1. **Title of the module**

MAST6012 (MA6512) - Statistical Consultancy and Data Presentation

MAST7012 (MA7512) - Statistical Consultancy and Data Presentation

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 (Level 4, Level 5, Level 6 or Level 7)**

MAST6012 (MA6512) Level 6

MAST7012 (MA7512) 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)**

Spring

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

**Level 6**

Pre-requisite: MAST4009 (Probability), MAST4011 (Statistics), MAST5001 (Applied Statistical Modelling 1)

Co-requisite: None

**Level 7:**

Pre-requisite: None

Co-requisite: MAST7291 (Probability and Statistics for Data Science), MAST8820 (Advanced Statistical Data Modelling)

1. **The courses of study to which the module contributes**

**Level 6:**

BSc Mathematics, BSc Mathematics and Statistics, BSc Financial Mathematics (including courses with a Year in Industry), BSc Mathematics with a Foundation Year, MMath Mathematics

**Level 7:**

MSc in Statistical Data Science, also with an Industrial Placement

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**

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

1. demonstrate systematic understanding of and a reasonable level of skill in the professional skills required by a practising statistician, including ethical considerations;
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: data presentation, hypothesis testing, linear and generalised linear models;
3. apply key aspects of practical data analysis and reporting in well-defined contexts, showing judgement in the selection and application of tools and techniques;
4. show judgement in the selection and application of statistical analysis techniques using a range of statistical software, e.g. R, SPSS and Excel.

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

1. demonstrate deep understanding of and a high level of skill in the professional skills required by a practising statistician, including ethical considerations;
2. demonstrate the capability to deploy established approaches accurately to analyse and solve problems using a high level of skill in calculation and manipulation of the material in the following areas: data presentation, hypothesis testing, linear and generalised linear models;
3. apply key aspects of practical data analysis and reporting in well-defined contexts, showing good judgement in the selection and application of tools and techniques;
4. show good judgement in the selection and application of statistical analysis techniques using a range of statistical software, e.g. R, SPSS and Excel.
5. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

**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 word-processing and spreadsheet use, 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;
	10. give an individual presentation;
	11. work effectively as a member of a team.
	12. understand the ethical implications of practical statistical analyses.

**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 word-processing and spreadsheet use, 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;
	10. give an individual presentation independently and effectively;
	11. work effectively as a member of a team.
	12. understand the ethical implications of practical statistical analyses.
1. **A synopsis of the curriculum**

This is a practical module to develop the skills required by a professional statistician (report writing, consultancy, presentation, wider appreciation of assumptions underlying methods, selection and application of analysis method, researching methods).

Software: R, SPSS and Excel (where appropriate/possible). Report writing in Word. PowerPoint for presentations.

* Presentation of data
* Report writing and presentation skills
* Hypothesis testing: formulating questions, converting to hypotheses, parametric and non-parametric methods and their assumptions, selection of appropriate method, application and reporting. Use of resources to explore and apply additional tests. Parametric and non-parametric tests include, but are not limited to, t-tests, likelihood ratio tests, chi-squared tests, Mann Whitney U-test, Wilcoxon signed rank test, McNemar’s test.
* Linear and Generalised Linear Models: simple linear and multiple regression, ANOVA and ANCOVA, understanding the limitations of linear regression, generalised linear models, selecting the appropriate distribution for the data set, understanding the difference between fixed and random effects, fitting models with random effects, model selection.
* Consultancy skills: group work exercise(s)

In addition, for level 7 students:

* Advanced presentation of data, such as visualisation of data points on a map
* Further extensions to Linear and Generalised Linear Models, such as hierarchical generalised linear models
1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Chatfield, C. (1995). Problem Solving: a Statistician’s Guide. Second edition. London: Chapman & Hall.

Cox, D.R. & Snell, E.J. (1981). [Applied Statistics: Principles and Examples](http://www.amazon.co.uk/dp/0412165600/ref%3Drdr_ext_tmb). London: Chapman & Hall.

Dobson, A.J. & Barnett, A. (2008). An Introduction to Generalized Linear Models. Third edition. London: Chapman & Hall.

Hand, D.J. & Everitt, B.S. (1987). The Statistical Consultant in Action.

Sprent, P. & Smeeton, N.C. (2007). Applied Nonparametric Statistical Methods. Fourth edition. London: Chapman & Hall.

1. **Learning and teaching methods**

Total contact hours: 36

Private study hours: 114

Total study hours: 150

Level 6 and level 7 modules are co-taught via terminal classes and seminars, but with some different material for level 7 in the form of examples and extended techniques.

1. **Assessment methods**
	1. Main assessment methods

Assessment 1a (group task), requiring on average between 4 and 7 hours to complete 5%

Assessment 1b (group task), requiring on average between 4 and 7 hours to complete 5%

Assessment 1c (group task), requiring on average between 4 and 7 hours to complete 5%

Assessment 1d (group participation) 5%

Assessment 2 (individual assessment), requiring on average between 4 and 7 hours to complete 20%

Individual Presentation and questions, 10minutes 10%

Examination (open book computing exam), 3 hours 50%

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 (section12) and methods of assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **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 | 9.10 | 9.11 | 9.12 |
| **Learning/ teaching method** |  |
| Private Study  | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Seminars | **X** | **X** | **X** | **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** |  |  |  |  |
| **Assessment method** |  |
| Examination | **X** | **X** | **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** | **X** | **X** | **X** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 7 Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.13 | 9.14 | 9.15 | 9.16 | 9.17 | 9.18 | 9.19 | 9.20 | 9.21 | 9.22 | 9.23 | 9.24 |
| **Learning/ teaching method** |  |
| Private Study  | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Seminars | **X** | **X** | **X** | **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** |  |  |  |  |
| **Assessment method** |  |
| Examination | **X** | **X** | **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** | **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

1. **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 8.4, 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 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 delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 16/06/2021 | Major | Term 2 22/23 | 1,3,6,7,8,9 | Yes |
|  |  |  |  |  |