STAT170

Introductory Statistics

S2 Day 2017

Dept of Statistics

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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Lecturer
Justin Wishart
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Consultation hours TBA on iLearn

Credit points
3

Prerequisites

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:

organise and summarise data graphically and numerically

use appropriate techniques to analyse data

use Minitab to manipulate and analyse data

draw conclusions from the results of data analysis

write a discussion based on the results of a statistical analysis

apply statistical techniques to problems arising from diverse fields of research

General Assessment Information

Students are advised that it is Macquarie University policy **not** to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, i.e. the final day of the official examination period.

The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances you may apply for Disruption to Studies via ask.mq.edu.au. A supplementary examination will only be granted if the student has been found to have had a significant disruption to studies**.** If a supplementary examination is granted as a result of the disruption to studies process, the examination will be scheduled approximately two weeks after the conclusion of the official examination period.

Note that there is a University policy regarding requests for special consideration for examinations and the granting of supplementary examinations, which can be found at: http://students.mq.edu.au/student_admin/exams/disruption_to_studies/.

Students can submit disruption to studies request(s) through the following link: https://ask.mq.edu.au/

Assessment Tasks

Name	Weighting	Hurdle	Due
Class Participation	0%	Yes	During classes
Class test 1	10%	No	Week 4
Mid-semester exam	25%	Yes	Week 7
Class Test 2	25%	No	Week 12
Final Examination	40%	No	University Examination Period

Class Participation

Due: **During classes**
Weighting: **0%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Warning: this is a hurdle assessment. To pass the unit, students need to participate in lectures, tutorials and practicals.

More specifically, from week 2 to week 13 students must *actively* participate in at least:

- 2/3 of the lectures (face-to-face), and
- 2/3 of the tutorial classes, and
- 2/3 of the practical classes

Participation in these activities will gain no marks, but is a requirement to pass the unit. Active participation is defined below.

Lectures

During lectures, questions relevant to the content will be displayed and students will have the opportunity to "vote" for the right answer. The activity will be based on a specific online polling system to be advised, which students will be able to access using any connected device they own (e.g. smartphones, tables, laptops).

Students are required to bring a connected device to every lecture and tutorial class .

Should students not have access to a connected device during lectures, they should contact the unit convenor before or during the first week of the teaching period.

Tutorial and practical classes

Participation will be assessed by tutors and demonstrators via rosters and observation of students' work during classes. Attendance and reasonable engagement in the class activities in at least 2/3 of the tutorial classes and 2/3 of the practical classes are requirements to pass the unit.

On successful completion you will be able to:

- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

Class test 1

Due: **Week 4**
Weighting: **10%**

The first Class Test will be held in week 4. Students will complete the test during the practical class they are enrolled in. Student will have access to a computer and will use Minitab 17 to answer the questions of the test. The duration of the test will be 40 minutes.

The test will assess:

- all the topics of Module 1 (weeks 1 and 2)
- ability to use Minitab 17 to solve the exercises.

On successful completion you will be able to:

- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis

Mid-semester exam

Due: **Week 7**
Weighting: **25%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Warning: this is a hurdle assessment. To pass the unit, students need to achieve 50% or more in this assessment task.

The mid-semester exam will be held in in week 7. Students must complete the exam in the practical class they are enrolled in. The duration of the exam will be 40 minutes.

The exam will assess:

- all the topics of Modules 1 and 2 (weeks 1-6)

The requirements will be similar to those of the final exam:

- Students will be permitted to take **one A4 sheet (any colour), handwritten on both sides** (using pens and/or pencils) into the examination. A page of formulae and relevant statistical tables will be given to students. Additionally students will be given blank sheets to work the questions. All the sheets must be submitted at the conclusion of the exam.
- A statistics calculator must be brought into the examination.

As the mid-semester exam is an hurdle assessment, if students have made a serious first

attempt, they must be given one more opportunity. ***A serious first attempt in a hurdle assessment is defined as the achievement of a mark of 30% or greater.***

Students will be able to re-sit the exam during the second week of the semester break. This week has been chosen in order to allow failing students to withdraw without academic penalty.

Student that won't be able to sit the exam during the semester break (eg because they are overseas or take part in sport competitions), will be offered to sit the exam in week 8. This option is not optimal and should be avoided, as students failing to pass the mid-semester exam won't be able to withdraw without academic penalties.

On successful completion you will be able to:

- use appropriate techniques to analyse data
- draw conclusions from the results of data analysis

Class Test 2

Due: **Week 12**
Weighting: **25%**

The second Class Test will be held in week 12. Students will complete the test during the practical class they are enrolled in. Student will have access to a computer and will be requested to use Minitab to answer the questions of the test. The duration of the test will be 40 minutes.

The test will assess:

- all the topics of Modules 3 and 4 (weeks 7-10)
- ability to use Minitab to solve the exercises.

On successful completion you will be able to:

- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis

Final Examination

Due: **University Examination Period**
Weighting: **40%**

The Final Examination will be a two hour written exam (plus ten minutes reading time) and will be held during the examination period. A page of formulae and relevant statistical tables will be attached to the final examination. Students will be permitted to take **one A4 sheet (any colour), handwritten on both sides** (using pens and/or pencils) into the final examination. This sheet must be submitted with your final exam paper at the conclusion of the exam. A statistics

calculator may also be taken into the final examination. See additional information posted on iLearn for more details on preparing for the final exam.

The exam will assess:

- all the topics of STAT170, but mainly Modules 3, 4, 5 (weeks 7-13)

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The University Examination timetable will be available in draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations at:http://www.timetables.mq.edu.au/

Important:

If you apply for Disruption to Studies for your final examination, you must make yourself available for the week of Dec 11 – 15, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

On successful completion you will be able to:

- use appropriate techniques to analyse data
- draw conclusions from the results of data analysis
- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

Delivery and Resources

Classes

Students must attend the following:

- 1 x 2 hour lecture - beginning in **Week 1.**
- 1 x 1 hour tutorial on the topics of the previous lecture - beginning in **Week 1.**
- 1 x 1 hour practical on the topics of the previous one or two lectures - beginning in **Week 2.**

Please note

- Practical and tutorial classes are compulsory and solutions will not be provided.

The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au

Students can change their tutorial and practical classes by using eStudent at: https://student1.mq.edu.au/

Administrative Assistance

For help with STAT170 related administrative matters, students should contact the STAT170 admin officer via stat170.admin@mq.edu.au

Required and Recommended Texts and/or Materials

- A calculator with statistics mode is essential and should be brought to all classes.
- Software:
    - For students with PCs, the statistical software package Minitab 17 can be downloaded for free from the student portal. This can be accessed from the web page for Student IT services: http://students.mq.edu.au/it_services/. For students with Mac computers, iLab can be used to access Minitab. Information on using iLab can also be found on the Student IT services web page.

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 STAT170 course material and can be accessed at: http://ilearn.mq.edu.au

Prizes

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

Unit Schedule

PART	MODULE	WEEK	LECTURE TOPIC	IN-CLASS ASSESSMENT

Basics	1	1 2	Introduction to statistics, Graphing data Numerical summaries	**Class Test 1** [10 marks] • *Time: week 4* • *Duration: 40 minutes* • *Place: practical class* • *Topics: module 1 + Minitab* **Mid-semester exam** [25 marks] • *Time: week 7* • *Duration: 40 minutes* • *Place: practical class* • *Topics: modules 1, 2*
	2	3 4 5	The Normal distribution Distribution of means and proportions Confidence intervals	
		6	More on populations and samples. Review of Modules 1, 2	
Tests	3	7 *2 wks break* *8*	One sample hypothesis test for a population mean Hypothesis tests for comparing population means	**Class Test 2** [25 marks] • *Time: week 12* • *Duration: 40 minutes* • *Place: practical class* • *Topics: modules 3, 4 + Minitab*
	4	9 10	Simple linear regression (Part 1) Simple linear regression (Part 2)	
	5	11 12	Hypothesis tests for a population proportion: z-test and chi-squared goodness-of fit Chi-squared test of independence	
		13	Review of STAT170	

Tutorial and practical activities by week:

WEEK	LECTURE	TUTORIAL	PRACTICAL
1	L1	T1: Intro, in class	P1: Intro, do at home
2	L2	T2: on L1, in class	P2: on L1, in class
3	L3	T3: on L2, in class	P3: on L2, in class
4	L4	T4: on L3, in class	P4: on L3, at home + **Class Test 1**
5	L5	T5: on L4, in class	P5, on L4, in class
6	L6	T6: on L5, in class	P6: on L5, in class
7	L7	T7: on L6, in class	P7: **Mid-Semester Exam**
8	L8	T8: on L7, in class	P8: on L7, in class
9	L9	T9: on L8, in class	P9: on L8, in class

10	L10	T10: on L9, in class	P10: on L9, in class
11	L11	T11: on L10, in class	P11: on L10, in class
12	L12	T12: on L11, in class	P12: on L11, at home + **Class Test 2**
13	L13	T13: on L12, in class	P13: on L12, in class

Learning and Teaching Activities

Lectures

Lectures are compulsory and begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format. The lectures are recorded via ‘echo360’, and can be accessed on iLearn (under Echo Recordings).

Tutorials

Tutorials are compulsory and begin in Week 1. Each tutorial, except the first, is based on work from the previous week’s lecture. The aim of tutorials is to practise techniques and to fully understand concepts covered in lectures. Tutorials are designed for students to work together in groups. The emphasis on group work is to explore ideas, devise and ask questions and plan ways to answer them. Since tutorials consist of group activities, solutions will generally not be provided online.

Practicals

Practical classes are compulsory and begin in Week 2. During these sessions students will be introduced to Minitab 17, a dedicated statistical package. Every week throughout the semester students will be required to work through practical material that teaches them how to apply techniques learned during lectures by using Minitab. The weekly practical material is based on work from the previous one or two weeks' lectures. Practical material, and the required Minitab datasets, will be made available via iLearn. Students should be able to easily access the practical material, in electronic or printed format, during their practical session each week.

Staff consultation (office) hours

Members of the Statistics Department have consultation hours each week during which they are available to help students enrolled in Introductory Statistics. The Statistics Department is located in 12 Wally's Walk (E7A). A list of consultation times will be made available both on iLearn and on the Statistics Department website. No appointments are necessary during these hours.

Numeracy Centre

The Numeracy Centre exists to help students who are experiencing difficulties with numeracy-based subjects such as STAT170. Any student who lacks the knowledge of mathematics needed for STAT170 is encouraged to seek the help of the Centre, which is located in C5A 225. The Centre offers a number of services including individual help, supplementary workshops that run each week and an opportunity to meet with other students to discuss problems.

Computing Laboratories

Minitab will be used in practical sessions and for completing assignments. Assignments and quizzes can be completed in the computing labs in E4B. Computing labs now use iLab, so work undertaken must be saved to the iLab desktop and then emailed or saved to a memory stick. Opening hours of computing laboratories during semester: 8am - 10pm Mon-Fri; 9am - 5pm Sat-Sun. For opening hours during semester breaks, see the notice boards outside the computing laboratories. Look for additional information on the whiteboards in the labs. Please note that computing labs may be booked for classes. Check the timetable on the door of the lab to make sure that the room is free.

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://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

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

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, 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.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

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.

Graduate Capabilities

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 outcomes

- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

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 outcomes

- draw conclusions from the results of data analysis
- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Class Participation
- Final Examination

Learning and teaching activities

- Lectures are compulsory and begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format. The lectures are recorded via ‘echo360’, and can be accessed on iLearn (under Echo Recordings).
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- Practical classes are compulsory and begin in Week 2. During these sessions students will be introduced to Minitab 17, a dedicated statistical package. Every week throughout the semester students will be required to work through practical material that teaches them how to apply techniques learned during lectures by using Minitab. The weekly practical material is based on work from the previous one or two weeks' lectures. Practical material, and the required Minitab datasets, will be made available via iLearn. Students should be able to easily access the practical material, in electronic or printed format, during their practical session each week.
- Members of the Statistics Department have consultation hours each week during which they are available to help students enrolled in Introductory Statistics. The Statistics Department is located in 12 Wally's Walk (E7A). A list of consultation times will be made available both on iLearn and on the Statistics Department website. No appointments are necessary during these hours.

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:

Assessment tasks

- Class Participation
- Mid-semester exam

Discipline Specific Knowledge and Skills

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 outcomes

- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Class Participation
- Class test 1
- Mid-semester exam
- Class Test 2
- Final Examination

Learning and teaching activities

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- Minitab will be used in practical sessions and for completing assignments. Assignments and quizzes can be completed in the computing labs in E4B. Computing labs now use iLab, so work undertaken must be saved to the iLab desktop and then emailed or saved to a memory stick. Opening hours of computing laboratories during semester: 8am - 10pm Mon-Fri; 9am - 5pm Sat-Sun. For opening hours during semester breaks, see the notice boards outside the computing laboratories. Look for additional information on the

whiteboards in the labs. Please note that computing labs may be booked for classes. Check the timetable on the door of the lab to make sure that the room is free.

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 outcomes

- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
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- apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Class Participation
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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 outcomes

- use appropriate techniques to analyse data

- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
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necessary during these hours.

- The Numeracy Centre exists to help students who are experiencing difficulties with numeracy-based subjects such as STAT170. Any student who lacks the knowledge of mathematics needed for STAT170 is encouraged to seek the help of the Centre, which is located in C5A 225. The Centre offers a number of services including individual help, supplementary workshops that run each week and an opportunity to meet with other students to discuss problems.
- Minitab will be used in practical sessions and for completing assignments. Assignments and quizzes can be completed in the computing labs in E4B. Computing labs now use iLab, so work undertaken must be saved to the iLab desktop and then emailed or saved to a memory stick. Opening hours of computing laboratories during semester: 8am - 10pm Mon-Fri; 9am - 5pm Sat-Sun. For opening hours during semester breaks, see the notice boards outside the computing laboratories. Look for additional information on the whiteboards in the labs. Please note that computing labs may be booked for classes. Check the timetable on the door of the lab to make sure that the room is free.

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 outcomes

- organise and summarise data graphically and numerically
- write a discussion based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Class Participation
- Mid-semester exam
- Final Examination

Learning and teaching activities

- Lectures are compulsory and begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format.

The lectures are recorded via ‘echo360’, and can be accessed on iLearn (under Echo Recordings).

- Tutorials are compulsory and begin in Week 1. Each tutorial, except the first, is based on work from the previous week’s lecture. The aim of tutorials is to practise techniques and to fully understand concepts covered in lectures. Tutorials are designed for students to work together in groups. The emphasis on group work is to explore ideas, devise and ask questions and plan ways to answer them. Since tutorials consist of group activities, solutions will generally not be provided online.
- Practical classes are compulsory and begin in Week 2. During these sessions students will be introduced to Minitab 17, a dedicated statistical package. Every week throughout the semester students will be required to work through practical material that teaches them how to apply techniques learned during lectures by using Minitab. The weekly practical material is based on work from the previous one or two weeks' lectures. Practical material, and the required Minitab datasets, will be made available via iLearn. Students should be able to easily access the practical material, in electronic or printed format, during their practical session each week.
- Members of the Statistics Department have consultation hours each week during which they are available to help students enrolled in Introductory Statistics. The Statistics Department is located in 12 Wally's Walk (E7A). A list of consultation times will be made available both on iLearn and on the Statistics Department website. No appointments are necessary during these hours.

Changes from Previous Offering

No live stream option will be available in S2 2017.

Changes since First Published

Date	Description
27/07/2017	Have removed the incorrect reference to a live stream.