



# Science

## STATS 101 : Introduction to Statistics (15 POINTS)

### Course Prescription

Intended for anyone who will ever have to collect or make sense of data, either in their career or private life. Steps involved in conducting a statistical investigation are studied with the main emphasis being on data analysis and the background concepts necessary for successfully analysing data, extrapolating from patterns in data to more generally applicable conclusions and communicating results to others. Other topics include probability; confidence intervals, statistical significance, t-tests, and p-values; nonparametric methods; one-way analysis of variance, simple linear regression, correlation, tables of counts and the chi-square test.

### Course Overview

We live in an information age. Computers allow us to collect and store information in quantities that previously would never have been dreamt of. However, data is useless until people can start to make sense of it. If you're interested in looking critically at numerical information without being misled, then Statistics could be the ideal subject for you.

The purpose of this course is to provide students with an introduction to statistical investigation and analysis. This is a core course in all majors/pathways for Statistics. It is also a supporting course for many other subjects (e.g. Psychology, Economics, Finance, Mathematics, Computer Science, Geography, Biology, Sociology,...)

The course covers some material similar to NCEA statistics but at a higher level and more advanced material is also covered. While some Year 13 statistics or mathematics is helpful, we do not assume or require that you have any formal background in statistics or mathematics. If you have a very weak background in mathematics, you may want to consider STATS 100 as an alternate course or as preparation before taking this course.

### Choosing your course.

If you are studying for a BCom, BProp, BPlan or BArch you should enrol in STATS 108.

If you are studying for a BSc, BA or other degrees you should enrol in STATS 101.

If you are eligible, you may be able to take STATS 101 as a General Education course. In which case enrol in STATS 101G. Check the General Education regulations for more details.

### Course Requirements

Restriction: STATS 102, 107, 108, 191

## 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
- Capability 6: Social and Environmental Responsibilities

Graduate Profile: [Bachelor of Science](#)

## Learning Outcomes

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

1. Identify the main components of a statistical investigation. (Capability 1 and 3)
2. Identify the characteristics of well-designed studies, critique strengths and weaknesses of study designs and data collections. (Capability 1, 2, 3, 4, 5 and 6)
3. Use appropriate tools for exploratory data analysis. (Capability 1 and 3)
4. Form and communicate conclusions from basic exploratory analysis. (Capability 1, 2, 4 and 5)
5. Apply basic concepts of proportions. (Capability 1 and 3)
6. Apply the basic concepts of statistical inference and choose appropriate inferential tools. (Capability 1 and 3)
7. Form and communicate the results of statistical analysis output. (Capability 1, 2, 4 and 5)

## Assessments

Assessment Type	Percentage	Classification
Assignments and online quizzes	30%	Individual Coursework
Mid-Semester Online test	20%	Individual Coursework
Final Exam	50%	Individual Examination
3 types	100%	

Assessment Type	Learning Outcome Addressed						
	1	2	3	4	5	6	7
Assignments and online quizzes	✓	✓	✓	✓	✓	✓	✓
Mid-Semester Online test	✓	✓	✓	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓	✓	✓	✓

A minimum of 45% is required in the exam to pass, in addition to a minimum of 50% in overall mark.

Partial plussage applies to the test and exam. If the exam mark is higher than the test, the test counts 10% and

the exam counts 60% instead.

## Tuākana

Statistics has a Tuākana Programme where there is a work space and a social space shared with Science Tuakana students. Tutorials and one-to-one assistance are available.

Contacts are Susan Wingfield ([s.wingfield@auckland.ac.nz](mailto:s.wingfield@auckland.ac.nz)) and

Heti Afimeimounga ([h.afimeimounga@auckland.ac.nz](mailto:h.afimeimounga@auckland.ac.nz)).

More information can be found at:

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

## Key Topics

### 1 – Exploring Data

Exploratory data analysis: sources of data, types of data, data organisation, types of variables, types of plots, types of numerical summaries, feature spotting, describing and comparing variables, graphical techniques with software. Proportional reasoning: estimates, likely outcomes, conditional situations, independence, relative risk, two-way tables of counts, notation, plots.

### 2 – Observational Studies and Experiments

Observational studies, experimentation, experimental design.

### 3 – Randomisation Tests with Experiments

Randomisation tests for medians, means, proportions, differences between medians, differences between means, differences between proportions.

### 4 – Polls and Surveys

Polls and surveys, random sampling.

### 5 – Bootstrap Confidence Intervals

Bootstrap confidence intervals for medians, means, proportions, differences between medians, differences between means, differences between proportions.

### 6 – Confidence Intervals (Normality-based)

Confidence intervals for population means and proportions and differences between means and proportions.

### 7 – Hypothesis Testing

Tests for population means and proportions. Tests for the difference between two means. Large sample comparisons of two proportions.

### 8 – Data on Numeric Variables

Integrated treatment of problems involving batches of data. How do tools for exploring data, confidence intervals, and hypothesis tests work together? One-way analysis of variance. Paired comparisons.

### 9 – Data on Categorical Variables

Chi-square test and graphical methods for two-way tables of counts.

### 10 – Relationships between Numeric Variables: Regression and Correlation

Fitting straight lines by least-squares. Confidence intervals and tests for slope. Prediction intervals. Residual plots.

## Special Requirements

The online test may be held at a time different to the lecture times. This includes the possibility that it may be

held in the evening.

### Workload Expectations

This course is a standard 15 point course and students are expected to spend 25 hours per week involved in each 15 point course that they are enrolled in. (For a 6 week summer school course)

For this course, you can expect a total of 36 hours of lectures, 66 hours of reading and thinking about the content and 48 hours of work on assignments and/or test preparation (including up to 12 hours of optional tutorials).

### Delivery Mode

#### Campus Experience

Lectures will be available as recordings. Other learning activities including tutorials will be available as recordings.

Attendance on campus is not required for the test but is required for the exam.

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

### Learning Resources

All learning resources are available on Canvas.

A Course book containing printed versions of the main lecture notes can be purchased from the Faculty of Science Student Resource Centre.

### 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.

## 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.