STAT6170

Introductory Statistics

Session 1, Online-scheduled-weekday 2022

School of Mathematical and Physical Sciences

Contents

General Information

Unit convenor and teaching staff
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Credit points
10

Prerequisites
Admission to MAppStat or GradCertAppStat or GradDipAppStat or GradDipBiotech or MBiotech or MRadiopharmSc or MSc or MDataSc or MLabQAMgt or GradDipLabQAMgt or GradCertLabQAMgt or GradCertMarScMgt or GradDipMarScMgt or MMarScMgt or MEnv or MScInnovationStat or MConBiol or GradDipConBiol or GradCertConBio or MScInnovationEnvSc or MSusDev or GradCertEnv or GradDipEnv

Corequisites

Co-badged status

Unit description
This unit provides a broad introduction to statistical concepts and data analysis techniques, providing basic statistical knowledge. The unit is concerned with the development of an understanding of statistical practice and is illustrated by a study of those techniques most commonly used in the sciences, social sciences and humanities. The aim of statistical practice is to make the scientific research process efficient; for this reason statistics is used in disciplines ranging from accountancy to zoology. Topics covered in this unit include: data collection methods; data quality; data summarisation; and statistical models like the normal distribution, followed by sampling distributions and statistical inferences about means, proportions and quantiles. 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 along with word processing for reporting the results. However, no prior computing knowledge is assumed.

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: 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 the ability to write a report based on a statistical analysis, using modern, specialised statistical software for analysis and presentation of results.

General Assessment Information

HURDLES: All Basic Module Tests are hurdle requirements to pass this unit. Details (pass level and so forth) will be provided via iLearn.

ASSIGNMENT SUBMISSION: Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page. A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

- Assignment submission is via iLearn. You must follow the submission instructions provided on iLearn.
- If there are technical obstructions to your submitting online, please email us to let us know.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due date and time. In the case of a late submission for a non-timed assessment (e.g., an assignment), if special consideration has NOT been granted, a 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given.

For example, an assessment worth 20% is due 5pm on 1st January. Student A submits the assessment at 1pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded

a final mark of 12/20.

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

Module 1 Test

Assessment Type [1]: Quiz/Test Indicative Time on Task [2]: 2 hours Due: **Week 4** Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to summarise a data set numerically and graphically, and to understand and interpret the output of such analyses.

On successful completion you will be able to:

- Organise and summarise data graphically and numerically.
- Evaluate the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

Module 2 test

Assessment Type [1]: Quiz/Test Indicative Time on Task [2]: 2 hours Due: **Week 6** Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to analyse and solve statistical problems leveraging the properties of distributions and sampling distributions.

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 the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

Module 3 test

Assessment Type [1]: Quiz/Test Indicative Time on Task [2]: 2 hours Due: **Week 8** Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about population means.

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.

Module 4 test

Assessment Type [1]: Quiz/Test Indicative Time on Task [2]: 2 hours Due: **Week 10** Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about the linear relationship between two numerical random variables.

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.

Module 5 test

Assessment Type [1]: Quiz/Test Indicative Time on Task [2]: 2 hours Due: **Week 12** Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about the appropriateness of models for a categorical random variable, and the independence of two categorical random variables.

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.

Statistical report

Assessment Type [1]: Quantitative analysis task Indicative Time on Task [2]: 10 hours Due: **Week 13** Weighting: **25%**

This assignment will test your ability to interpret research questions, analyse a data set and write

a statistical report based on the results of the analyses.

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.
- Demonstrate the ability to write a report based on a statistical analysis, using modern, specialised statistical software for analysis and presentation of results.

[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 Learning Skills Unit 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

Assessment Tasks

Name	Weighting	Hurdle	Due
Module 1 Test	15%	Yes	Week 4
Module 2 test	15%	Yes	Week 6
Module 3 test	15%	Yes	Week 8
Module 4 test	15%	Yes	Week 10
Module 5 test	15%	Yes	Week 12
Statistical report	25%	No	Week 13

Module 1 Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 4**
Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to summarise a data set numerically and graphically, and to understand and interpret the output of such analyses.

On successful completion you will be able to:

- Organise and summarise data graphically and numerically.
- Evaluate the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

Module 2 test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 6**
Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to analyse and solve statistical problems leveraging the properties of distributions and sampling distributions.

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 the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

Module 3 test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 8**
Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about population means.

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.

Module 4 test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 10**
Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about the linear relationship between two numerical random variables.

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.

Module 5 test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 12**
Weighting: **15%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This quiz will test the ability of students to answer research questions about the appropriateness of models for a categorical random variable, and the independence of two categorical random variables.

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.

Statistical report

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 10 hours
Due: **Week 13**
Weighting: **25%**

This assignment will test your ability to interpret research questions, analyse a data set and write a statistical report based on the results of the analyses.

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.
- Demonstrate the ability to write a report based on a statistical analysis, using modern, specialised statistical software for analysis and presentation of results.

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[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

Off-shore students must email stat1170.admin@mq.edu.au as soon as possible to discuss study options.

Census dates

Please check https://www.mq.edu.au/study/calendar-of-dates for the last day to withdraw from this unit without financial penalty, and the last date to withdraw from this unit without academic penalty.

Classes

STAT6170 will be delivered remotely, and no classes are scheduled.

Students will be given the opportunity to watch STAT1170-INT lecture recordings on Echo360.

Please note: there are no small group teaching activities (SGTA) or practical classes for STAT6170, but students are expected to work through the material used in STAT1170 classes.

Software

The technical software used in this unit is ***Excel***, ***R*** and ***RStudio***. Students will be given guidance on how to use these products, and be expected to complete the unit's assessments with the indicated software.

Help with STAT6170-Related Administrative Matters

For help with STAT6170-related administrative matters, students should email the convenor.

Required and Recommended Texts and/or Materials

- A calculator with statistics mode may be useful during lectures.
- Excel 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_services/. (Note that, as a Macquarie student, you have free access to Excel.)
- R and RStudio are freely available to everyone. Access and installation instructions may be found at https://www.r-project.org/ for R, and at https://rstudio.com/products/rstudio/download/ for RStudio.

Recommended textbook used in this unit:

- Modern Statistics: An introduction, Don McNeil and Jenny Middledorp (ISBN 9781486007011). This can be purchased in hard copy from, for example, the Coop Bookshop or in e-format (ISBN 9781486022120, access details to be provided in class).

Other recommended reading:

- Introduction to the Practice of Statistics, Moore, D.S. and McCabe, G. P (W.H. Freeman)
- Statistics without Tears by Rowntree (Penguin)
- Mind on Statistics by Utts & Heckard (Thomson, 2004)
- Elementary Statistics by Johnson & Kuby (Thomson, 2007)
- Statistics: The Art & Science of Learning from Data by Agresti & Franklin (Prentice Hall, 2007)
- The Statistical Sleuth by Ramsey and Schafer (Duxbury, 2002)

Technology Used and Required

iLearn, (which is a version of Moodle) is used for delivery of STAT6170 course material and can be accessed at: http://ilearn.mq.edu.au.

Unit Schedule

MODULE	WEEK	LECTURE TOPIC	ASSESSMENT
1	1 2	Introduction to statistics, Graphing data, Numerical summaries	**Online Quiz** [15 marks] • *Due in week 4* • *Topics: modules 1, Excel*
2	3 4	The Normal distribution, Distribution of means and proportions, Confidence intervals	**Online Quiz** [15 marks] • *Due in week 6* • *Topics: modules 1-2, Excel*
3	5 6	One sample hypothesis test for a population mean, Hypothesis tests for comparing population means	**Online Quiz** [15 marks] • *Due in week 8* • *Topics: modules 1-3, Excel*
4	7 8	Simple linear regression	**Online Quiz** [15 marks] • *Due in week 10* • *Topics: modules 1-4, Excel*
5	9 10	Hypothesis tests for a population proportion: z-test and chi-squared goodness-of fit, Chi-squared test of independence	**Online Quiz** [15 marks] • *Due in week 12* • *Topics: modules 1-5, Excel*
	11 12	Statistical report	**Statistical report** [25 marks] • *Due in week 12* • *Topics: weeks 11, 22, modules 1-5, Excel*

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 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.