STAT2001
Introductory Mathematical Statistics

Course Description
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.

Semester and Year | Semester 1 of 2015
Mode of Delivery | On campus by way of lectures and tutorials
Prerequisites | To enrol in this course you must have completed MATH1113 or MATH1116 (H) or MATH1014, and either STAT1003 or STAT1008.
Incompatible Courses | None
Course Convener | Dr Borek Puza
Office Location: | Room 4.29, CBE Bldg (26C)
Phone: | +61 2 6125 4587
Email: | borek.puza@anu.edu.edu
Consultation hours: | 2-2.30 Mondays and 3-3.30 Wednesdays in all lecture weeks.
Bio and research interests | Borek Puza is a Senior Lecturer in RSFAS. His research interests include Bayesian statistics, Monte Carlo methods, and confidence estimation.
Tutors | Details regarding tutors and their consultation times will be made available on Wattle in the first two weeks of lectures.
Student Administrators | Anna Pickering, Room 4.48, CBE Bldg (26C), +61 2 612 59045, anna.pickering@anu.edu.au

COURSE OVERVIEW

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

- LO1: Introductory probability including combinatorics and Bayes' theorem
- LO2: Discrete random variables and their probability distributions
- LO3: Continuous random variables and their probability distributions
- LO4: Multivariate random variables and their probability distributions
- LO5: Sampling distributions and the central limit theorem
- LO6: The method of moments and maximum likelihood estimation
- LO7: Confidence estimation and hypothesis testing
Research-Led Teaching
If time permits, the lecturer may illustrate selected topics by discussing relevant examples from papers he has published in the fields of Bayesian statistics, Monte Carlo methods and confidence estimation. These examples will not be assessable.

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:

- The tutorial and assignments will feature more difficult problems.
- More examples will be provided in lectures to illustrate the theory.
- Several past exam problems will be reviewed and solved in class.

Technology, Software, Equipment
No computing is required for this course. However, you will need a scientific calculator. Also, it is recommended that students learn to use the R programming language, as available for free at r-project.org. Knowledge of this language is purely optional but may be useful to students when performing calculations. Students will not be able to use R during the exams.

Co-teaching
This course is co-taught with STAT6039 Principles of Mathematical Statistics. STAT6039 students will have slightly different learning outcomes and assessment. They will also be allocated to separate tutorial groups. Tutorial questions will be the same for both cohorts.

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

COURSE SCHEDULE

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<th>Assessment</th>
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<td>Orientation Week</td>
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<tr>
<td>2</td>
<td>Chapter 1: Introduction</td>
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<tr>
<td>3</td>
<td>Chapter 2: Probability</td>
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<tr>
<td>4</td>
<td>Chapter 3: Discrete random variables</td>
<td></td>
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<tr>
<td>5</td>
<td>Chapter 4: Continuous random variables</td>
<td></td>
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<tr>
<td>6</td>
<td>Chapter 5: Multivariate random variables</td>
<td>Assignment 1 due at 12 noon on Wed 25 March</td>
</tr>
<tr>
<td>7</td>
<td>Chapter 6: Functions of random variables</td>
<td>Mid-semester exam (possibly)</td>
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<td></td>
<td>Two-week teaching break</td>
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<tr>
<td>8</td>
<td>Chapter 7: Sampling distributions and the central limit theorem</td>
<td>Mid-semester exam (possibly)</td>
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<tr>
<td>9</td>
<td>Chapter 8: Point and interval estimation</td>
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<tr>
<td>10</td>
<td>Chapter 9: Methods for point estimation</td>
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<td>11</td>
<td>Chapter 10: Hypothesis testing</td>
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<td>12</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 at 12 noon on Wed 20 May</td>
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<tr>
<td>13</td>
<td>Revision</td>
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## COURSE ASSESSMENT

### Assessment Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Title</th>
<th>Value</th>
<th>Due Date</th>
<th>Linked Learning Outcomes</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Assignment 1</td>
<td>10%</td>
<td>12 noon Wednesday 25 March</td>
<td>LO1; Chapters 1 and 2.</td>
</tr>
<tr>
<td>2</td>
<td>Assignment 2</td>
<td>10%</td>
<td>12 noon Wednesday 20 May</td>
<td>LO1, LO2, LO3, and LO4; Chapters 1 to 6</td>
</tr>
<tr>
<td>3</td>
<td>Mid-semester Exam</td>
<td>20% or 0% (redeemable)</td>
<td>Week 7 or 8, to be announced later</td>
<td>LO1 and LO2; Chapters 1, 2 and 3</td>
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<tr>
<td>4</td>
<td>Final Exam</td>
<td>60% or 80%</td>
<td>Final examination period</td>
<td>LO1 to LO7; Chapters 1 to 10.</td>
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</tbody>
</table>

**Assessment Task 1: Assignment 1**

**Details of task:**
This assignment covers Chapters 1 and 2 and is worth 10% of the total assessment. The assignment should be done alone and submitted by 12 noon on Wednesday 25 March.

**Assessment Task 2: Assignment 2**

**Details of task:**
This assignment covers Chapters 1 to 6 and is worth 10% of the total assessment. The assignment should be done alone and submitted by 12 noon on Wednesday 20 May.

**Assessment Task 3: Mid-semester Exam**

**Details of task:**
This exam covers Chapters 1, 2 and 3 and is worth 20% of the total assessment, or 0% (as detailed below under Examinations). The exam will be in either Week 7 or Week 8 (with the exact date and venue to be announced and placed on Wattle in due course).

**Assessment Task 4: Final Exam**

**Details of task:**
This exam covers Chapters 1 to 10 and is worth 60% of the total assessment, or 80% (as detailed below under Examinations). The exam will be in the final examination period (with the exact date and venue to be announced and placed on Wattle in due course).
**Assignment Submission**
Assignments should be neatly handwritten or typed. Each assignment should be placed in the appropriate box outside the RSFAS Office on the 4th floor of the CBE Bldg (26C) by the due date. Assignments should be accompanied by a cover sheet as provided on Wattle. Students should put their ANU ID number on the cover sheet but not any of their names. Email and fax submissions are not acceptable. Each student should keep a copy of assessment materials submitted for their own record.

**Extensions and Penalties**
No extensions will be given unless arranged before the due date and accompanied by a medical certificate. Late assignments without an extension will be marked zero.

**Returning Assignments**
Marked assignments can be collected from the filing cabinets in the foyer outside the RSFAS Office on the 4th floor of the CBE Building (26C).

**Resubmission of Assignments**
It will not be possible for assignments to be resubmitted.

**Examinations**
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.

**Scaling**
Your final mark for the course will be based on the raw marks allocated for each assignment or examination. 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 or equal the scaled mark of that student), and may be either up or down.

**Referencing Requirements**
In assignments and exams, students must appropriately reference any results, words or ideas that they take from another source which is not their own. A guide can be found at: [https://academicskills.anu.edu.au/resources/handouts/referencing-basics](https://academicskills.anu.edu.au/resources/handouts/referencing-basics)
READING LISTS

Prescribed Texts


Recommended Reading


COMMUNICATION

The lecturer can be contacted by email, by phone or in person. The best way to make an appointment with the lecturer is to speak with him directly after class given by him.

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:

- the College of Business and Economics website ([http://cbe.anu.edu.au/students/student-information/college-courses/](http://cbe.anu.edu.au/students/student-information/college-courses/)) and
- Wattle ([https://wattle.anu.edu.au](https://wattle.anu.edu.au)), the University’s online learning environment. Log on to Wattle using your student number and your ISIS password.
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.

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