FOSE1015
Statistical Concepts for Science
Session 1, In person-scheduled-weekday, North Ryde 2024
Science and Engineering Faculty level units

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## General Information

<table>
<thead>
<tr>
<th>Unit convenor and teaching staff</th>
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<tbody>
<tr>
<td>Unit Convenor</td>
</tr>
</tbody>
</table>
| Karol Binkowski                  | karol.binkowski@mq.edu.au  
| Unit Convenor                   |  
| Jun Ma                           | jun.ma@mq.edu.au  

<table>
<thead>
<tr>
<th>Credit points</th>
<th>10</th>
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<table>
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<tr>
<th>Prerequisites</th>
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<tr>
<th>Corequisites</th>
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<tr>
<th>Co-badged status</th>
<th>STAT1170, STAT6170, FOSX1015</th>
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### Unit description

This unit provides a broad introduction to statistical concepts and data analysis techniques. You will develop an understanding of statistical practice through a study of those techniques most commonly used in the sciences, social sciences and humanities. Topics covered in this unit include data collection methods, data quality, data summarisation, and statistical models such as the normal distribution, followed by sampling distributions and statistical inferences about means and proportions. Also studied are methods of analysis relating to comparisons, counted data and relationships, including regression and correlation. Statistical computer packages are used for handling and analysing data. However, no prior computing knowledge is assumed. This unit introduces vital skills for tertiary learning and explores their relationship to success in future careers.

## 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](https://www.mq.edu.au/study/calendar-of-dates)

## Learning Outcomes

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

- **ULO1**: Organise and summarise data graphically and numerically.
- **ULO2**: Analyse and solve problems about distributions and sampling distributions.
ULO3: Evaluate and apply statistical strategies to answer a research question.
ULO4: Draw conclusions from the results of a statistical analysis.
ULO5: Evaluate the appropriateness of statistical methodologies when analysing a
variety of problems arising from other fields of research.
ULO6: Demonstrate foundational employability and self-directed learning skills, including
recording academic achievements to link university study to future careers.

General Assessment Information

The "Indicative Time on Task" for each task is automatically generated and potentially confusing.
The times given for the tests (2 hours each) are just estimates; for each student, this will depend
on how many times the test is attempted. The times allocated to activity participation (each 0
hours) should be ignored.

REQUIREMENTS TO PASS THIS UNIT

To pass this unit you must:

• For each Module Basic Test, achieve a total mark equal to or greater than 50/60, and
• Participate in, and undertake all the Practice-based activities for a minimum of 10 of the
  12 weekly SGTAs
• Participate in, and undertake all the Practice-based activities for a minimum of 10 of the
  12 weekly Practicals, and
• Pass the Employability quizzes.

HURDLE ASSESSMENTS

• Assessment 1: Practice-based skills for SGTA classes (0%). Development of knowledge
  and skills requires continual practice. During SGTAs you will practice a range of
  statistical techniques. To pass this hurdle assessment, you must be able to demonstrate
  your progress in developing and communicating knowledge and skills in 9 out of
  11 SGTAs. This is a hurdle assessment meaning that failure to meet this requirement
  may result in a fail grade for the unit. Students are permitted up to two absences:
  additional absences will require an approval from "stat1170.admin@mq.edu.au".
• Assessment 2: Practice-based skills for Practical classes (0%) Development of
  knowledge and skills requires continual practice. During Practicals you will practice a
  range of statistical & computational techniques. To pass this hurdle assessment, you
  must be able to demonstrate your progress in developing and communicating knowledge
  and skills in 10 out of 12 Practicals. This is a hurdle assessment meaning that failure to
  meet this requirement may result in a fail grade for the unit. Students are permitted up to
  two absences: additional absences will require an approval from
"stat1170.admin@mq.edu.au"

- Assessment 3: Module Tests (100%) Low-stake quizzes serve as a formative assessment, providing a regular opportunity to demonstrate understanding and receive feedback for progress. This unit has FIVE module quiz tests, and you must show your mastery in acquiring statistical knowledge by completing and obtaining the required passing mark for each quiz by its due date. These are hurdle assessments meaning that failure to meet this requirement may result in a fail grade for the unit. Please contact stat1170.admin@mq.edu.au if you fail to meet the hurdle requirement.

**LATE ASSESSMENT SUBMISSION PENALTY**

This unit has submitted work so LATE ASSESSMENT POLICY does not apply. For missing Module Quizzes, please see the details of "Assessment 3" give above.

**SPECIAL CONSIDERATION**

The Special Consideration Policy aims to support students who have been impacted by shortterm circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment.

For this unit, a student will apply for a Special Consideration ONLY if this student miss a Module Test for more than 3 days. If a student miss a Module test for less than or equal to 3 days, they should apply for an extension through "stat1170.admin@mq.edu.au".

**EMPLOYABILITY SKILLS**: This unit has been designed so that 20% of student workload is allocated to employability skills. The employability skills modules are not graded, but the modules are hurdle tasks: you must complete the activities as outlined in order to pass this unit. Some activities will be automatically graded, but all will ask you to apply the modules to your work in this unit, general university studies and your personal goals. You will be informed of any due dates, but most modules can be completed in your own time. See your iLearn unit for detailed information on how to complete the skills modules.

**FINAL EXAM POLICY**: There is no final exam for this unit.

### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
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<tbody>
<tr>
<td>Practice Based Skills for practical classes</td>
<td>0%</td>
<td>Yes</td>
<td>Each class</td>
</tr>
<tr>
<td>Practice Based Skills for SGTA classes</td>
<td>0%</td>
<td>Yes</td>
<td>Each class</td>
</tr>
<tr>
<td>Foundation activities</td>
<td>0%</td>
<td>Yes</td>
<td>Weeks 1,2,3,5,7</td>
</tr>
<tr>
<td>Module Tests</td>
<td>100%</td>
<td>Yes</td>
<td>Weeks 4,6,8,10,12</td>
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</table>
Practice Based Skills for practical classes
Assessment Type: Practice-based task
Indicative Time on Task: 0 hours
Due: Each class
Weighting: 0%
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Development of knowledge and skills requires continual practice. During Practicals you will practice a range of statistical & computational techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 Practicals.

On successful completion you will be able to:
• Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Practice Based Skills for SGTA classes
Assessment Type: Practice-based task
Indicative Time on Task: 0 hours
Due: Each class
Weighting: 0%
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Development of knowledge and skills requires continual practice. During SGTAs you will practice a range of statistical techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 SGTAs.

On successful completion you will be able to:
• Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Foundation activities
Assessment Type: Quiz/Test
Indicative Time on Task: 0 hours
Due: Weeks 1,2,3,5,7
Weighting: 0%
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Activities related to foundational employability and self-directed learning skills

On successful completion you will be able to:
  • Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Module Tests
Assessment Type: Quiz/Test
Indicative Time on Task: 10 hours
Due: Weeks 4,6,8,10,12
Weighting: 100%
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This unit consists of modules. At the end of each module there is a Module test, in which the student is required to demonstrate mastery of the material covered in that module.

On successful completion you will be able to:
  • Organise and summarise data graphically and numerically.
  • Analyse and solve problems about distributions and sampling distributions.
  • Evaluate and apply statistical strategies to answer a research question.
  • Draw conclusions from the results of a statistical analysis.
  • Evaluate the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

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.
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

The statistics content will be delivered in classes from Week 1 to Week 11. Specifically, students should work through the following material on a weekly basis:

- A 1-hour SGTA on the topics of the previous lecture – Weeks 1–11. (Week 1 will introduce the employability module.)
- A 1-hour practical on the topics of the previous one or two lectures – Weeks 1–11. (Week 1 will introduce the employability module.)

Some activities will be available in connection to the employability modules, especially near the end of semester. Details will be announced via iLearn.

Communication

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to your lecturers [or stat1170.admin@mq.edu.au] from your university email address.

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 semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Assistance

For help with any matters related to this unit, students should contact the appropriate department staff, by emailing stat1170.admin@mq.edu.au.

Required and Recommended Texts and/or Materials

- A calculator with statistics mode may be useful during lectures.
- Software:
  - The software used in this unit is Excel, the spreadsheet application from Microsoft’s Office suite. For students with Mac or Windows computers, this application can be downloaded from the student portal. This can be accessed from the web page for Student IT services: http://students.mq.edu.au/it_service
Students using other operating systems might find Google Sheets or OpenOffice Calc to be a workable alternative.

Recommended textbook for this unit:


Other recommended reading:

- *Statistics without Tears* by Rowntree (Penguin)
- *Mind on Statistics* by Utts & Heckard (Thomson, 2004)
- *Elementary Statistics* by Johnson & Kuby (Thomson, 2007)
- *The Statistical Sleuth* by Ramsey and Schafer (Duxbury, 2002).

Technology Used and Required

iLearn (a version of Moodle) is used for delivery of course material and can be accessed at: http://ilearn.mq.edu.au.

Prizes

The Don McNeil Prize for Introductory Statistics is named in honour of the foundation Professor of Statistics at Macquarie University. The prize is awarded twice per year to the student with the best overall performance in a first-year statistics unit.

Unit Schedule

In Weeks 1–10, the lectures will introduce the following topics. Each topic will be developed in SGTAs and Practicals in the following week.

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Data, research questions, graphics</th>
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<tbody>
<tr>
<td>Week 2</td>
<td>Numerical data</td>
</tr>
<tr>
<td>Week 3</td>
<td>Introduction to distributions</td>
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<tr>
<td>Week 4</td>
<td>Sampling distributions</td>
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<tr>
<td>Week 5</td>
<td>Hypothesis tests for a population mean</td>
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<tr>
<td>Week 6</td>
<td>Comparing population means</td>
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<tr>
<td>Week 7</td>
<td>Simple linear regression</td>
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</tbody>
</table>
Employability activities and assessment will occur throughout the semester, including Weeks 11–13.

**Policies and Procedures**

Macquarie University policies and procedures are accessible from Policy Central (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). 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) 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.