1. **Title of the module**

MAST6028 (MA6528) - Principles of Data Collection

MAST8840 (MA884) - Principles of Data Collection

1. **School or partner institution which will be responsible for management of the module**

School of Mathematics, Statistics and Actuarial Science

1. **The level of the module (e.g. Level 4, Level 5, Level 6 or Level 7)**

MAST6028: Level 6; MAST7028: Level 7

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn

1. **Prerequisite and co-requisite modules**

**Level 6**:

Pre-requisite: MAST4009 (Probability), MAST4011 (Statistics) and at least one of MAST5007 (Mathematical statistics) and MAST5001 (Applied statistical modelling 1)

Co-requisite: None

**Level 7:**

Pre-requisite: Students are expected to have studied material equivalent to that covered in the modules above.

Co-requisite: None

1. **The course(s) of study to which the module contributes**

For the level 6 module, BSc Mathematics, BSc Mathematics and Statistics, BA Mathematics and Accounting & Finance, MMath Mathematics (including courses with a Year in Industry), BSc Mathematics with a Foundation Year, MMathStat Mathematics and Statistics

For the level 7 module, MSc Statistical Data Science, International MSc in Statistical Data Science, MMath Mathematics (including courses with an Industrial Placement).

1. **The intended subject specific learning outcomes.**

**On successfully completing the level 6 module students will be able to:**

* 1. demonstrate systematic understanding of key aspects of sampling and experimental design;
  2. demonstrate the capability to deploy established approaches accurately to analyse and solve problems using a reasonable level of skill in calculation and manipulation of the material in the following areas: sampling, questionnaire design, analysis of variance, clinical trial design;
  3. apply key aspects of sampling and experimental design in well-defined contexts, showing judgement in the selection and application of tools and techniques;
  4. show judgement in the application of R for the analysis of data from experiments.

**On successfully completing the level 7 module students will be able to:**

* 1. demonstrate systematic understanding of sampling and experimental design;
  2. demonstrate the capability to solve complex problems using a very good level of skill in calculation and manipulation of the material in the following areas: sampling, questionnaire design, analysis of variance, clinical trial design, advanced experimental design;
  3. apply a range of concepts and principles in sampling and experimental design in loosely defined contexts, showing good judgment in the selection and application of tools and techniques;
  4. make effective and well-considered use of R for the analysis of data from experiments.

1. **The intended generic learning outcomes.**

**On successfully completing the level 6 module students will be able to:**

1. manage their own learning and make use of appropriate resources;
2. understand logical arguments, identifying the assumptions made and the conclusions drawn;
3. communicate straightforward arguments and conclusions reasonably accurately and clearly;
4. manage their time and use their organisational skills to plan and implement efficient and effective modes of working;
5. solve problems relating to qualitative and quantitative information;
6. make competent use of information technology skills such as online resources (moodle), internet communication;
7. communicate technical and non-technical material competently;
8. demonstrate an increased level of skill in numeracy and computation;
9. demonstrate the acquisition of the study skills needed for continuing professional development.

**On successfully completing the level 7 module students will be able to:**

1. work competently and independently, be aware of their own strengths and understand when help is needed;
2. demonstrate a high level of capability in developing and evaluating logical arguments;
3. communicate arguments confidently with the effective and accurate conveyance of conclusions;
4. manage their time and use their organisational skills to plan and implement efficient and effective modes of working;
5. solve problems relating to qualitative and quantitative information;
6. make effective use of information technology skills such as R, online resources (moodle), internet communication;
7. communicate technical and non-technical material effectively;
8. demonstrate an increased level of skill in numeracy and computation;
9. demonstrate the acquisition of the study skills needed for continuing professional development.
10. **A synopsis of the curriculum**

Sampling: Simple random sampling. Sampling for proportions and percentages. Estimation of sample size. Stratified sampling. Systematic sampling. Ratio and regression estimates. Cluster sampling. Multi-stage sampling and design effect. Questionnaire design. Response bias and non-response.

General principles of experimental design: blocking, randomization, replication. One-way ANOVA. Two-way ANOVA. Orthogonal and non-orthogonal designs. Factorial designs: confounding, fractional replication. Analysis of covariance.

Design of clinical trials: blinding, placebos, eligibility, ethics, data monitoring and interim analysis. Good clinical practice, the statistical analysis plan, the protocol. Equivalence and noninferiority. Sample size. Phase I, II, III and IV trials. Parallel group trials. Multicentre trials.

In addition, level 7 students will study hierarchical designs: fixed and random effects models; split-plot designs; crossover trials; variance components.

1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually)**

Barnett, V. (2002) Sample Survey Principles and Methods. 3rd edition. New York, Wiley.

Cox, D.R. (1992) Planning of Experiments. New York, Wiley.

Cochran, W.G. & Cox, G.M. (1992) Experimental Designs. 2nd edition. New York, Wiley.

Cox. D.R & Reid, N. (2000) The Theory of the Design of Experiments. Boca Raton, Chapman & Hall/CRC

Lawson, J. (2015) Design and Analysis of Experiments with R. Boca Raton, Chapman & Hall/CRC.

Matthews, J. N. S. (2000) An Introduction to Randomized Controlled Clinical Trials. 2nd edition. Boca Raton, Chapman & Hall/CRC.

1. **Learning and Teaching methods**

**Level 6**

Total contact hours: 38

Private study hours: 112

Total study hours: 150

**Level 7**

Total contact hours: 42

Private study hours: 108

Total study hours: 150

1. **Assessment methods**

13. 1 Main assessment methods

**Level 6**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 10%

Examination 2 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

**Level 7**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises (with directed reading), requiring on average between 15 and 20 hours to complete 10%

Examination 2 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

13.2 Reassessment methods

Like-for-like

1. ***Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section 12) and methods of Assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 6 Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 | 9.9 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| Terminal classes | **x** | **x** | **x** | **x** |  | **x** |  |  | **x** | **x** |  | **x** |  |
| Revision classes | **x** | **x** | **x** |  |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Examination | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 7 Module learning outcome** | 8.5 | 8.6 | 8.7 | 8.8 | 9.10 | 9.11 | 9.12 | 9.13 | 9.14 | 9.15 | 9.16 | 9.17 | 9.18 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study and Assessment | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| Terminal classes | **x** | **x** | **x** | **x** |  | **x** |  |  | **x** | **x** |  | **x** |  |
| Revision classes | **x** | **x** | **x** |  |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Examination | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or Centre(s) where module will be delivered:** Canterbury
2. **Internationalisation**

Statistics as a branch of mathematics is an international language with techniques developed and refined by statisticians across the globe. Mastery of the subject-specific learning outcomes, 8.1 to 8.8, will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Mathematics, Statistics and Actuarial Science, which includes many members of staff with international experience of teaching and research collaboration.

In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material.

Examples with an international dimension are included in the module where appropriate.

The support SMSAS provides to its students is also internationally attuned given our international student body.

**DIVISIONAL OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs( Q6&7 cover sheet) |
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