



STAT1371

Statistical Data Analysis

Session 1, In person-scheduled-weekday, North Ryde 2023

School of Mathematical and Physical Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	4
<u>Delivery and Resources</u>	5
<u>Unit Schedule</u>	7
<u>Policies and Procedures</u>	7

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Unit Convenor/Lecturer

Houying Zhu

houying.zhu@mq.edu.au

Unit Convenor/Lecturer

Samuel Muller

samuel.muller@mq.edu.au

Credit points

10

Prerequisites

(HSC Mathematics Extension 1 or Extension 2) or (10cp from MATH1000 or MATH1010-MATH1025 or MATH130-MATH136) or admission to BActStud or BActStudBSc or BAppFinBActStud or BActStudBProfPrac or BActStudProfPrac(Hons) or BMathSc

Corequisites

Co-badged status

Unit description

This unit is intended for students with a high level of proficiency in mathematics. The unit provides an introduction to modern statistical principles and practice with special emphasis on data analytical techniques. The aim of the unit is to promote an understanding of the principles involved in statistical analysis of simple data sets using elementary techniques. Data analysis will be carried out using an appropriate statistical package. The unit includes topics such as numeric and visual summaries of sample data; data quality; basic probability and random variables, including the binomial, Poisson, negative binomial, hypergeometric, uniform and normal distributions. Sampling distributions and their important properties are used to investigate estimates and their accuracy. Statistical inference techniques are considered such as tests of means, proportions, categorical data as well as regression and correlation.

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 the difference between populations and samples, and apply appropriate statistical techniques to analyse different types of variables

ULO2: Understand and apply basic probability concepts to both discrete and continuous variables for solving problems

ULO3: evaluate application of the scientific method through estimation and statistical inference for means, proportions, categorical data and linear regression

ULO4: Demonstrate foundational learning skills including active engagement in their learning process.

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must:

- Attempt all assessments, and
- Achieve a total mark equal to or greater than 50%

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 a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests and exams, students need to submit an application for [Special Consideration](#).

In this unit, late submissions will be accepted as follows:

- Web Quizzes: NO, unless Special Consideration is granted
- Mid-Semester Test: NO, unless Special Consideration is granted
- Final Examination: NO, unless Special Consideration is granted

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 ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Mid-Semester Test</u>	20%	No	Week 7
<u>Final Exam</u>	50%	No	Formal Examination Period
<u>Web Quizzes</u>	30%	No	Weekly

Mid-Semester Test

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 1 hours

Due: **Week 7**

Weighting: **20%**

Mid-Semester Test

On successful completion you will be able to:

- explain the difference between populations and samples, and apply appropriate statistical techniques to analyse different types of variables
- Understand and apply basic probability concepts to both discrete and continuous variables for solving problems

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 3 hours

Due: **Formal Examination Period**

Weighting: **50%**

An invigilated examination held during the University's formal examination period.

On successful completion you will be able to:

- explain the difference between populations and samples, and apply appropriate statistical techniques to analyse different types of variables
- Understand and apply basic probability concepts to both discrete and continuous variables for solving problems
- evaluate application of the scientific method through estimation and statistical inference for means, proportions, categorical data and linear regression
- Demonstrate foundational learning skills including active engagement in their learning process.

Web Quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 11 hours

Due: **Weekly**

Weighting: **30%**

There are eleven quizzes, due at approximately weekly intervals.

On successful completion you will be able to:

- explain the difference between populations and samples, and apply appropriate statistical techniques to analyse different types of variables
- Understand and apply basic probability concepts to both discrete and continuous variables for solving problems
- evaluate application of the scientific method through estimation and statistical inference for means, proportions, categorical data and linear regression

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
- the [Writing Centre](#) 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

Delivery and Resources

Classes

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

Small-Group Teaching Activities (SGTAs) (beginning in Week 2): Students must register for the SGTA class.

Practicals (beginning in Week 2): Students must register for the Practical class.

The timetable for classes can be found on the University website at:

<http://www.timetables.mq.edu.au>.

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

Maths Background Quiz

This is a set of questions (pdf format) to allow students to assess whether they have sufficient mathematics in their background for STAT1371. Students are to attempt the quiz in their own time and mark it using the supplied solutions. Only students intending to do an Actuarial Studies degree have STAT1371 as a core unit. For all other students, you should do one of FOSE1015, STAT1170 or STAT1250 based on your degree requirement.

Calculators

Each student will need a small calculator, preferably one that does simple statistical calculations (it should have at least mean and standard deviation capability). You should bring it to all SGTA classes. A calculator will also be needed for the mid-session tests and the final examination. You will **not** be permitted to use a programmable calculator or one with a full alpha character set in any examination.

Recommended Textbooks:

- Diez, D.M., Barr, C.D. & Çetinkaya-Rundel, M. (2012). *OpenIntro Statistics*. Open Textbook Library (Corporate Author) (ed.). [Online]. OpenIntro. Available at <https://www.openintro.org/book/os/>.
- Hadley Wickham (2017). *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*. First Edition. Hadley Wickham & Garrett Grolemund.
- Mendenhall, W. Beaver, R.J. and Beaver, B.M. (2019). *Introduction to Probability and Statistics*. Metric Edition. Cengage Learning Custom P.
- Richard J. Larsen and Morris L. Marx (2021). *Introduction to Mathematical Statistics and Its Applications*. 6th edition. Published by Pearson.

Computing and Software

R and RStudio: These are freely available to download from the web, and they will be used for data analysis in this unit. See Topic 1 for more information, and software R will be used in the mid-semester test.

Methods of Communication

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors should be placed on the iLearn discussion forums.

COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>. Remember to check this page regularly in case the information and requirements change during the semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

1.	Sample Descriptives Visual and numerical summaries for both categorical and measured variables.
2.	Probability Basic probability concepts and applications: events, sets, joint probability, conditional probability, independence and Bayes' Theorem.
3.	Discrete random variables Evaluation of general expectation and variance. Properties of sums of random variables. Specific distributions covered such as Bernoulli, Binomial, Poisson, Geometric and Negative Binomial.
4.	Continuous random variables Evaluation of general expectation and variance (using calculus). Specific distributions covered: uniform, polynomial-based probability distributions and the normal distribution.
5.	Sampling distributions Distributions of sample statistics, mean and variance of linear transforms of a random variable, and the Central Limit Theorem.
6.	Introduction to inference The scientific method, with particular application to hypothesis testing for a single population mean, one-sample z test, Type I and Type II errors and confidence interval.
7.	Inference for one population mean Application of the one-sample t-test and confidence interval. Investigating normality, particularly normal score plots.
8.	Inference for two population means The two-sample t-test (and evaluate confidence intervals) for the difference in two population means. Basics of experimental design, with particular application to the paired t-test.
9.	Correlation and Regression Correlation for two measured variables. Simple linear regression, including estimation and inference for the coefficients, the mean function and prediction intervals, and assumption diagnostics.
10.	Categorical Data Analysis Large-sample inference procedures regarding proportions. Hypothesis testing, confidence intervals and inference for categorical data.

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 ask.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/>

The Writing Centre

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

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [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 [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

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.