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 including simple linear regression and basic time series; 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>Semester and Year</th>
<th>S1 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course URL</td>
<td><a href="http://wattlecourses.anu.edu.au">http://wattlecourses.anu.edu.au</a></td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td>On campus</td>
</tr>
<tr>
<td>Prerequisites</td>
<td></td>
</tr>
<tr>
<td>Incompatible Courses</td>
<td>STAT1003</td>
</tr>
<tr>
<td>Course Convenor/Lecturer:</td>
<td>Dr Bronwen Whiting</td>
</tr>
<tr>
<td>Phone:</td>
<td>02 6125 3837 (x53837 on campus)</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:bronwen.whiting@anu.edu.au">bronwen.whiting@anu.edu.au</a></td>
</tr>
<tr>
<td>Consultation hours:</td>
<td>10am -12pm on Tuesdays in teaching weeks</td>
</tr>
<tr>
<td>Research Interests</td>
<td>Density estimation, regression modelling</td>
</tr>
<tr>
<td>Student administrator/s</td>
<td>Ms Tracy Skinner</td>
</tr>
<tr>
<td>Phone:</td>
<td>02 6125 0487</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>

**COURSE OVERVIEW**

**Learning Outcomes**

Upon successful completion of the requirements for this course, students should have the knowledge and skills to:
LO1: Discuss different types of variables and produce appropriate graphical and numerical descriptive statistics

LO2: 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 and portfolio construction

LO3: 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

LO4: Consider concepts of estimation – point and interval estimators, unbiasedness and consistency, calculation and interpretation of confidence intervals for a range of situations

LO5: 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

LO6: Perform and interpret simple and multiple linear regressions, assessing suitability of the model for the data type and situation; apply and interpret simple time series models

LO7: 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

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 finance, economics and accounting to introduce statistical tools, methods and ways of thinking to students and prepare them for future courses, work and research projects.

Continuous Improvement
We use feedback from students, professional bodies and staff to make regular improvements to the course. In response to this feedback, design improvements from the previous version of the course include:

- Adjustment to the assessment schedule to include weekly quizzes as well as more assignments, each with smaller weighting
- Introduction of more real data examples, including discussion of articles including those from scholarly journals, mainstream media and electronic media
- Provision of worked solutions to some Minitab tutorial exercises to better guide student use of the software and interpretation of the output.

Technology, Software, Equipment
This course will use software including Minitab and Microsoft Word. All software that is required for the course is freely available on the PCs across campus, including in the PC labs used for tutorial classes. There is no requirement for students to have access to Minitab or other software on personal devices. Be aware that Minitab is NOT free software.

**Student Feedback**

All CBE courses are evaluated using Student Experience of Learning and Teaching (SELT) surveys, administered by Planning and Statistical Services at the ANU. These surveys are offered online, and students will be notified via email to their ANU address when surveys are available in each course. Feedback is used for course development so please take the time to respond thoughtfully. Course feedback is anonymous and provides the Colleges, University Education Committee and Academic Board with opportunities to recognise excellent teaching and to improve courses across the university. For more information on student surveys at ANU and reports on feedback provided on ANU courses, visit [http://unistats.anu.edu.au/surveys/selt/students/](http://unistats.anu.edu.au/surveys/selt/students/) and [http://unistats.anu.edu.au/surveys/selt/results/learning/](http://unistats.anu.edu.au/surveys/selt/results/learning/)

**COURSE SCHEDULE**

Note that the table below gives an indication of the Sections of the course expected to be covered in each week, but that this will change as the semester progresses. Following the completion of each week’s lectures, a notice will be placed on Wattle to outline where the class will begin discussions the following week.

<table>
<thead>
<tr>
<th>Week/Session</th>
<th>Summary of Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 lectures; Section 1</td>
<td>Practice quiz (non-assessable) due 12pm Friday</td>
</tr>
<tr>
<td>2</td>
<td>3 lectures, 1 tutorial; Section 2</td>
<td>Quiz 1 due 12pm Friday</td>
</tr>
<tr>
<td>3</td>
<td>3 lectures, 1 tutorial; Section 2</td>
<td>Quiz 2 due 12pm Friday</td>
</tr>
<tr>
<td>4 (note public holiday 9/3)</td>
<td>2 lectures, 1 tutorial; Section 3</td>
<td>Quiz 3 due 12pm Friday</td>
</tr>
<tr>
<td>5</td>
<td>3 lectures, 1 tutorial; Section 3</td>
<td>Assignment 1 due 11am Friday; Quiz 4 due 12pm Friday</td>
</tr>
<tr>
<td>6</td>
<td>3 lectures, 1 tutorial; Section 4, Section 5</td>
<td>Quiz 5 due 12pm Friday</td>
</tr>
<tr>
<td>7 (note public holiday 3/4)</td>
<td>3 lectures, 1 tutorial; Section 6</td>
<td>Quiz 6 due 12pm Thursday (note Friday public holiday)</td>
</tr>
<tr>
<td>8</td>
<td>3 lectures, 1 tutorial; Section 7</td>
<td>Quiz 7 due 12pm Friday</td>
</tr>
<tr>
<td>9</td>
<td>3 lectures, 1 tutorial; Section 7</td>
<td>Assignment 2 due 11am Friday; Quiz 8 due 12pm Friday</td>
</tr>
<tr>
<td>Week</td>
<td>Schedule</td>
<td>Assessment</td>
</tr>
<tr>
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</tr>
<tr>
<td>10</td>
<td>3 lectures, 1 tutorial; Section 8, Revision</td>
<td>Quiz 9 due 12pm Friday</td>
</tr>
<tr>
<td>11</td>
<td>3 lectures, 1 tutorial; Section 8</td>
<td>Quiz 10 due 12pm Friday</td>
</tr>
<tr>
<td>12</td>
<td>3 lectures, 1 tutorial; Section 9</td>
<td>Assignment 3 due 11am Friday; Quiz 11 due 12pm Friday</td>
</tr>
<tr>
<td>13</td>
<td>3 lectures, 1 tutorial; Section 9, Revision</td>
<td>Quiz 12 due 12pm Friday</td>
</tr>
<tr>
<td></td>
<td>Examination period</td>
<td>Final exam – see timetables.anu.edu.au</td>
</tr>
</tbody>
</table>

**COURSE ASSESSMENT**

<table>
<thead>
<tr>
<th>Item</th>
<th>Title</th>
<th>Value</th>
<th>Due Date</th>
<th>Linked Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assignment 1</td>
<td>10% of final raw score</td>
<td>11am, Friday 20th March</td>
<td>LO1, LO2, LO3, LO7</td>
</tr>
<tr>
<td>2</td>
<td>Assignment 2</td>
<td>10% of final raw score</td>
<td>11am, Friday 1st May</td>
<td>LO1, LO2, LO3, LO4, LO5, LO6, LO7</td>
</tr>
<tr>
<td>3</td>
<td>Assignment 3</td>
<td>10% of final raw score</td>
<td>11am, Friday 22nd May</td>
<td>LO1, LO2, LO3, LO4, LO5, LO6, LO7</td>
</tr>
<tr>
<td>4</td>
<td>Quizzes</td>
<td>Best 10 of 12 count for 10% of final raw score (that is, each of the best 10 quizzes will count for 1%)</td>
<td>12pm each Friday of teaching terms, from week 2; exception in Week 7 – due before 12pm Thursday this week</td>
<td>LO1, LO2, LO3, LO4, LO5, LO6, LO7</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>60% of final raw score</td>
<td>TBA</td>
<td>LO1, LO2, LO3, LO4, LO5, LO6, LO7</td>
</tr>
</tbody>
</table>

Your raw mark for the course will be calculated as 10% Assignment 1 + 10% Assignment 2 + 10% Assignment 3 + 10% (Best 10 Quizzes) + 60% final exam.

**Assessment Task 1:** Assignment 1

**Details of task:** Students will be required to research specific sampling methodologies, provide a recommendation of a sampling plan for given situations and demonstrate an understanding of the different types of sampling available. They will further be required to show an ability to effectively use graphical and numerical summaries and descriptions for various types of data and provide interpretations of these summaries. Further, they may be required to perform calculations, both by hand and using the provided statistical computer program; and provide explanations.
and comments appropriate for the results they obtain. Other skills may also be required, relevant to the data and the course material. All skills will be shown in respect of answering specific questions, writing appropriate advice and performing specific tasks outlined in the assignment sheet.

Value: 10% of the final raw score
Presentation requirements: To be presented on A4 paper, with coversheet on the front, held together by a staple. Output from the Minitab computer program must be computer printed.
Estimated return date: In tutorials in Weeks 6 and 7.

Assessment Task 2: Assignment 2

Details of task: Students will be required to demonstrate the skills learnt in the course, including summarising data, and interpreting these summaries; performing regressions and hypothesis tests, both by hand and in Minitab, and interpreting the results of these as well as assessing the appropriateness of various statistical tests in different situations and discussing their results and conclusions. They may be required to generate or collect simple data sets, summarise these appropriately and perform tests relevant to the situation given. They should demonstrate an understanding of random variables of different types and relevant associated concepts. Other skills may also be required, relevant to the data and the course material. All skills will be shown in respect of answering specific questions and performing specific tasks outlined in the assignment sheet.

Value: 10% of the final raw score
Presentation requirements: To be presented on A4 paper, with coversheet on the front, held together by a staple. Output from the Minitab computer program must be computer printed.
Estimated return date: In tutorials in Weeks 10 and 11.

Assessment Task 3: Assignment 3

Details of task: Students will be required to demonstrate the skills learnt in the course, including summarising data, and interpreting these summaries; performing regressions and hypothesis tests, both by hand and in Minitab, and interpreting the results of these as well as assessing the appropriateness of various statistical tests in different situations and discussing their results and conclusions. Other skills may also be required, relevant to the data and the course material. All skills will be shown in respect of answering specific questions and performing specific tasks outlined in the assignment sheet.

Value: 10% of the final raw score
Presentation requirements: To be presented on A4 paper, with coversheet on the front, held together by a staple. Output from the Minitab computer program must be computer printed.
Estimated return date: In tutorials in Week 13.

Assessment Task 4: Weekly Quizzes
Details of task: A quiz will be held each teaching week of semester, run on the Wattle site for the course. A practice quiz will be held in Week 1 to allow students to familiarise themselves with the quizzing process; with assessable quizzes run in each of weeks 2 to 13.
A 2 hour time limit exists on the quiz program such that after a student opens a quiz they have a maximum of 2 hours to click “Submit” or their quiz score is not recorded. Questions may include multiple choice, multiple answer, true/false, ordering questions and calculation questions among others. The quizzes should be completed individually, but can be considered as “open book”.

Value: The best 10 (of 12) quiz scores for each student will be combined to give a total of 10% of the final raw score. That is, each of the best 10 quizzes will contribute 1%.

Presentation requirements: Quizzes must be answered through the Wattle site.
Estimated return date: Quiz results will be available following the quiz deadline; quizzes will also be discussed in each Monday lecture (Tuesday if there is a public holiday on Monday).

Assignment submission
Assignments must be submitted to the School Office and include the appropriate cover sheet, which is available on the Wattle site. Email and fax submissions are not acceptable. You must keep a copy of assessment materials submitted for your records

Extensions and penalties
Extensions will not be given. Late assignments and quizzes will not be accepted. Students with documented extenuating circumstances should see the lecturer before the due date of the assessment. In such situations, the weighting of the assessment piece may be reallocated to other tasks.

Returning assignments
Assignments 1, 2 and 3 will be returned in tutorial classes. As such it is important that students fill in assignment cover sheets correctly, naming the correct tutor and tutorial class.

Resubmission of assignments
Assignments will not be accepted for resubmission.

Examination(s)
A final examination will be held during the university examination period at the end of semester. It will contribute 60% to your final raw score. It may include material from the entire semester. 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.

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.

**Referencing requirements**
It is unlikely that you will need to reference sources in this course, (there are no essays etc.). If you do need to reference any source, you should provide sufficient detail in your assignment that a reader may confirm your quote or evidence from the original source. Harvard referencing (also known as Parenthetical referencing) should be used.

**READING LISTS**
The prescribed text is *Business Statistics: An Introductory Course STAT1008*, compiled by Dr Bronwen Whiting; published by Pearson. It is available from the Co-op bookshop, as well as being on Reserve (2 hour and 2 day) in Chifley library.

If you purchase the text you may choose to purchase access to an online learning area. This area will not be mandatory to the course, although some students may find it helpful to assist their learning.

The course will also use the statistical software program Minitab. It is available free on the campus PCs, but is not free software. If you wish to have this program on your own, personal device, you must purchase a license.

**TUTORIAL AND/OR SEMINAR REGISTRATION**
Enrolment in tutorials will be completed online using the CBE Electronic Teaching Assistant (ETA). To enrol, follow these instructions:

1. Go to http://eta.fec.anu.edu.au
2. You will see the Student Login page. To log into the system, enter your University ID (your student number) and password (your ISIS password) in the appropriate fields and hit the Login button.
3. Read any news items or announcements.
4. Select "Sign Up!" from the left-hand navigation bar.
5. Select your courses from the list. To select multiple courses, hold down the control key. On PCs, this is the Ctrl key; on Macs, it is the key. Hold this key down while selecting courses with the mouse. Once courses are selected, hit the SUBMIT button.
6. A confirmation of class enrolments will be displayed. In addition, an email confirmation of class enrolments will be sent to your student account.
7. For security purposes, please ensure that you click the LOGOUT link on the confirmation page, or close the browser window when you have finished your selections.
8. If you experience any difficulties, please contact the School Office (see page 1 for contact details).
9. Students will have until 5pm Wednesday 25 February to finalise their enrolment in tutorials. After this time, students will be unable to change their tutorial enrolment.

COMMUNICATION

Email
If necessary, the lecturers and tutors for this course will contact students on their official ANU student email address. Information about your enrolment and fees from the Registrar and Student Services' office will also be sent to this email address.

Announcements
Students are expected to check the Wattle site for announcements about this course, e.g. changes to timetables or notifications of cancellations. Notifications of emergency cancellations of lectures or tutorials will be posted on the door of the relevant room.

Course URLs
More information about this course may be found on:

• Programs and Courses (http://programsandcourses.anu.edu.au/2015/Catalogue )
• the College of Business and Economics website (http://cbe.anu.edu/courses) and
• Wattle (https://wattle.anu.edu.au), the University's online learning environment. Log on to Wattle using your student number and your ISIS password.

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

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 Student Academic Integrity Policy before the commencement of their course.

Other key policies include:

• Student Assessment (Coursework)
• Student Surveys and Evaluations