

ST121-10 Statistical Laboratory

23/24

Department

Statistics

Level

Undergraduate Level 1

Module leader

Samuel Touchard

Credit value

10

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 2.

This module is not available to students within the Dept of Statistics, who take ST117 instead. This module is available for external students who have taken the necessary prerequisites. This module will be useful for ST231 Statistical Modelling and other modules which use statistical data analysis such as ST340 Programming for Data Science and ST323 Multivariate Statistics.

Pre-requisites for non-Statistics Students: 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.

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:

- Gain 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.
- Gain the ability to propose appropriate probabilistic models for simple data sets.

Indicative reading list

"R for Data Science" by H.Wickham; G.Grolemund 2016

"Hands-On Programming with R" by G.Grolemund 2014

"Statistical methods" by Rudolf J. Freund; William J. Wilson; Donna L. Mohr 2010.

"Problem solving: a statistician's guide" by Christopher Chatfield 2017.

"Introduction to the practice of statistics" David S. Moore; George P. McCabe; Bruce Craig 2012.

"Introductory statistics with R" Peter Dalgaard 2008.

[View reading list on Talis Aspire](#)

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 D1

	Weighting	Study time
Laboratory Report 1	15%	15 hours

The first report will emphasise on R coding skills and/or other statistical questions.

The number of words noted below 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. 500 words is equivalent to one page of text, diagrams, formula or equations; your Laboratory Report 1 should not exceed 15 pages in length.

Laboratory Report 2	15%	15 hours
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Weighting

Study time

The second report will emphasise on R as a simulation and visualisation tool and/or other statistical questions.

The number of words noted below 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. 500 words is equivalent to one page of text, diagrams, formula or equations; your Laboratory Report 2 should not exceed 15 pages in length.

In-person Examination

70%

2 hours

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

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

Assessment group R1

Weighting

Study time

In-person Examination - Resit

100%

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

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

Feedback on assessment

Reports will be marked and returned to students within 20 working days.

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 Option list B for:

- Year 1 of UMAA-G105 Undergraduate Master of 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 UMAA-G101 Undergraduate Mathematics with Intercalated Year

This module is Option list C for:

- 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