Quantitative Research Methods provides basic training in the gathering, description and analysis of quantitative information in the social, business, management and financial sciences.

This is a course in basic research methods including discussions of: data gathering issues and techniques; sources of data and potential biases; graphical and numerical data description techniques, sampling behaviour of averages and the Central Limit Theorem; point and interval estimation procedures; concepts in hypothesis testing for comparing two populations, simple and multiple linear regression; p-values and significance levels.

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>On Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>None</td>
</tr>
<tr>
<td>Incompatible Courses</td>
<td>STAT1003 -Statistical Techniques</td>
</tr>
<tr>
<td>Course Convener:</td>
<td>Dr Bronwyn Loong</td>
</tr>
<tr>
<td>Phone:</td>
<td>612 57312</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:bronwyn.loong@anu.edu.au">bronwyn.loong@anu.edu.au</a></td>
</tr>
<tr>
<td>Office hours for student consultation:</td>
<td>Thursday 10am-12noon</td>
</tr>
<tr>
<td>Relevant administrator</td>
<td>Mrs Tracy Skinner</td>
</tr>
<tr>
<td>Phone:</td>
<td>612 50487</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:tracy.skinner@anu.edu.au">tracy.skinner@anu.edu.au</a></td>
</tr>
</tbody>
</table>
| Tutors            | Tim McLennan-Smith (Head Tutor)  
|                   | Lingyu He  
|                   | Lihong Chen  
|                   | Xiaoyang Xu (Zack)  
|                   | Lei Wang  
|                   | Shonal Dutt  
|                   | Dongqing Li |

Communication

The *Head Tutor* will be your first contact after your assigned tutor for grading issues, tutorial issues and questions about the exams.

Please contact the *course convenor* for big issues and concerns including illness, falling behind and academic accessibility issues.

**SEMESTER 1 2017**
COURSE OVERVIEW

Learning Outcomes

Upon successful completion of the requirements for this course, students should have the knowledge and skills to:

LO1: Compare and contrast different sampling methodologies and assess suitability for a range of situations; discuss issues with choice of sampling method; sampling vs nonsampling errors; sample vs census choice

LO2: Discuss different types of variables and produce appropriate graphical and numerical descriptive statistics

LO3: Understand and apply probability rules and concepts relating to discrete and continuous random variables, including univariate and bivariate distributions and some specific probability density functions, concepts of expectation, variance, correlation.

LO4: Understand the importance of the Central Limit Theorem and its uses and applications; judging appropriate conditions for its application; use the CLT to find probabilities associated with a range of values for a sample average; sample size determination

LO5: Consider concepts of estimation - point and interval estimators, unbiasedness and consistency, calculation and interpretation of confidence intervals for a range of situations

LO6: Perform and interpret hypothesis tests for a range of situations, identifying the situation at hand and assessing whether assumptions are met; discuss types of errors, significance, p-values, make appropriate conclusions with regards to decision making

LO7: Perform and interpret simple and multiple linear regressions, assessing suitability of the model for the data type and situation;

LO8: Appreciate the use of technology to perform statistical analysis, including performing simulations and interpretation of statistical software output.
Assessment Summary

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Value</th>
<th>Due Date</th>
<th>Date for Return of Assessment</th>
<th>Linked Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Online quiz A</td>
<td>5%</td>
<td>Week 5</td>
<td>Week 6</td>
<td>LO1, LO2, LO5</td>
</tr>
<tr>
<td>2. Midterm exam</td>
<td>20%</td>
<td>Week 6</td>
<td>Week 7</td>
<td>LO1, LO2, LO5, LO6, LO8</td>
</tr>
<tr>
<td>3. Online quiz B</td>
<td>5%</td>
<td>Week 8</td>
<td>Week 9</td>
<td>LO3</td>
</tr>
<tr>
<td>4. Online quiz C</td>
<td>5%</td>
<td>Week 11</td>
<td>Week 12</td>
<td>LO4, LO5, LO6, LO7</td>
</tr>
<tr>
<td>5. Final examination</td>
<td>65%</td>
<td>TBA</td>
<td></td>
<td>LO1-LO8</td>
</tr>
</tbody>
</table>

Research-Led Teaching

In order to investigate new fields, make sense of new areas and tackle new problems, we need appropriate tools to explore and summarise data, graphically and numerically, deal with the variation it presents and make decisions under uncertainty. This course will use examples from varied areas to introduce statistical tools, methods and ways of thinking to students and prepare them for future courses, work and research projects.

Feedback

Staff Feedback
Students will be given feedback in the following forms in this course:

- To the whole class during lectures.
- Within tutorial groups.
- Individually during consultation hours

Student Feedback
ANU is committed to the demonstration of educational excellence and regularly seeks feedback from students. One of the key formal ways students have to provide feedback is through Student Experience of Learning Support (SELS) surveys. The feedback given in these surveys is anonymous and provides the Colleges, University Education Committee and Academic Board with opportunities to recognise excellent teaching, and opportunities for improvement.

For more information on student surveys at ANU and reports on the feedback provided on ANU courses, go to


Policies

ANU has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and implement them. You can find
the University's education policies and an explanatory glossary at: http://policies.anu.edu.au/

Students are expected to have read the Academic Misconduct Rule before the commencement of their course.

Other key policies include:

- Student Assessment (Coursework)
- Student Surveys and Evaluations

**Required Resources**


**PURCHASE THE E-BOOK ONLY WITHOUT WILEY PLUS**

The course will also use the statistical software program R. It is available free on the campus PCs and can be installed for free on home computers. https://www.r-project.org/

**Additional course costs**

Apart from purchasing the textbook, there is no additional course cost.

**Examination material or equipment**

Permitted materials for the midterm exam are an English language dictionary, a non-programmable calculator, and one A4 sheet of paper with notes on one side only.

Permitted materials for the final exam are an English language dictionary, a non-programmable calculator, and one A4 sheet of paper with notes on both sides.
Recommended Resources

COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Summary of Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Students can access Wattle materials</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Sign up for tutorial, Install R on computers; Chapter 1 - Collecting Data</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chapter 2 - Describing Data, Tutorials begin</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Chapter 2 - Describing Data; Chapter 3 - Confidence Intervals</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Chapter 3 - Confidence Intervals; Chapter 4 - Hypothesis Tests</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chapter 4 - Hypothesis Tests; Chapter 11 - Probability Basics</td>
<td>Online quiz A</td>
</tr>
<tr>
<td>6</td>
<td>Chapter 11 - Probability Basics</td>
<td>Midterm exam</td>
</tr>
<tr>
<td>7</td>
<td>Chapter 5 - Approximating with a distribution</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chapter 6 - Inference for means and proportions</td>
<td>Online quiz B</td>
</tr>
<tr>
<td>9</td>
<td>Chapter 6 - Inference for means and proportions</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Chapter 9 - Inference for regression</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Chapter 10 - Multiple regression</td>
<td>Online quiz C</td>
</tr>
<tr>
<td>12</td>
<td>Chapter 7 - Chi-Square Tests for Categorical Variables</td>
<td>Examination Period</td>
</tr>
</tbody>
</table>

ASSESSMENT REQUIREMENTS

Assessment Tasks 1, 3 and 4 : Quizzes A, B & C

Details of task:
The quizzes are to be attempted online on Wattle. The quizzes are worth 5% each of your overall score in the course. You will have 30 minutes to complete each quiz. Both the quizzes are compulsory. Under no circumstances will you be able to attempt the quiz outside of the allocated time period. Announcements will be made during lectures and on the Wattle course site regarding the availability of the quiz.

The quizzes will consist of ten multiple choice questions. Quiz A will cover LO1, LO2 and LO5 of the course. Quiz B will cover LO3 of the course. Quiz C will cover LO4, LO5, LO6 and LO7 of the course.

Feedback will be provided via Wattle.

Extensions and penalties

No extensions will be granted. This is a compulsory assessment and each quiz is worth 5% of your overall mark for the course.
Examinations

Assessment Task 3 : Midterm examination

The mid-semester exam will be 1.5 hours long and will cover learning objectives LO1, LO2, LO5, LO3, LO6 and LO8 of the course. Specific details regarding examination conditions and the time and location for this examination will be provided once confirmed. Permitted materials for the midterm exam are an English language dictionary, a non-programmable calculator, and one A4 sheet of paper with notes on one side only.

The mid-semester examination is optional and redeemable. No deferred examination will be offered for the mid-semester exam, instead the weighting will be moved to the final exam.

Assessment Task 4 : Final examination

A final examination will be held during the university examination period at the end of semester. The final examination will be 3 hours long and will cover the entire syllabus. Permitted materials for the final exam are an English language dictionary, a non-programmable calculator, and one A4 sheet of paper with notes on both sides. Details of the final examination timetable are available on the ANU Timetabling website (http: //timetable.anu.edu.au/). The onus is upon students to acquire their own scheduling details.

Scaling

Your final mark for the course will be based on the raw marks allocated for each of your assessment items. However, your final mark may not be the same number as produced by that formula, as marks may be scaled. Any scaling applied will preserve the rank order of raw marks (i.e. if your raw mark exceeds that of another student, then your scaled mark will exceed the scaled mark of that student), and may be either up or down.

Privacy Notice

The ANU has made a number of third party, online, databases available for students to use. Use of each online database is conditional on student end users first agreeing to the database licensors terms of service and/or privacy policy. Students should read these carefully.

In some cases student end users will be required to register an account with the database licensor and submit personal information, including their: first name; last name; ANU email address; and other information.

In cases where student end users are asked to submit content to a database, such as an assignment or short answers, the database licensor may only use the students content in accordance with the terms of service including any (copyright) licence the student grants to the database licensor.

Any personal information or content a student submits may be stored by the licensor, potentially offshore, and will be used to process the database service in accordance with the licensors terms of service and/or privacy policy.
If any student chooses not to agree to the database licensors terms of service or privacy policy, the student will not be able to access and use the database. In these circumstances students should contact their lecturer to enquire about alternative arrangements that are available.

**Tutorial Seminar Registration**

Tutorial signup for this course will be done via the Wattle website. Detailed information about signup times will be provided on Wattle or during your first lecture. When tutorials are available for enrolment, follow these steps:

1. Log on to Wattle, and go to the course site
2. Click on the link ‘Tutorial enrolment’
3. On the right of the screen, click on the tab ‘Become Member of . . . ’ for the tutorial class you wish to enter
4. Confirm your choice

If you need to change your enrolment, you will be able to do so by clicking on the tab ‘Leave group . . . ’ and then re-enrol in another group. You will not be able to enrol in groups that have reached their maximum number. Please note that enrolment in ISIS must be finalised for you to have access to Wattle.

**SUPPORT FOR STUDENTS**

The University offers a number of support services for students. Information on these is available online from [http://students.anu.edu.au/studentlife/](http://students.anu.edu.au/studentlife/).