resources

Crawlew M. The R Book SecondEdition:
http://www.bio.ic.ac.uk/research/mjcraw/therbook/index.htm

Teaching for Disabilities and Learning Differences

The module-specific site on Moodle provides students 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. 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 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.