ST121-10 Statistical Laboratory

26/27

Department
Statistics
Level
Undergraduate Level 1
Module leader
Francesca Basini
Credit value
10
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module provides the opportunity for students outside the Department of Statistics to develop their statistical programming and modelling skills.

It will provide background required for other statistics modules offered by the department such as ST240 Linear Statistical Modelling.

Availability. This module is not available to students within the Department of Statistics, who take ST117 instead. This module is available for external students who have the necessary pre-requisite knowledge.

Pre-requisites. ST120 Introduction to Probability.

Module web page

Module aims

To introduce students to the R software package, making use of it for exploratory data analysis and simple simulations. This should deepen and reinforce the understanding of probabilistic notions being learnt in ST120 Introduction to Probability.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to R
Exploratory data analysis: methods of visualisation and summary statistics
Sampling from standard discrete and continuous distributions (Bernoulli, Geometric, Poisson, Gaussian, Gamma)
Generic methods for sampling from univariate distributions
The use of R to illustrate probabilistic notions such as conditioning, convolutions and the law of large numbers
Examples of modelling real data (but without formal statistical inference) and the use of visualisations to assess fit

Learning outcomes

By the end of the module, students should be able to:

- have familiarity with the R software package, making use of it for exploratory data analysis.
- use R to simulate samples from a variety of probability distributions.
- propose appropriate probabilistic models for simple data sets.
- describe, fit and interpret a simple linear regression model.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

- Select and apply appropriate mathematical and/or statistical techniques.
- Create structured and coherent arguments communicating them in written form.
- Communicate subject-specific information effectively and coherently.
- Analyse problems, abstracting their essential information formulating them using appropriate mathematical language to facilitate their solution.
- Select and apply appropriate statistical programming language (for example, R) for exploratory data analysis.

Transferable skills

- Critical thinking: extracting patterns from incomplete data and using them to form evidence-based conclusions.
- Problem solving: use of logical reasoning to build arguments grounded in evidence and with explicit underlying assumptions.

- Self-awareness: monitoring of your own learning and seeking feedback.
- Communication: verbal discussion of ideas in seminars and among peers; written communication in assignments.
- Information literacy: evaluation of data and uncertainty in a model-based way.
- Digital literacy: use of computational tools to understand and visualise data, and to produce reports.
- Professionalism: self-motivation, taking charge of your own learning, and prioritising effectively.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (20%)
Practical classes	4 sessions of 1 hour (4%)
Private study	44 hours (44%)
Assessment	32 hours (32%)
Total	100 hours

Private study description

Weekly revision of lecture slides and materials, wider reading and practice exercises, developing familiarity with R programming language and preparing for examination.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D3

	Weighting	Study time	Eligible for self-certification
Laboratory Report 1	15%	15 hours	No

The first report will emphasise on R coding skills and/or other statistical questions.
The study time noted refers to the amount of time in hours that a well-prepared student who has

	Weighting	Study time	Eligible for self-certification

attended lectures and carried out an appropriate amount of independent study on the material could expect to spend on this assignment. Your Laboratory Report 1 should not exceed 15 pages in length.

Laboratory Report 2	15%	15 hours	No

The second report will emphasise on R as a simulation and visualisation tool and/or other statistical questions.
The study time noted refers to the amount of time in hours that a well-prepared student who has attended lectures and carried out an appropriate amount of independent study on the material could expect to spend on this assignment. Your Laboratory Report 2 should not exceed 15 pages in length.

Centrally-timetabled examination (On-campus)	70%	2 hours	No

You will be required to answer all questions on this examination paper.
The study time noted refers to the length of the exam in hours.

- Students may use a calculator
- Answerbook Pink (12 page)

Assessment group R3

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No

You will be required to answer all questions on this examination paper.

- Answerbook Pink (12 page)
- Students may use a calculator

Feedback on assessment

Assignments are marked and given feedback online within 20 working days of the submission deadline.
Solutions and cohort level feedback will be provided for the examination.

Past exam papers for ST121

Availability

Anti-requisite modules

If you take this module, you cannot also take:

- ST117-15 Introduction to Statistical Modelling

Courses

This module is Optional for:

- UCSA-G4G1 Undergraduate Discrete Mathematics
  - Year 1 of G4G1 Discrete Mathematics
  - Year 1 of G4G1 Discrete Mathematics
- UCSA-G4G3 Undergraduate Discrete Mathematics
  - Year 1 of G4G1 Discrete Mathematics
  - Year 1 of G4G3 Discrete Mathematics
- Year 1 of UCSA-G4G4 Undergraduate Discrete Mathematics (with Intercalated Year)
- Year 1 of UCSA-G4G2 Undergraduate Discrete Mathematics with Intercalated Year
- UMAA-G100 Undergraduate Mathematics (BSc)
  - Year 1 of G100 Mathematics
  - Year 1 of G100 Mathematics
  - Year 1 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 1 of G100 Mathematics
  - Year 1 of G103 Mathematics (MMath)
  - Year 1 of G103 Mathematics (MMath)
- Year 1 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
- Year 1 of UMAA-G1NC Undergraduate Mathematics and Business Studies
- Year 1 of UMAA-G1N2 Undergraduate Mathematics and Business Studies (with Intercalated Year)
- Year 1 of UMAA-GL11 Undergraduate Mathematics and Economics
- Year 1 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)
- UMAA-GV17 Undergraduate Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
- UMAA-GV18 Undergraduate Mathematics and Philosophy with Intercalated Year
  - Year 1 of GV18 Mathematics and Philosophy with Intercalated Year
  - Year 1 of GV18 Mathematics and Philosophy with Intercalated Year
- Year 1 of UMAA-G101 Undergraduate Mathematics with Intercalated Year