

Liverpool John Moores University

Title: PROBABILITY AND RISK
Status: Definitive
Code: **5103STATS** (124200)
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics
Teaching School/Faculty: Computer Science and Mathematics

| Team | Leader |
|------------------|--------|
| Robert Wilkinson | Y |
| Gabriela Czanner | |

Academic Level: FHEQ5
Credit Value: 20
Total Delivered Hours: 57
Total Learning Hours: 200
Private Study: 143

Delivery Options

Course typically offered: Semester 2

| Component | Contact Hours |
|-----------|---------------|
| Lecture | 20 |
| Practical | 15 |
| Tutorial | 20 |

Grading Basis: 40 %

Assessment Details

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|-----------|-------------------|------------------------------|---------------|---------------|
| Portfolio | AS1 | Simulation and risk analysis | 50 | |
| Exam | AS2 | Examination | 50 | 2 |

Aims

To extend the student's knowledge of, and experience in, the use of probability models.

To deepen the student's understanding of important topics in inference.

To introduce the students to the use of simulation models.

To enable the student to familiarise themselves with risk techniques through which

they can assist decision makers in making informed decisions in the face of uncertainty.

Learning Outcomes

After completing the module the student should be able to:

- 1 Compare estimators on the basis of their important properties.
- 2 Calculate sample-sizes on the basis of power considerations.
- 3 Apply simulation - based techniques in more complex situations.
- 4 Identify sources of uncertainty.
- 5 Apply concepts of robustness, flexibility and sensitivity analysis to a number of application areas using statistical software.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

| | | | | |
|----------------------|---|---|---|--|
| coursework portfolio | 5 | 1 | | |
| examination | 2 | 3 | 4 | |

Outline Syllabus

*Review of some aspects of the theory of probability, Bayes' Theorem.
Discrete probability distributions: binomial, Poisson, hypergeometric, geometric.
Continuous probability distributions: normal, exponential, lognormal, X^2 , T and F.
Introductory power and sample size calculations.
The bootstrap.
Inference for linear combinations of normally distributed random variables.
An introduction to the use of ranking methods.
Goodness of fit tests, contingency tables.
Uncertainty in specification of problems, data sources, model, forecasts, objectives.
Robustness, flexibility, sensitivity. Decision making tools. Paper analysis. Decision Trees. Bayesian Analysis. Project Management.*

Learning Activities

Lectures, tutorials, laboratory sessions, directed reading, simulation.

Notes

In this module the basic tools of Risk – Analysis, Management and Assessment, are introduced. In particular, we discuss a number of probability distributions along with certain aspects of statistical inference. Finally, we study simulation techniques and their development on a computer.

