1. **Title of the module**

(MACT7290) Probability and Statistics for Actuarial Science

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)**

Level 7

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

30 credits (15 ECTS)

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

Autumn

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

Prerequisite: material equivalent to that covered in MAST4006 (Mathematical Methods 1) and MAST4007 (Mathematical Methods 2). The Programme Director will check for suitable coverage of relevant material.

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

PDip Actuarial Science, International Masters in Applied Actuarial Science

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

**On successfully completing the module students will:**

8.1 have a systematic knowledge of probability theory and statistical inference

8.2 be able to use mathematical techniques to manipulate joint, marginal and conditional probability distributions, to derive distributions of transformed random variables, to analyse associations between random variables, and study the effects of one or more explanatory variables on the response variables through linear regression modeling

8.3 be able to use a comprehensive range of mathematical techniques to calculate point and interval estimates of parameters and to perform tests of hypotheses

* 1. be able to select and apply the above techniques to critically evaluate complex real world problems and find suitable solutions, including appropriate use of statistical software.
1. **The intended generic learning outcomes.**

**On successfully completing the module students will:**

9.1 have developed their understanding of probability and statistics;

9.2 have critically applied a range of mathematical techniques to solve complex statistical problems

9.3 have developed their ability to critically evaluate and abstract the essentials of problems and to formulate them mathematically

9.4 have developed high-level skills in numeracy and problem solving

9.5 have enhanced their study skills and ability to work with relatively little supervision

1. **A synopsis of the curriculum**

The curriculum covers parts of the professional curriculum of the Institute and Faculty of Actuaries syllabus CS1, and it introduces (and revises for some students) the essentials of probability and classical (frequentist) statistical inference.

**Probability**: review of elementary probability, concept of random variable, discrete and continuous probability distributions, cumulative distribution function, expectation and variance, joint distributions, marginal and conditional distributions, generating functions and transformation of random variables.

**Statistics**: sampling distributions, point estimation, method of moment and maximum likelihood estimation, confidence intervals, hypothesis testing, association between variables and linear regression.

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

MILLER, I. and MILLER, M. (2003) [Recommended]

*John E. Freund’s Mathematical Statistics with Applications*. 7th international edition.

Pearson Education, Prentice Hall, New Jersey.

HOGG, R., CRAIG, A. and McKEAN, J. (2013) [Background]

*Introduction to Mathematical Statistics*. 7th international edition.

Pearson Education, Prentice Hall, New Jersey.

LARSON, H. J. (1982) [Background]

*Introduction to Probability Theory and Statistical Inference*. 3rd edition.

Wiley, New York.

SPIEGEL, M. R, SCHILLER, J. and ALU SRINIVASAN, R. (2013) [Background]

*Schaum’s Outline of Probability and Statistics*. 4th edition.

McGraw-Hill, New York.

1. **Learning and teaching methods**

Total contact hours: 75

Private study hours: 225

Total number of study hours: 300

1. **Assessment methods**

13.1 Main assessment methods

Assessment 1 Written coursework exercises involving the use of mathematical and computational techniques, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Written coursework exercises involving the use of mathematical and computational techniques, requiring on average between 10 and 15 hours to complete 10%

Examination 3 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 (section12) and methods of Assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |
| Private Study and Assessment | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Lectures/Exercise classes | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |
| Examination | **X** | **X** | **X** |  | **X** | **X** | **X** | **X** | **X** |
| Coursework | **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**

This module is based on mathematical principles. Mathematics and statistics are international languages with techniques developed and refined by mathematicians and 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.

**FACULTIES SUPPORT 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) |
|  |  |  |  |  |
|  |  |  |  |  |