



## MODULE SPECIFICATION

<b>Academic Year (student cohort covered by specification)</b>	2020-21
<b>Module Code</b>	2475
<b>Module Title</b>	Robust Statistical Methods
<b>Module Organiser(s)</b>	Dr Clémence Leyrat
<b>Faculty</b>	Epidemiology & Population Health
<b>FHEQ Level</b>	Level 7
<b>Credit Value</b>	<b>CATS:</b> 5 <b>ECTS:</b> 2.5
<b>HECoS Code</b>	101031
<b>Term of Delivery</b>	Term 1
<b>Mode of Delivery</b>	For 2020-21 this module will be delivered online only.  Where specific teaching methods (lectures, seminars, discussion groups) are noted in this module specification these will be delivered using an online platform. There will be a combination of live and interactive activities (synchronous learning) as well as recorded or self-directed study (asynchronous learning).
<b>Mode of Study</b>	Full-time
<b>Language of Study</b>	English
<b>Pre-Requisites</b>	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.
<b>Accreditation by Professional Statutory and Regulatory Body</b>	None
<b>Module Cap (Maximum number of students)</b>	25-35 (numbers may be capped due to limitations in staffing)
<b>Target Audience</b>	This module is compulsory for the MSc Medical Statistics.
<b>Module Description</b>	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 Q&A session and a computer practical using R.
<b>Duration</b>	5 weeks at 0.5 days per week
<b>Timetabling slot</b>	Second half of Term 1
<b>Last Revised (e.g. year changes approved)</b>	2019

<b>Programme(s)</b>	<b>Status</b>
This module is linked to the following programme(s)	
MSc Medical Statistics	Compulsory

## Module Aim and Intended Learning Outcomes

<b>Overall aim of the module</b>
The overall module aim is to: <ul style="list-style-type: none"> <li>introduce the basic principles of robust statistical methods.</li> </ul>

<b>Module Intended Learning Outcomes</b>
Upon successful completion of the module a student will be able to: <ol style="list-style-type: none"> <li>Understand, describe and decide when it is, and when it is not, appropriate to use robust methods</li> <li>Understand and describe the strengths and limitations of a range of robust methods</li> <li>Apply these techniques appropriately in a number of simple settings</li> </ol>

## Indicative Syllabus

<b>Session Content</b>
The module is expected to cover the following topics: <ul style="list-style-type: none"> <li>A revision of standard statistical procedures and the assumptions underlying them</li> <li>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)</li> <li>Randomisation and permutation procedures</li> <li>The non-parametric bootstrap</li> <li>Sandwich-style estimators of standard errors</li> </ul>



## 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
<b>Total</b>	<b>50</b>	<b>100</b>

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. 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 asynchronous (using 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 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; the summer exams will also 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 <a href="#">Chapter 8a</a>	1, 2 & 3
Exam (Papers 1 & 2)	1 question in Paper 1	See 8a.6.22 in <a href="#">Chapter 8a</a>	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.

Sprenst 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

Crawley M. The R Book Second Edition:

<http://www.bio.ic.ac.uk/research/mjcrow/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](#).