STAT6039
Principles of Mathematical Statistics

A first course in mathematical statistics with emphasis on applications; probability, random variables, moment generating functions and correlation, sampling distributions, estimation of parameters by the methods of moments and maximum likelihood, hypothesis testing, the central limit theorem, simple linear regression.

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>On campus, see <a href="http://timetable.anu.edu.au/">http://timetable.anu.edu.au/</a></th>
<th>Students will be expected to attend 3 hours of lectures and a 1 hour tutorial each week.</th>
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</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>To enrol in this course you must have completed MATH1113 or MATH1116 or MATH1014, and either STAT1003 or STAT1008; or be enrolled in the Master of Actuarial Studies, Master of Actuarial Practice or Master of Statistics.</td>
<td></td>
</tr>
<tr>
<td>Incompatible Courses</td>
<td>NA</td>
<td></td>
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<tr>
<td>Co-taught Courses</td>
<td>STAT2001. Graduate students attend joint classes with undergraduates but are assessed separately.</td>
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<tr>
<td>Course Convener:</td>
<td>Dr Janice Scealy</td>
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<tr>
<td>Phone:</td>
<td>02 612 57295</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:janice.scealy@anu.edu.au">janice.scealy@anu.edu.au</a></td>
<td></td>
</tr>
<tr>
<td>Office hours for student consultation:</td>
<td>Tuesday 10:00-11:00 or by appointment (made and confirmed via email).</td>
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</tr>
<tr>
<td>Research Interests</td>
<td>My research focuses on various different topics in mathematical statistics including compositional data analysis, robust statistics, statistics on manifolds, model selection and geostatistics. For further details see: <a href="http://www.rsfas.anu.edu.au/rsfas/people/?profile=Janice%E2%80%94Scealy">http://www.rsfas.anu.edu.au/rsfas/people/?profile=Janice—Scealy</a></td>
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</tr>
<tr>
<td>Relevant administrator</td>
<td>Colleen Lee</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:colleen.lee@anu.edu.au">colleen.lee@anu.edu.au</a></td>
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</table>

SEMESTER 2
2017

COURSE OVERVIEW

Learning Outcomes

Upon successful completion of the requirements for this course, students will achieve an understanding of and facility in the following topics:

1. Introductory probability including combinatorics and Bayes’ theorem
2. Discrete random variables and their probability distributions
3. Continuous random variables and their probability distributions
4. Multivariate random variables and their probability distributions
5. Sampling distributions and the central limit theorem
6. The method of moments and maximum likelihood estimation
7. Confidence estimation and hypothesis testing
8. Simple linear regression

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 (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment 1</td>
<td>10 %</td>
<td>12 noon 24th August 2017</td>
<td>9am 1 September 2017</td>
<td>1 (chapters 1 and 2)</td>
</tr>
<tr>
<td>2. Assignment 2</td>
<td>10 %</td>
<td>12 noon 19th October 2017</td>
<td>9am 27 October 2017</td>
<td>1, 2, 3 and 4 (chapters 1 to 6)</td>
</tr>
<tr>
<td>3. Mid-semester Exam</td>
<td>20% or 0% (redeemable)</td>
<td>Week 6 or 7, to be announced later</td>
<td></td>
<td>1 and 2 (chapters 1, 2 and 3)</td>
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<tr>
<td>4. Final Exam</td>
<td>60% or 80%</td>
<td>Exam period</td>
<td></td>
<td>All (chapters 1 to 11)</td>
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</tbody>
</table>

Research-Led Teaching

If time permits, the lecturer may illustrate selected topics by discussing relevant examples from papers she has published in the fields of compositional data analysis and statistics on manifolds. These examples will not be assessable.

Feedback

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

1. written comments
2. verbal comments
3. feedback to the whole class.

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

http://unistats.anu.edu.au/surveys/selt/students/ and
http://unistats.anu.edu.au/surveys/selt/results/learning/

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

NA

Additional course costs

NA

Examination material or equipment

Both the mid-semester and final exams will be open book, with no restrictions on permitted material, apart from items excluded by general ANU policy (such as mobile phones). Programmable calculators are permitted. The mid-semester exam will cover Chapters 1-3. The final exam will cover Chapters 1-10.

The mid-semester exam is redeemable, meaning that you will get the better of the two breakdowns 20 + 60 and 0 + 80. That is, if you do better in the final exam than in the mid- semester exam, your mid-semester exam will not count and your final exam will count 80%. If you do not sit the mid-semester exam, your final exam will definitely count 80%.

Although the mid-semester exam is redeemable and optional, it is advised that students do it if possible. No special provision will be made for students who cannot sit the mid-semester exam. That is, there will be no special mid-semester exams.
Recommended Resources

Class materials, including detailed lecture notes, Power-point slides, lecture demonstrations, tutorials, assignments and other relevant materials, will be made available on the class web page on Wattle at https : //wattle.anu.edu.au/. To log on to Wattle, you need to have your ANU ID (student number) and password. In order to access the class web page within Wattle, you will need to be formally enrolled in the course. It is essential that you visit the class web page regularly.

Prescribed texts:


COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week/Session</th>
<th>Summary of Activities</th>
<th>Assessment</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Chapters 1 and 2: Introduction</td>
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<td>2</td>
<td>Chapter 2: Probability</td>
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<tr>
<td>3</td>
<td>Chapter 3: Discrete random variables</td>
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<td>4</td>
<td>Chapter 4: Continuous random variables</td>
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<tr>
<td>5</td>
<td>Chapter 5: Multivariate random variables</td>
<td>Assignment 1 due</td>
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<tr>
<td>6</td>
<td>Chapter 6: Functions of random variables</td>
<td>Mid-semester exam (possibly)</td>
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<tr>
<td>7</td>
<td>Chapter 7: Sampling distributions and the central limit theorem</td>
<td>Mid-semester exam (possibly)</td>
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<tr>
<td>8</td>
<td>Chapter 8: Point and interval estimation</td>
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<tr>
<td>9</td>
<td>Chapter 9: Methods for point estimation</td>
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<td>10</td>
<td>Chapter 10: Hypothesis testing</td>
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<tr>
<td>11</td>
<td>Chapter 11: Simple linear regression (taught to all students but assessable only for STAT6039 students; not assessable for STAT2001 students)</td>
<td>Assignment 2 due</td>
</tr>
<tr>
<td>12</td>
<td>Revision</td>
<td></td>
</tr>
</tbody>
</table>

ASSESSMENT REQUIREMENTS

Detailed assignment specifications will be handed out at least three weeks prior to the due dates.

As a further academic integrity control, students may be selected for a 15 minute individual oral examination of their written assessment submissions.

Any student identified, either during the current semester or in retrospect, as having used ghost writing services will be investigated under the University’s Academic Misconduct Rule.
Assignment submission

**Hard Copy Submission:** Assignment reports should be submitted to the appropriate box at the RSFAS School Office by the due date. Submitted assignments must include the cover sheet provided on Wattle. Please keep a copy of the assignment for your records.

Extensions and penalties

Extensions and late submission of assessment pieces are covered by the Student Assessment (Coursework) Policy and Procedure.

The Course Convener may grant extensions for assessment pieces that are not examinations or take-home examinations. If you need an extension, you must request it in writing on or before the due date. If you have documented and appropriate medical evidence that demonstrates you were not able to request an extension on or before the due date, you may be able to request it after the due date.

No submission of assessment tasks without an extension after the due date will be permitted. If an assessment task is not submitted by the due date, a mark of 0 will be awarded.

Returning assignments

Assignment 1 and 2 can be collected from the RSFAS school office on level 4 of the CBE building or in your tutorial.

Referencing requirements

NA

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
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 licensor’s 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/).