



STAT3191

Statistical Inference for Data Science

Session 2, In person-scheduled-weekday, North Ryde 2026

School of Mathematical and Physical Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff

Unit Convenor

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Lecturer

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Credit points

10

Prerequisites

STAT2170 and COMP2200

Corequisites

Co-badged status

STAT6191

Unit description

Statistical inference allows us to draw meaningful conclusions about a population by analysing a representative sample. This unit covers foundational probability concepts, providing the framework for using sample data to make inferences about the broader population. It then explores the theory and application of classical statistical inference techniques to quantify uncertainty and make informed decisions. The unit also introduces the Bayesian approach, which combines prior knowledge with sample data for a more holistic, subjective analysis, especially useful in areas with limited data or significant prior knowledge. The focus is on building a strong conceptual understanding, with practical examples to reinforce theory and highlight real-world relevance.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Industry, Innovation and Infrastructure

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Explain and use Probability Theory relevant to Statistical Inference.

ULO2: Demonstrate knowledge of the fundamental principles of inference.

ULO3: Estimate key population parameters of interest, test hypotheses about them and construct confidence regions.

ULO4: Evaluate and use likelihood-based inference methods.

ULO5: Evaluate and use elementary Bayesian inference methods.

ULO6: Analyse data using computing packages which implement the most common Inference procedures.

General Assessment Information

To pass this unit you must achieve a total mark equal to or greater than 50%.

There are no hurdle assessments for this unit.

We strongly encourage all students to actively participate in all learning activities. Regular engagement is crucial for your success in this unit, as these activities provide opportunities to deepen your understanding of the material, collaborate with peers, and receive valuable feedback from instructors, to assist in completing the unit assessments. Your active participation not only enhances your own learning experience but also contributes to a vibrant and dynamic learning environment for everyone

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is **11:55 pm**. A 1-hour grace period will be provided to students who experience technical concerns. For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for [Special Consideration](#). For example, if the assignment is worth 8 marks (of the entire unit) and your submission is late by 19 hours (or 23 hours 59 minutes 59 seconds), 0.4 marks (5% of 8 marks) will be deducted. If your submission is late by 24 hours (or 47 hours 59 minutes 59 seconds), 0.8 marks (10% of 8 marks) will be deducted, and so on.

Assessments where Late Submissions will be Accepted

- Statistical Inference Problem Set – YES, Late Assessment Submission Penalty applies.
- Project Report – YES, Late Assessment Submission Penalty applies. This assessment is NOT eligible for a Short Extension.
- Final Exam – NO, unless Special Consideration is granted.

Release

- Statistical Inference Problem Set: To be released no later than 28th August.
- Project Report: Specifications to be released no later than 18th September.

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through <http://connect.mq.edu.au/>.

Short Extensions

For some assessment types, students are allowed to request an extra 3 calendar days to complete eligible assessments. No reason or evidence is required.

Assessments where Short Extensions Apply

- Statistical Inference Problem Set – YES
- Project Report – NO
- Final Exam – NO

Final Exam Policy

It is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via <https://connect.mq.edu.au>.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during this supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
<u>Statistical Inference Problem Set</u>	20%	No	11/09/2026	Individual	Yes	Open
<u>Final Exam</u>	50%	No	Exam Period	Individual	No	Observed
<u>Project Report</u>	30%	No	23/10/2026	Group	No	Open

Statistical Inference Problem Set

Assessment Type ¹: Problem-based task

Indicative Time on Task ²: 15 hours

Due: **11/09/2026**

Weighting: **20%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

Students will be given a set of problems to complete on their own as a take-home assessment. In this assessment, students will reinforce and apply the concepts covered in lectures, along with the skills developed in SGTA sessions.

On successful completion you will be able to:

- Explain and use Probability Theory relevant to Statistical Inference.
- Demonstrate knowledge of the fundamental principles of inference.
- Estimate key population parameters of interest, test hypotheses about them and construct confidence regions.

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 25 hours

Due: **Exam Period**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

You will undertake a final examination during the formal examination period.

On successful completion you will be able to:

- Explain and use Probability Theory relevant to Statistical Inference.
- Demonstrate knowledge of the fundamental principles of inference.
- Estimate key population parameters of interest, test hypotheses about them and construct confidence regions.
- Evaluate and use likelihood-based inference methods.
- Evaluate and use elementary Bayesian inference methods.
- Analyse data using computing packages which implement the most common Inference procedures.

Project Report

Assessment Type ¹: Written Submission

Indicative Time on Task ²: 30 hours

Due: **23/10/2026**

Weighting: **30%**

Groupwork/Individual: Group

Short extension ³: No

AI Approach: Open

A written report must be submitted, in which students will demonstrate their practical skills by applying statistical techniques to a simulation-based inference problem.

On successful completion you will be able to:

- Explain and use Probability Theory relevant to Statistical Inference.
- Demonstrate knowledge of the fundamental principles of inference.
- Estimate key population parameters of interest, test hypotheses about them and construct confidence regions.
- Evaluate and use likelihood-based inference methods.
- Evaluate and use elementary Bayesian inference methods.
- Analyse data using computing packages which implement the most common Inference procedures.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- [Academic Success](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

³ An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

Delivery and Resources

Classes

Lectures (beginning in Week 1): A one-hour lecture each week.

SGTA classes (beginning in Week 2): A two-hour SGTA class each week. Students must register for the SGTA class.

Students can use the Class Finder tool in eStudent to see when and where classes are being held via Publish: <https://publish.mq.edu.au/>.

Enrolment can be managed using eStudent at: <https://students.mq.edu.au/support/technology/systems/estudent>.

Computing and Software

R, RStudio, and Quarto are freely available for download and will be used in the SGTA sessions and assessment tasks for this unit.

Recommended References:

- Wasserman, Larry. *All of Statistics: A Concise Course in Statistical Inference*. Springer Texts in Statistics, Springer New York, 2004.
- Casella, George, and Roger L. Berger. *Statistical Inference*. 2nd ed., Duxbury, 2002.

Methods of Communication

We will communicate with you via your university email and through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the unit convenor via the contact email on iLearn.

Unit Schedule

Week 1: Introduction to statistical inference; fundamental concepts of probability; basic set theory.

Week 2: Random variables; discrete and continuous probability distributions; joint, marginal and conditional probabilities; independence.

Week 3: Common probability distributions; expectations and other key moments.

Week 4: Sequences of random variables; modes of convergence.

Week 5: Statistical models and estimation; sampling; properties of estimators; introductory estimation methods.

Week 6: Introduction to likelihood; key likelihood concepts.

Week 7: Maximum likelihood estimation (MLE); computation, properties and inference with MLE.

Week 8: Additional properties of estimators; minimum variance estimators; confidence intervals.

Week 9: Standard hypothesis testing.

Week 10: Likelihood-based hypothesis testing.

Week 11: The Bayesian paradigm; Bayes' theorem; Bayesian inference.

Week 12: Prior Specification; conjugate priors; maximum posteriori estimates; credible intervals.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies](https://students.mq.edu.au/support/study/policies) (<https://students.mq.edu.au/support/study/policies>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a

range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page.

Unit information based on version 2026.02 of the [Handbook](#)