1. **Kentvision code and title of the module**

MAST5015 – Data Collection and Analytics

MAST6015 – Data Collection and Analytics

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

Division of Computing, Engineering, Mathematical Sciences (CEMS)

School of Mathematics, Statistics and Actuarial Science

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

MAST5015: Level 5; MAST6015: Level 6

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 or Spring

1. **Prerequisite and co-requisite modules and/or any module restrictions**

**Level 5:**

MAST4009 (Probability), MAST4011 (Statistics), MAST4005 (Linear Mathematics), MAST4006 (Mathematical Methods 1)

Co-requisite: None

**Level 6:**

Pre-requisite for BSc Courses: MAST4009 (Probability), MAST4011 (Statistics), MAST4005 (Linear Mathematics), MAST4006 (Mathematical Methods 1)

Co-requisite for MSc course: Probability and Statistics for Data Science (MAST7291)

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

For the level 5 module, compulsory to the following courses: BSc Data Science (including course with a Year in Industry), BSc Data Science with a Foundation Year

For the level 6 module, optional to the following courses: BSc Mathematics, BSc Mathematics and Statistics, BSc Mathematics and Accounting & Finance, MMath Mathematics (including courses with a Year in Industry), BSc Mathematics with a Foundation Year, MSc Statistical Data Science (including course with an Industrial Placement)

1. **The intended subject specific learning outcomes.  
   On successfully completing the level 5 module students will be able to:**

* 1. demonstrate knowledge and critical understanding of the well-established principles within data collection and analytics;
  2. demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: sampling, questionnaire design, data stream algorithms and network statistics;
  3. apply the concepts and principles in sampling, data stream models and network statistics in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques;
  4. make appropriate use of R and IT technologies in data collection and analytics.

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

* 1. demonstrate systematic understanding of key aspects of data collection and analytics;
  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, stream algorithms and network statistics;
  3. apply key aspects of sampling, data stream models and network statistics in well-defined contexts, showing judgement in the selection and application of tools and techniques;
  4. show judgement in the application of R and IT technologies in data collection and analytics.

1. **The intended generic learning outcomes.  
   On successfully completing the level 5 module students will be able to:**

Demonstrate an increased ability 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 use of R, online resources (Moodle), internet communication;
  7. communicate technical and non-technical material competently.
  8. demonstrate an increased level of skill in numeracy and computation.

**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.
10. **A synopsis of the curriculum**

This module is designed to cover: Ethics and compliance of data science. Impact of international regulations. Appropriate handling of data. Simple random sampling. Sampling for proportions and percentages. Estimation of sample size. Stratified sampling. Systematic sampling. Cluster sampling. Data streams. Finding frequentist items. Estimating the number of distinct elements. Sparse recovery. Weight-based sampling. Real time analytics. Network data: Density, clustering coefficient, centrality and degree distribution.

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

The University is committed to ensuring that core reading materials are in accessible electronic format in line with the Kent Inclusive Practices.

The most up to date reading list for each module can be found on the university's [reading list pages](https://kent.rl.talis.com/index.html).

1. **Learning and teaching methods**

Total contact hours: 40 hours

Private study hours: 110 hours

Total study hours: 150

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

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

Assessment 2 Exercises, requiring on average between 20 and 30 hours to complete 20%

Individual Presentation and Questions: 10 minutes in total 20%

Individual Project: Expected length 4000 words 50%

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 5 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 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Lectures/Exercise classes | **X** | **X** | **X** | **X** |  | **X** | **X** |  | **X** |  | **X** | **X** |
| Computer classes | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Assessment 1 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Assessment 2 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Individual Presentation and Questions | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Individual Project | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 6 Module learning outcome** | 8.5 | 8.6 | 8.7 | 8.8 | 9.9 | 9.10 | 9.11 | 9.12 | 9.13 | 9.14 | 9.15 | 9.16 | 9.17 |
| **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** |  |
| Computer classes | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  | **X** | **X** | **X** | **X** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Assessment 1 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Assessment 2 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Individual Presentation and Questions | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Individual Project | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

1. **Inclusive module design**

The Division 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**

Data science, as a discipline, uses internationally recognised techniques developed and refined by statisticians and computer scientists 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/School of Computing, 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/Computing 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)** |
| 19/11/2021 | Major- New module | AY 2022/23 |  |  |
| 11/04/2022 | Major | Autumn 2022 | 13, 14 |  |