ST404-15 Applied Statistical Modelling

23/24

Department
Statistics
Level
Undergraduate Level 4
Module leader
Paul Skerritt
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 2 and is core for students on MMORSE or MMathStat courses (Integrated Masters).
It is not available as an Unusual Option to any other students.

Module aims

To introduce the art of statistical model-building and to give practice in team work, in communication and presentation skills, and in writing a report on a statistical investigation.

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.

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Modelling strategies for multiple regression on real data
Diagnostic analysis for statistical linear models using R
Extensions to the classic linear statistical model

Generalised linear models
Teamwork, leadership & communication
Oral presentation and academic writing skills

Learning outcomes

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

- Be able to build, interpret and evaluate a statistical model for a real data set;
- Have gained experience of working in a team on a statistical investigation;
- Have practised their oral and written presentation skills.

Subject specific skills

Exploratory data analysis, practical data modeling, the use of data transformations. Application of generalized linear models, model criticism: residual and influential analysis, multicollinearity, variable selection and shrinkage methods. Use of statistical software.

Transferable skills

Report writing and presentation skills. Team working. Use of code in programs. Critical thinking and problem solving. Self-reflection . Team management.

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (19%)
Practical classes	6 sessions of 1 hour (4%)
Assessment	120 hours (77%)
Total	156 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

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

Students can register for this module without taking any assessment.

Assessment group A4

	Weighting	Study time
Group statistics modelling portfolio	65%	80 hours

A portfolio of work carried out as a team and individual that builds evidence of professional team work to complete a data analysis task. This evidence includes the following.

1. Professional team reports presenting the analysis and findings of the group from the data analysis tasks set.
2. An approximate 10-minute professional team oral presentation detailing the analysis of main findings. The intended audience is considered professional but without formal statistical training.
3. A professional A1 poster that sets out a description of methodology and inferences suitable for a non-specialist audience.
4. An individual piece of reflective writing on teamwork experiences. This personal account describes, critically discusses, and reflect on individual learning experience.

For the purposes of the portfolio 500 words is equivalent to one page of text, diagrams, formula, or equations. Due to the nature of the work undertaken and the difficulty in assigning a word count to equations, figures, tables, graphics, data output and computer code, the word count is an approximation and an individual group’s count may vary depending on the nature of the analysis undertaken and the group’s approach to the analysis and presentation. Material in appendices will not contribute to the limit. The word limit does not include the poster or presentation, which are specified separately above.

Individual Assignment	35%	40 hours

Using a provided data set, create research questions, carry out analysis and then present, discuss, and evaluate the results of this analysis.

For the purposes of the portfolio 500 words is equivalent to one page of text, diagrams, formula, or equations. Due to the nature of the work undertaken and the difficulty in assigning a word count to equations, figures, tables, graphics, data output and computer code, the word count is an approximation and an individual's count may vary depending on the nature of the analysis undertaken and the individual’s approach to the analysis and presentation. Material in appendices will not contribute to the limit. With these specifications in mind, the total length will be approximately 3500 words.

Assessment group R

	Weighting	Study time
Statistics Modelling Assessment	100%	

	Weighting	Study time

An individual data analysis task using a data set, that includes research question specification, analysis and then presentation, discussion, and evaluation of the results of this analysis. The assessment will include a reflection on team working.

For the purposes of the portfolio 500 words is equivalent to one page of text, diagrams, formula, or equations. Due to the nature of the work undertaken and the difficulty in assigning a word count to equations, figures, tables, graphics, data output and computer code, the word count is an approximation and an individual's count may vary depending on the nature of the analysis undertaken and the individual's approach to the analysis and presentation. Material in appendices will not contribute to the limit. With these specifications in mind, the total length will be approximately 4000 words.

Feedback on assessment

Coursework with deadline in Term 2 will have feedback within 20 working days of deadline. Coursework with deadline in Term 3 will not have feedback returned until after the module mark is reported by the exam board.

Availability

Pre-requisites

To take this module, you must have passed:

- All of
  - ST218-12 Mathematical Statistics Part A
  - ST219-12 Mathematical Statistics Part B
  - ST221-12 Linear Statistical Modelling

Courses

This module is Core for:

- USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
  - Year 3 of G30A Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream)
  - Year 3 of G30B Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream)
  - Year 3 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)
  - Year 3 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)

    - Year 3 of G30D Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
- USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
    - Year 3 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
    - Year 3 of G30F Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream) Int
    - Year 3 of G30G Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream) Int
    - Year 3 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
    - Year 4 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
    - Year 4 of G30F Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream) Int
    - Year 4 of G30G Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream) Int
    - Year 4 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
- Year 3 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
- Year 4 of USTA-G1G4 Undergraduate Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)

This module is Optional for:

- Year 1 of TMAA-G1PE Master of Advanced Study in Mathematical Sciences