

STATS 330 : Statistical Modelling

Science

(15 POINTS)

Course Prescription

Application of the generalised linear model and extensions to fit data arising from a range of sources including multiple regression models, logistic regression models, and log-linear models. The graphical exploration of data.

Course Overview

STATS 330 further develops ideas introduced in STATS 201/208, giving a synthesis and broader understanding of generalised linear models and related methods. Simulation-based procedures, including bootstrapping and cross-validation, are introduced as a means to provide robust inference, to investigate consequences of assumption violations, and to solve goodness-of-fit and model-selection problems. Particular focus is placed on how the modelling procedure varies depending on whether the analysis aims to explain an underlying process or predict future observations. Students will learn to implement all methods taught in R, the widely used, open-source software environment for statistical computing. Emphasis is on practical application, providing students with a versatile statistical toolbox useful for a range of fields in both academia and industry, including almost all subjects in business and economics, along with any experimental or social science. It is also a useful complement to computer science.

Course Requirements

Prerequisite: 15 points from STATS 201, 207, 208, BIOSCI 209

Capabilities Developed in this Course

- Capability 1: Disciplinary Knowledge and Practice
- Capability 2: Critical Thinking
- Capability 3: Solution Seeking
- Capability 4: Communication and Engagement
- Capability 5: Independence and Integrity

Learning Outcomes

By the end of this course, students will be able to:

1. Define the generalised linear model and describe its underlying assumptions (Capability 1)
2. Explain and use a variety of statistical tools and procedures that determine the appropriateness of a fitted statistical model (Capability 1)
3. Summarise an appropriate modelling procedure, outlining how this is driven by the aims of the analysis (Capability 1)
4. Identify an appropriate candidate model to fit to a particular data set that is capable of answering the questions of interest (Capability 3)
5. Evaluate the appropriateness of a fitted statistical model, and take sensible steps to improve a model that is found to be inappropriate (Capability 2 and 3)
6. Write their own R code to carry out each step of the modelling procedure (Capability 1 and 5)
7. Communicate the findings of an analysis accurately and concisely (Capability 4)

Assessments

Assessment Type	Percentage	Classification
Assignments	20%	Individual Coursework
Final Exam	50%	Individual Examination
Quizzes	10%	Individual Coursework
Test	20%	Individual Coursework
4 types	100%	

Assessment Type	Learning Outcome Addressed						
	1	2	3	4	5	6	7
Assignments	✓	✓	✓	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓	✓		✓
Quizzes	✓	✓	✓	✓	✓	✓	
Test	✓	✓	✓	✓	✓		✓

Tuākana

We maintain strong links with the maths-stats Tuākana program and encourage students into this program:

<https://www.auckland.ac.nz/en/science/study-with-us/maori-and-pacific-at-the-faculty/tuakana->

programme.html

Key Topics

Generalised Linear Models

Generalised Additive Models

Model Selection

Simulation

Confidence and Prediction intervals

Bootstrapping

Special Requirements

The test may be held in the evening.

Workload Expectations

This course is a standard 15 point course and students are expected to spend 150 hours per semester involved in each 15 point course that they are enrolled in.

Delivery Mode

Campus Experience

Lectures will be available as recordings. Other learning activities including labs will not be available as recordings.

Online (Zoom) office hours can be arranged as required.

Attendance on campus is not required for the test.

Attendance on campus is required for the exam.

The activities for the course are scheduled as a standard weekly timetable.

Learning Resources

Course notes are supplied to students via CANVAS.

Student Feedback

During the course Class Representatives in each class can take feedback to the staff responsible for the course and staff-student consultative committees.

At the end of the course students will be invited to give feedback on the course and teaching through a tool called SET or Qualtrics. The lecturers and course co-ordinators will consider all feedback.

Your feedback helps to improve the course and its delivery for all students.

Digital Resources

Course materials are made available in a learning and collaboration tool called Canvas which also includes reading lists and lecture recordings (where available).

Please remember that the recording of any class on a personal device requires the permission of the instructor.

Online resources include:

- Lecture recordings
- Course notes
- R-workshop resources
- Case studies with code/final reports
- Past exams/tests

Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting their learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the internet. A student's assessed work may be reviewed against online source material using computerised detection mechanisms.

Copyright

The content and delivery of content in this course are protected by copyright. Material belonging to others may have been used in this course and copied by and solely for the educational purposes of the University under license.

You may copy the course content for the purposes of private study or research, but you may not upload onto any third party site, make a further copy or sell, alter or further reproduce or distribute any part of the course content to another person.

Inclusive Learning

All students are asked to discuss any impairment related requirements privately, face to face and/or in written form with the course coordinator, lecturer or tutor.

Student Disability Services also provides support for students with a wide range of impairments, both visible and invisible, to succeed and excel at the University. For more information and contact details, please visit the [Student Disability Services' website](http://disability.auckland.ac.nz) <http://disability.auckland.ac.nz>

Special Circumstances

If your ability to complete assessed coursework is affected by illness or other personal circumstances outside of your control, contact a member of teaching staff as soon as possible before the assessment is due.

If your personal circumstances significantly affect your performance, or preparation, for an exam or eligible written test, refer to the University's [aegrotat or compassionate consideration page](https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html) <https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html>.

This should be done as soon as possible and no later than seven days after the affected test or exam date.

Learning Continuity

In the event of an unexpected disruption we undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions the University has contingency plans to ensure that access to your course continues and your assessment is fair, and not compromised. Some adjustments may need to be made in emergencies. You will be kept fully informed by your course co-ordinator, and if disruption occurs you should refer to the University Website for information about how to proceed.

Level 1: Delivered normally as specified in delivery mode

Level 2: You will not be required to attend in person. All teaching and assessment will have a remote option.

Level 3 / 4: All teaching activities and assessments are delivered remotely

Student Charter and Responsibilities

The Student Charter assumes and acknowledges that students are active participants in the learning process and that they have responsibilities to the institution and the international community of scholars. The University expects that students will act at all times in a way that demonstrates respect for the rights of other students and staff so that the learning environment is both safe and productive. For further information visit [Student Charter](https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html) <https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html>.

Disclaimer

Elements of this outline may be subject to change. The latest information about the course will be available for enrolled students in Canvas.

In this course you may be asked to submit your coursework assessments digitally. The University reserves the right to conduct scheduled tests and examinations for this course online or through the use of computers or other electronic devices. Where tests or examinations are conducted online remote invigilation arrangements may be used. The final decision on the completion mode for a test or examination, and remote invigilation arrangements where applicable, will be advised to students at least 10 days prior to the scheduled date of the assessment, or in the case of an examination when the examination timetable is published.