



STAT6114

Design of Experiments and Surveys

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

School of Mathematical and Physical Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor

Jun Han

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Contact via Contact via email.

12WW 634

See iLearn for consultation hours.

Credit points

10

Prerequisites

STAT6170

Corequisites

STAT6180

Co-badged status

STAT2114

Unit description

This unit introduces experimental design and survey design. These are important methods for collecting data. Experimental design looks at the construction of basic designs and the analysis of such designs. Survey design covers different sampling strategies, the design of sample surveys, data collection methods, and the statistical analysis of data collected from surveys. The emphasis is on practical applications using R, with real-world examples.

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: Apply appropriate statistical technique(s) to estimate population parameters based on commonly used sampling methods.

ULO2: Identify potential issues for survey designs and evaluate the ethical relevance and implications in the design of a questionnaire and its questions.

ULO3: Apply basic knowledge to design questionnaires and construct questions.

ULO4: Identify suitable experimental designs to solve a variety of problems.

ULO5: Identify appropriate statistical method(s) and use relevant software for the analysis of data from basic experimental and survey designs.

ULO6: Effectively communication experimental designs and survey procedures, and their results and conclusions to diverse audiences.

ULO7: Perform effectively as an individual and as part of a team, and practice self-reflection.

General Assessment Information

Attendance and participation

We strongly encourage all students to participate actively 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.

Requirements to Pass this Unit

To pass this unit, you must:

- Achieve a total mark equal to or greater than 50%.

Assessment Release

- Group Project: Specifications to be released no later than 14th August.
- Assignment: To be released no later than 9th October.

Hurdle Assessments

There is no Hurdle Assessment in this unit.

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:

- Group Project – YES, Standard Late Penalty applies;
- Assignment – YES, Standard Late Penalty applies;
- Final Examination – NO, unless Special Consideration is granted.

Special Considerations and Short Extensions

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 <https://connect.mq.edu.au>.

Short Extensions

For some assessment types, students are allowed to request an extra 3 calendar days to complete eligible assessments.

Written Assessments/Quizzes/Tests: If you experience circumstances or events that affect your ability to complete the written assessments in this unit on time, please inform the convenor and submit a Special Consideration request through <https://connect.mq.edu.au>.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Group Project	40%	No	18/09/2026	Individual and Group	No	Open
Assignment	20%	No	23/10/2026	Individual	Yes	Open
Final Exam	40%	No	Exam Period	Individual	No	Observed

Group Project

Assessment Type ¹: Portfolio

Indicative Time on Task ²: 30 hours

Due: **18/09/2026**

Weighting: **40%**

Groupwork/Individual: Individual and Group

Short extension ³: No

AI Approach: Open

You will practise a core workplace research workflow by designing and delivering a small-scale survey study and using evidence to inform decisions for real audiences. You will collaborate in a

team to design and run a survey, analyse the resulting dataset, and produce a reproducible report, a non-specialist presentation, and a brief reflection. You will develop skills in survey design, data management and analysis, reproducible communication, teamwork, and audience-focused reporting.

On successful completion you will be able to:

- Apply appropriate statistical technique(s) to estimate population parameters based on commonly used sampling methods.
- Identify potential issues for survey designs and evaluate the ethical relevance and implications in the design of a questionnaire and its questions.
- Apply basic knowledge to design questionnaires and construct questions.
- Identify appropriate statistical method(s) and use relevant software for the analysis of data from basic experimental and survey designs.
- Effectively communicate experimental designs and survey procedures, and their results and conclusions to diverse audiences.
- Perform effectively as an individual and as part of a team, and practice self-reflection.

Assignment

Assessment Type ¹: Problem-based task

Indicative Time on Task ²: 10 hours

Due: **23/10/2026**

Weighting: **20%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

You will strengthen work-ready data analysis capability by applying unit concepts to interpret and communicate evidence in ways expected in disciplinary and professional contexts. You will analyse a dataset using appropriate methods and clearly present your findings in a coherent format. You will develop skills in selecting techniques, evaluating results, and explaining insights with clarity.

On successful completion you will be able to:

- Identify suitable experimental designs to solve a variety of problems.
- Identify appropriate statistical method(s) and use relevant software for the analysis of data from basic experimental and survey designs.

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 10 hours

Due: **Exam Period**

Weighting: **40%**

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:

- Apply appropriate statistical technique(s) to estimate population parameters based on commonly used sampling methods.
- Apply basic knowledge to design questionnaires and construct questions.
- Identify suitable experimental designs to solve a variety of problems.
- Identify appropriate statistical method(s) and use relevant software for the analysis of data from basic experimental and survey designs.

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): pre-recorded lecture videos will be released each week.

Workshops (beginning in Week 1): There is a one-hour workshop each week.

SGTA classes (beginning in Week 2): Students must register for and attend one two-hour class per week.

The timetable for classes can be found on the University website at: <http://publish.mq.edu.au/>

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

Recommended text:

- [Lohr, Sharon L \(2022\). Sampling: Design and Analysis, Third Edition, Boca Raton, FL : CRC Press, for Survey Design.](#)
- [Lawson, J. \(2015\). Design and Analysis of Experiments with R. Chapman and Hall/CRC, for Experiment Design;](#)

These are available from the Co-Op Bookshop and the University library.

Other useful references (available in the library Reserve):

- Saneii, H. and Doosti, H. (2024). [Practical Biostatistics for Medical and Health Sciences.](#) Springer.
- Kuehl, R.O. (2000 or newer). Statistical Principles of Research Design and Analysis, Second edition, Duxbury Press.
- Montgomery DC. (2019). Design and Analysis of Experiments, 10th Edition, Wiley.
- Scheaffer RL, Mendenhall W and Ott RL (1996). Elementary Survey Sampling, 5th (or newer) Edition.
- Cochran WG (1977). Sampling Techniques.
- Moser CA & Kalton G (1971). Survey Methods in Social Investigations.
- Barnett V (1974). Elements of Sampling Theory.

Technology Used and Required

This subject requires the use of the following computer software:

- **R:** R is a free statistical software package. Access and installation instructions may be found at: <https://www.r-project.org/>
- **RStudio:** RStudio is an open-source tool that is used to manage and present work performed using R. Access and installation instructions may be found at <https://rstudio.com/products/rstudio/download/>
- **Quarto:** An open-source scientific and technical publishing system, installed by default with the latest release of RStudio.
- **LaTeX:** LaTeX is a free mathematical typesetting program. Access and installation instructions may be found at: <https://www.latex-project.org/get/>

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

Survey design:

Week	Topic
1	Introduction to surveys: sample survey and its principal steps, probability and non-probability sampling, and sources of error
2	Simple random sampling (SRS); Parameter estimation
3	SRS (contd): estimation of proportion; Stratified random sampling
4	Stratified random sampling (contd); Choosing strata sample sizes
5	Ratio and regression estimators
6	Cluster sampling; Systematic sampling

Experimental design:

Week	Topic
7	Designed experiments vs observational studies; Completely randomized design (CRD): one-way ANOVA
8	One-way ANOVA (contd)
	Session 2 Break
9	Contrasts (contd); Multiple comparisons;
10	Multiple comparisons (contd); Model checking
11	More on CRD; Randomized block design (RBD)
12	The analysis of covariance

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

The previous 2-hour lecture has been replaced with pre-recorded lecture videos and a 1-hour workshop. The videos introduce the core statistical concepts, and you are expected to review them before class. The workshop will focus on worked examples, problem-solving, and questions to help you apply the material and prepare for the assessments.

To enable students more time to focus on collaborative learning, understanding, and reflecting on the content of our unit, we have revised the assessment structure as follows. There are three assessments: a group project, an assignment, and a final exam. Although no marks are associated with attendance, all activities provide you with key content designed to help you understand the content and complete the assessments.

