STAT171
Statistical Data Analysis
S1 Day 2013

Statistics

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### General Information

**Unit convenor and teaching staff**
- Unit Convenor
- Suzanne Curtis
  - suzanne.curtis@mq.edu.au
- Contact via suzanne.curtis@mq.edu.au
- E4A 552
- TBA

**Credit points**
- 3

**Prerequisites**
(HSC Mathematics extension 1 or 3cp from MATH130-MATH136(P)) or admission to BActStud

**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 and the analysis of simple data sets using elementary techniques. Data analysis will be carried out using the statistical package Minitab. The unit includes topics such as basic probability and random variables; data summarisation and display; data quality; and probability models for data including the normal, Poisson, binomial and sampling distributions and their important properties. Statistical inference techniques are considered such as estimates and their accuracy; tests of means; proportions and other characteristics; regression and correlation; and an introduction to the analysis of count data.

### Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at [http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/](http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/)

### Learning Outcomes

1. Summarising and displaying data
2. Probability
3. Discrete random variables
4. Continuous random variables
5. Sampling distributions (including the Central Limit Theorem)
6. Statistical inference (Hypothesis Testing, Error Types, Confidence Intervals)
7. Inference regarding a single population mean and investigating normality
8. Inference regarding two population means
9. Inference regarding proportions (for one and two populations)
10. Regression and correlation
11. Sample size and power
12. Categorical data analysis (goodness of fit tests, independence tests, odds ratios)
13. All Topics

### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Quizzes</td>
<td>10%</td>
<td>see web quiz schedule</td>
</tr>
<tr>
<td>Assignments</td>
<td>15%</td>
<td>see unit schedule</td>
</tr>
<tr>
<td>Test</td>
<td>15%</td>
<td>4th April 2013</td>
</tr>
<tr>
<td>Exam</td>
<td>60%</td>
<td>June 2013</td>
</tr>
</tbody>
</table>

### Web Quizzes

Due: [see web quiz schedule](http://unitguides.mq.edu.au/unit_offerings/22609/unit_guide/print)

Weighting: 10%

There are eleven quizzes, due at approximately weekly intervals. The 10 best marks are used.

This Assessment Task relates to the following Learning Outcomes:

- All Topics

### Assignments

Due: [see unit schedule](http://unitguides.mq.edu.au/unit_offerings/22609/unit_guide/print)

Weighting: 15%

There are five assignments (each worth 3%) due at approximately fortnightly intervals.

This Assessment Task relates to the following Learning Outcomes:

- All Topics
Test
Due: 4th April 2013
Weighting: 15%
This 45 minute test held during the lecture covers Topics 1-4 inclusive. You may take one A4 page (written on one or both sides) of summary notes into the test.

This Assessment Task relates to the following Learning Outcomes:
• All Topics

Exam
Due: June 2013
Weighting: 60%
A formal examination held during the University's examination period. You may take two A4 pages (written on one or both sides) of summary notes into the exam.

This Assessment Task relates to the following Learning Outcomes:
• All Topics

Delivery and Resources

Lectures
There are three lectures per week. Students should bring to each lecture a copy of the pdf file of the lecture slides on which to make notes - these will be made available on iLearn in advance of each topic. Some "pop-ups" will be presented in the lectures which are not available in advance. All lectures will have an audio and visual recording made, accessible by students via the Echo-360 facility in iLearn.

Tutorials
Students are required to attend one tutorial per week as allocated at enrolment. It is strongly recommended that you attend your tutorial each week. You may only attend the tutorial to which you have been assigned. Tutorials in STAT171 will begin in the second week of classes.

Week 2: tutorials will be held in the computer labs (see iLearn for the room numbers). The exercises will be available on iLearn by the end of week 1 of teaching, and should be printed and brought to the tutorial. This tutorial is the only supervised teaching session in the computer labs for STAT171, and will involve using Minitab to analyse some data and Windows software to write a short report.

Weeks 3 – 13 will be held in the tutorial rooms. The tutorial exercises will be available on iLearn by the end of the previous week and will consist of:
* questions which should have been attempted prior to the tutorial - solutions will be discussed;

* questions denoted (**) indicating “difficult”;

* a “discussion” question for consideration during the tutorials (not available in advance);

* selected textbook and other questions which will normally not be discussed during the tutorial, but a fully worked solution will be made available on iLearn at the end of each week.

There is also available an optional set of recommended extra exercises from the previous textbook (“Introduction to Probability and Statistics”, Ed13, by Mendenhall, Beaver and Beaver), which have check answers in the back. These have been selected as useful for test and exam revision or to provide further practice at applying the techniques developed in lectures.

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 tutorials. A calculator will also be needed for the mid-session test 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.

Textbook


It is expected that all students will have access to a copy of the textbook. It is not necessary to bring the textbook to tutorials or lectures.

Other References (Note that many of the older editions of the listed books are also useful references).

Mendenhall, W., Beaver, R. and Beaver, B. ‘Introduction to Probability and Statistics’ (Ed13) (This book was the STAT171 text book for several years prior to 2010.) QA276.M425/2009


Computing and Software

Students will regularly need access to a computer with internet access. Computers are available in C5C rooms 211, 213, 217 and 219 for those students who do not own their own. Please see the above website for further information such as opening hours and conditions of use. The following software will be used in STAT171:

* Minitab (Version 16): Macquarie University has a license agreement with Minitab which allows students to download a version of Minitab for their computer. Information and instructions for downloading are available from the student portal: https://my.mq.edu.au/. Click on “Software Downloads” and select “Minitab”. - NOTE: you will need to download the license file as well as the Minitab software. - For using Minitab on Mac, please see http://www.minitab.com/en-GB/support/answers/answer.aspx?id=754.

* MathXL: This is the software running the web quizzes. An access code is supplied with the text book as a "value package" or can be purchased separately from the University co-op bookshop. Please see the separate information sheet available on iLearn for further information regarding obtaining an access code and registering correctly. MathXL can be accessed from the website http://www.mathxl.com/login.htm. The questions are associated with the text book. They have been selected to reinforce material introduced in lectures and to give students practice. They are set at two levels with identical questions (but randomly generated numeric components are used): (i) Practice (non compulsory) - many attempts are allowed, with interactive help available. (ii) Assessment (part of assessment) - the higher mark of two attempts is used (no interactive help available).

Students should use practice quizzes to become familiar with the questions and confident they understand the concepts prior to completing the assessment quizzes. Please note that at both levels, the quizzes may be saved mid attempt and resumed later (within the available time).

Changes from previous delivery
There have been no changes from previous delivery, apart from an updated edition of the textbook (now edition 12).

## Unit Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Begins</th>
<th>Work Due</th>
<th>Details</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25 Feb</td>
<td>Maths background quiz</td>
<td>mark your own</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4 Mar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11 Mar</td>
<td>Assignment One</td>
<td>Mon 11th March</td>
<td>3%</td>
</tr>
<tr>
<td>4</td>
<td>18 Mar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>25 Mar</td>
<td>Assignment Two</td>
<td>Mon 25th March</td>
<td>3%</td>
</tr>
<tr>
<td>6</td>
<td>1 Apr</td>
<td>Mid-session test</td>
<td>Thurs 4th April lecture</td>
<td>15%</td>
</tr>
<tr>
<td>7</td>
<td>8 Apr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>29 Apr</td>
<td>Assignment Three</td>
<td>Mon 29th April</td>
<td>3%</td>
</tr>
<tr>
<td>9</td>
<td>6 May</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>13 May</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>20 May</td>
<td>Assignment Four</td>
<td>Mon 20th May</td>
<td>3%</td>
</tr>
<tr>
<td>12</td>
<td>27 May</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>3 Jun</td>
<td>Assignment Five</td>
<td>Mon 3rd June</td>
<td>3%</td>
</tr>
</tbody>
</table>

Please refer to information on each assignment regarding submission and return details.

Assignments are to be presented on A4 paper, unless otherwise specified. Some answers may be handwritten (illegible work will not be marked), other questions will need to have word-processed reports submitted. The requirements will be specified on each assignment.

Please note that marks will be deducted for work submitted late. The assignment will not be marked unless it is accompanied by a Faculty of Science assignment cover sheet (available on iLearn) which clearly shows your name, your tutor’s name and your tutorial time and makes a declaration that the work is your own.

## Web Quiz Schedule

<table>
<thead>
<tr>
<th>Topic / Dates open and closed</th>
<th>Practice_open</th>
<th>Assessment_open</th>
<th>Closed_11:59pm</th>
</tr>
</thead>
</table>

http://unitguides.mq.edu.au/unit_offerings/22609/unit_guide/print
<table>
<thead>
<tr>
<th></th>
<th>Course</th>
<th>Dates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Guided Tour</td>
<td>(1) Mon 25 Feb (13) Wed 12 Jun</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Descriptives</td>
<td>(1) Fri 01 Mar (2) Fri 08 Mar</td>
<td>(4) Tue 19 Mar</td>
</tr>
<tr>
<td>2</td>
<td>Probability</td>
<td>(2) Fri 08 Mar (3) Fri 15 Mar</td>
<td>(5) Tue 26 Mar</td>
</tr>
<tr>
<td>3</td>
<td>Discrete random variables</td>
<td>(3) Fri 15 Mar (4) Fri 22 Mar</td>
<td>(6) Tue 02 Apr</td>
</tr>
<tr>
<td>4</td>
<td>Continuous random variables &amp; 5. Sampling distributions</td>
<td>(4) Fri 22 Mar (5) Fri 29 Mar</td>
<td>(7) Tue 09 Apr</td>
</tr>
<tr>
<td>5</td>
<td>Statistical inference</td>
<td>(6) Fri 05 Apr (7) Fri 12 Apr</td>
<td>(9) Tue 07 May</td>
</tr>
<tr>
<td></td>
<td>University Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>One population mean</td>
<td>(7) Fri 12 Apr (8) Fri 03 May</td>
<td>(10) Tue 14 May</td>
</tr>
<tr>
<td>8</td>
<td>Two population means</td>
<td>(8) Fri 03 May (9) Fri 10 May</td>
<td>(11) Tue 21 May</td>
</tr>
<tr>
<td>9</td>
<td>Proportions</td>
<td>(9) Fri 10 May (10) Fri 17 May</td>
<td>(12) Tue 28 May</td>
</tr>
<tr>
<td>10</td>
<td>Regression &amp; correlation</td>
<td>(10) Fri 17 May (11) Fri 24 May</td>
<td>(13) Tue 04 Jun</td>
</tr>
<tr>
<td>11</td>
<td>Sample size and power</td>
<td>(11) Fri 24 May (12) Fri 31 May</td>
<td>(14) Tue 11 Jun</td>
</tr>
<tr>
<td>12</td>
<td>Categorical data analysis</td>
<td>(12) Fri 31 May (12) Wed 05 Jun</td>
<td>(14) Tue 18 Jun</td>
</tr>
</tbody>
</table>

(Universy session week numbers shown in brackets)

**Access** (please also see the separate information sheet on how to register) Students need to register with their individual MathXL code. This is available for purchase from the University co-op bookshop either:

- “value-packed” with the text book (printed text book with web e-text and MathXL access); or
- a stand-alone product (web e-text and MathXL access).

Some free access codes are available to students, but these do not have web access to the e-text, and so should only be requested if absolutely necessary. Please see the lecturer for more information.
Guided Tour: This is highly recommended as MathXL has many features to assist students (including “StatCrunch”, a Minitab like tool).

Practice Quizzes

- may be attempted as many times as you like;
- have built in “Help me solve this” and “Show me an example” features;
- are recommended but not compulsory.

Assessment Quizzes

- may be saved and resumed at any time during the period of availability;
- may only be attempted twice – the higher of the two marks is used in your assessment (if only one attempt is made, that mark is used);
- the best 10 of the 11 assessment quiz marks will be each worth 1% of your overall assessment.

Settings for individual students can only be changed by the lecturer (justification will be required).

Closing dates may be extended as required. Students will be clearly notified of this via iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://www.mq.edu.au/policy/docs/academic_honesty/policy.html


Special Consideration Policy http://www.mq.edu.au/policy/docs/special_consideration/policy.html

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Support

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at: http://students.mq.edu.au/support/

UniWISE provides:

- Online learning resources and academic skills workshops http://www.students.mq.edu.au/support/learning_skills/
- Personal assistance with your learning & study related questions.
Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

**Learning outcome**

- All Topics
Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

**Learning outcome**

- All Topics

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

**Learning outcome**

- All Topics

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

**Learning outcome**

- All Topics

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:
Learning outcome

• All Topics

Socially and Environmentally Active and Responsible
We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

• All Topics

Commitment to Continuous Learning
Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

• All Topics

Engaged and Ethical Local and Global citizens
As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

• All Topics

Capable of Professional and Personal Judgement and Initiative
We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to
handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

**Learning outcome**

- All Topics