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refer to the ANU Campus Map (map GH32, reference G3)

Course Outline

STAT2001 Introductory Mathematical Statistics

STAT6039 Principles of Mathematical Statistics

First Semester 2012

STUDENTS: Course details change from semester to semester. ***Please check*** *that you are reading the Course Outline for the correct semester.*

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, application of the central limit theorem to large sample inference.

Contacts

Role	Office address	Email	Telephone	Consultation times
Course Convenor and Lecturer (Course Authority) **Dr Borek Puza**	Rm 4.29 CBE Bldg 26C	borek.puza@anu.edu.au	6125 4587	To be advised, or by appointment.
Tutor/s **To be advised**	TBA	TBA	TBA	TBA
School Student Administrators **Tracy Skinner**	Rm 4.48 CBE Bldg 26C	tracy.skinner@anu.edu.au	6125 0487	NA

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 **regularly** 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:

- Study @ ANU,
- the College of Business and Economics website, and
- Wattle, the University's online learning environment. Log on to Wattle using your student number and your ISIS password.

Course Information

Learning Outcomes

Upon successful completion of the requirements for this course, students will be able to:

- Calculate probabilities using set theory, combinatorics,

  the sample point method and the event composition method
- Solve statistical problems involving discrete distributions
- Solve statistical problems involving continuous and multivariate distributions
- Approximate probabilities using the central limit theorem
- Construct point and interval estimates and conduct hypothesis tests

A sound understanding in this course will facilitate a strong progression toward a solid foundation in mathematical statistics. Furthermore, mastering this course will provide a springboard for students wishing to excel in later courses such as Stochastic Modelling, Generalised Linear Models, Statistical Inference, Risk Theory, Survival Modelling and Time Series. Coupled with Probability Theory (MATH3029), this course will provide a deep understanding of Probability and its applications, a fundamental keystone for pursuing courses in stochastic calculus and statistics.

Workload

Students taking this course are expected to commit at least 10 hours a week to completing the work. This will include:

- 3 hours a week: attending lectures
- 1 hour a week: attending tutorials
- 6 hours a week: private study and review of course material, working on assignments and tutorials, preparing for exams, checking the Wattle website.

Course Delivery

Lectures and tutorials.

Attendance Requirements

Attendance is not compulsory. However it is strongly recommended that students attend all lectures and their designated tutorial each week.

Tutorial Registration

Enrolment in tutorials will be completed online using the 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).

Study Schedule (approximate)

Week	Theme / Topic / Module	Activity	Required student preparation	Deadlines
Week 1	Chapter 1: Introduction	Lectures		
Week 2	Chapter 2: Probability	Lectures, Tutorial		
Week 3	Chapter 2: Probability	Lectures, Tutorial		
Week 4	Chapter 3: Discrete random variables	Lectures, Tutorial		
Week 5	Chapter 4: Continuous random variables	Lectures, Tutorial		
Week 6	Chapter 5: Multivariate random variables	Lectures, Tutorial		
Week 7	Chapter 6: Functions of random variables	Lectures, Tutorial		
Two-week teaching break				
Week 8	Chapter 7: Sampling distributions and the central limit theorem	Lectures, Tutorial		
Week 9	Chapter 8: Point and interval estimation	Lectures, Tutorial		
Week 10	Chapter 9: Methods for point estimation	Lectures, Tutorial		
Week 11	Chapter 10: Hypothesis testing	Lectures, Tutorial		
Week 12	Additional topics (if time permits)	Lectures, Tutorial		
Week 13	Revision	Lectures, Tutorial		

Assessment

Proposed Assessment Schedule

Details about assessment may change during the first two weeks of semester. Please ensure that you check with your lecturer or tutor about any changes. Changes to the assessment schedule will be posted to the Wattle site.

Assessment item	Description and detail of assignment	Specific requirements	Due Date	Weighting (%)
Two assignments	Assignments on selected topics	See below	Probably due weeks 6 and 12	10% each (total 20%)
Mid-Semester Examination	Redeemable exam on Chapters 2 and 3 only	See below	Probably in week 7 or 8	20% (or 0%)
Final Examination	Compulsory exam on all course material	See below	During the final exam period	60% (or 80%)

Learning Outcomes-Assessment

How well have you achieved the learning outcomes for this course? Your lecturer makes this judgement based on your assignments and examination papers. This table illustrates how each assessment item provides evidence about your achievements against each learning outcome.

Course Learning Outcomes Upon successful completion of the requirements for this course, students will be able to:	Ass. 1	Ass. 2	Mid-Semester Exam	Final Exam
Calculate probabilities using set theory, combinatorics, the sample point method and the event composition method	☑	☑	☑	☑
Solve statistical problems involving discrete distributions		☑	☑	☑
Solve statistical problems involving continuous and multivariate distributions		☑		☑
Approximate probabilities using the central limit theorem		☑		☑
Construct point and interval estimates and conduct hypothesis tests				☑

Assignment Details

Assignments are to be worked on alone and submitted as per instructions shown on the Wattle website. Solutions may be typed or neatly handwritten. Please show all working, present your solutions in coherent English, and draw a box around each required result. Calculations may be done either using a hand-held calculator or using the statistical software R. If a computer is used to do the calculations, the code should be provided as an appendix to the assignment. Solutions consisting merely of annotated computer code are **not** acceptable.

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 the scaled mark of that student), and may be either up or down.

Extensions

Extensions will be granted only in extreme circumstances and require a medical certificate.

Penalties

Each late assignment will receive **zero** marks, unless an extension has been granted.

Examinations

Both exams are open book, with no restrictions on permitted material. The mid-semester exam is on Chapters 1, 2 and 3 only, and the final exam is on all Chapters 1 to 10. Some sections are not examinable, and there may be some additional material that is examinable. Exactly what is examinable will be clearly indicated on Wattle. STAT6039 students will be required to undertake additional assessment, probably an extra question in the final exam.

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 choose not to sit the mid-semester exam, your final exam will definitely count 80%.

Although the mid-semester exam is optional, it is advised that students do it if possible. No special provisions will be made for students who cannot sit the mid-semester exam.

Texts and Other Reading

Prescribed Texts

Wackerly, D.D., Mendenhall III, W., and Scheaffer, R.L. (2008). *Mathematical Statistics with Applications, Seventh edition*. Duxbury, Thomson, Brooks/Cole.

Owen, W.J. (2008). *Student Solutions Manual for Wackerly, Mendenhall, and Scheaffer's Mathematical Statistics with Applications, Seventh Edition*. Duxbury, Thomson, Brooks/Cole.

Recommended Reading

Most of the course consists of material from the first ten chapters in the textbook, with some sections omitted. There may also be covered some additional material that is not in the textbook. Relevant sections and exercises in the textbook are indicated in the Text Guide for 7th Edition, which you can find on Wattle in the General folder. Also in the General folder is General Information for students enrolled with the ANU College of Business and Economics.

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 http://www.r-project.org/. Knowledge of this language is purely optional but may be useful and instructive to students when performing calculations and doing assignments.

Course-related Matters

Prerequisites for students entering STAT2001/6039 in 2012

Either MATH1115 Mathematics for Applications 1 (H) or both MATH1013 Mathematics and Applications 1 and MATH1014 Mathematics and Applications.

Prerequisites for students entering STAT2001/6039 after 2012

Either MATH1113 Mathematics Foundations for Statistics or MATH1116 Mathematics for Applications 2 (H) or MATH1014 Mathematics and Applications, and either STAT1003 Statistical Techniques or STAT1008 Quantitative Research Methods.

Co-teaching

Not relevant.

Other information

Completion of this course along with Regression Modelling (STAT2008/STAT6038) entitles students for consideration for exemption from Subject CT3 of the Institute of Actuaries of Australia. To qualify for an exemption from CT3 students must receive an average mark of at least 60 in this course and Regression Modelling. In addition a minimum mark of 50 Pass in both subjects is required to be considered for an exemption.

This course is open to all qualified students; however, within the Faculty of Science it is designated as an Honours Pathway Course (HPC) involving material of greater mathematical depth than STAT1003.