



FACULTY OF SCIENCE
SCHOOL OF MATHEMATICS AND STATISTICS

MATH2859
Probability, Statistics and Information

SEMESTER 2, 2018

Course information

Units of credit: 3

Prerequisites: MATH1231 or MATH1241 (or, in Program 3648 or 3651 or 3652 or 3653 or 3749, MATH1131 or MATH1141).

Exclusions: MATH2801, MATH2841, MATH2901, MATH2089, MATH2099, BIOS2041, BEES2041

This course is only available to students for whom it is specifically required as part of their program.

Course staff

Dr Alun Pope (Statistics) RC-1030, phone 9385-7020, email: a.pope@unsw.edu.au

You will also be assigned a tutor for the tutorials/laboratories. They should be your first point of contact for any questions about this course.

Location and Times

Lectures (Weeks 1-12)

Monday 3pm –5pm Physics Theatre

Tutorials/Laboratory classes

Tutorial class odd weeks (No tutorials in Week 1)

Computer laboratory class (RC-G012) week1 and then even weeks.

This course will enable you to understand the various ways in which random variation arises in engineering contexts and to develop facility at:

- applying various graphical and data analysis methods for summarizing and understanding data;
- applying various statistical models and methods for drawing conclusions and making decisions under uncertainty in engineering contexts;
- applying Matlab for graphical and statistical analysis.

We believe that effective learning is best supported by a climate of inquiry, in which students are actively engaged in the learning process. Hence this course is structured with a strong emphasis on problem solving tasks in lectures, in tutorials and laboratories, and in assessment tasks. Students are expected to devote the majority of their class and study time to the solving of such tasks.

New ideas and skills are first introduced and demonstrated in lectures, and then students develop these skills by applying them to specific tasks in tutorials and assessments. Computing skills are developed and practiced in regular computer laboratory sessions.

This course has a major focus on research, inquiry and analytical thinking as well as information literacy. We will also explore capacity and motivation for intellectual development through the solution of both simple and complex mathematical models of problems arising in engineering, and the interpretation and communication of the results.

Course Evaluation and Development

The School of Mathematics evaluates each course each time it is run. Feedback on the course is gathered, using among other means, UNSW's myExperience. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback. Past comments have highlighted the critical importance of gaining competence in Matlab as early as possible. To this end, the online self-paced Matlab tutorials have been completely updated.

In the past few years we have trialled online quizzes in MATH2859 to encourage consistent engagement with the course. Students found these very helpful. This semester we are using three on-line quizzes in the course, for the Statistics component. The purpose of these is primarily to try to keep you up to date with the material being covered and to provide feedback on how you are progressing. Thus their weight in the final result is just 10%.

Assessment

The final grade in MATH2859 will be based on the sum of the marks from each assessment task. Final grades may be adjusted by scaling with the approval of the appropriate departmental meeting.

Assessment schedule

ASSESSMENT COMPONENT	DETAILS	WEIGHTING	DUE DATE
Introductory Matlab Quizzes	Available via MapleTA from Moodle web page. Start as early as possible from Week 1.	5%	End of week 2
Statistics on-line Quizzes	Three quizzes during semester, available via MapleTA from Moodle (worth equal marks)	10%	End of week 5 End of week 9 End of week 12
Mid-semester Test	Test administered on Maple TA during your Week 8 lab class. You must sit the test in the lab class in which you are enrolled	25%	Week 8 lab class
Final Examination	During the exam period. 1 hour	60%	Examination Period, S2 2018
Total		100%	

Rationale for assessment: The on-line quizzes and class tests will give students regular opportunities to get feedback on their progress and mastery of the material.

Details of the material to be assessed in each mid-semester test will be made available in the couple of weeks before the test. Note that **students must sit the test in the class in which they are enrolled** unless they have prior written approval from the lecturer. Note that the numerical methods mid-semester test will be held as a classroom tutorial, while the statistics mid-semester test will be held in the computer labs (and administered via Maple TA). To prepare for your statistics mid-semester test, practice tests will be made available on Maple TA in week 6. Students who are unable to attend a test must give a medical certificate to the lecturer. There will be no opportunity to re-sit a test.

Many practical problems require use of a computer software package, and in this course students are required to become familiar with Matlab. The Matlab part of MATH2859 is assessed in the following ways:

- Matlab online quizzes due for completion on Friday Week 2, covering material in the Matlab self-paced tutorial (first work through the tutorial on Moodle, *then* go to Maple TA to do the test.)
- Three statistics online quizzes.
- Mid-semester test to be held in the computer laboratory in Week 8.

All statistics assessments will be administered through MapleTA. Here are some guidelines you should follow when taking each quiz:

- For the Matlab online quizzes due in Week 2 you are allowed as many attempts as you want. Your best mark will count.
- For the Statistics on-line quizzes (due Weeks 5, 9, 12), you are allowed a maximum of 3 attempts.

- For the mid-semester test, you are only permitted one attempt, using a lab computer during your regular lab class. Practice tests will be available on Maple TA in week 6.
- Once you begin an attempt at a quiz, you have a fixed time to finish that attempt.
- You should only start an attempt at a quiz if you plan to finish it in that sitting.
- Once you answer a question, select *Save Answer*. You will still be allowed to modify your response. Selecting *Finish* submits your responses to MapleTA which cannot be changed.
- Do not close MapleTA or your web browser during a quiz. You will **not** be able to continue that attempt the next time you login.
- It is expected that you work on each quiz **alone**.

Finally, the final exam will assess student understanding of the material covered in the lectures, tutorials and laboratory classes.

Help with the course

Your lecturer will have regular consultation times which will be advertised in lectures and on UNSW Moodle. There will also be additional regular consultation times advertised with other members of the school. At these times you are welcome to just turn up! For other consultation times, please email your lecturer for an appointment.

Resources and Syllabus

Recommended Text

J. Devore and N. Farnum, *Applied Statistics for Engineers and Scientists*, 2nd Edition, 2005, Duxbury Press, Thomson Publishers. (or 3rd edition of this book)

Additional Reading

Basically any text with “Statistics” and “Engineers” in its title. A quite comprehensive reference is

D. Montgomery and G. Runger, *Applied Statistics and Probability for Engineers*, 5th Edition, 2011, Wiley (or a previous edition of this book)

Lecture slides in PDF format will be made available via the UNSW Moodle web site. **They are not a substitute for attendance at lectures.** Other material, including data files for computer exercises, and solutions to tutorial exercises will also be available from the web site.

Syllabus and approximate schedule

Note that this syllabus is intentionally only approximate. Some variations will definitely occur as some topics require more time than others.

Week	Topic	Text Reference
1	Presentation and Introduction	1.1
2	Descriptive Statistics	1.2, 1.3, 2.1, 2.2, 2.3
3	Elements of Probability	5.1, 5.2, 5.3
4	Random Variables	5.4

5	Special discrete and continuous probability distributions	1.5, 1.6
6	The Normal distribution. Sampling distributions.	1.4, 5.5, 5.6
7	Inferences concerning a mean (confidence intervals)	7.1, 7.2, 7.4
8	Inferences concerning a mean (hypothesis tests)	7.3, 7.5, 8.3
9	Inference concerning proportions, variances and differences in means	8.1, 8.2, 8.5
10	Regression analysis (I)	11.1, 11.2, 11.3
11	Regression analysis (II)	11.4, 11.5, 11.6
12	Analysis of Variance	Chapter 9

Matlab software

Matlab R2016 is available on the computers in the School of Mathematics and Statistics computer laboratories on the mezzanine level and ground floor of the Red Centre. Information about how to obtain Matlab is available through the UNSW Moodle.

Matlab References

- School of Mathematics and Statistics, Introduction to MATLAB, 2016 (available through the course web site).
- School of Mathematics and Statistics, Statistics using MATLAB (SUM) (available through the course web site).
- A. Gilat, MATLAB: an introduction with applications, New York, Wiley, 2005
- R. Pratap, Getting Started with MATLAB7, Oxford University Press, 2005.
- D. J. Higham and N. J. Higham, MATLAB guide, SIAM Philadelphia, 2004.

Library

The library has a mathematics and statistics subject guide on the web which is a good starting point for mathematical and statistical information. See

<http://subjectguides.library.unsw.edu.au>

ADMINISTRATION

All general administrative information including course and tutorial enrolment, attendance requirements, student e-mail, cheating and plagiarism, applications for special consideration and additional assessment may be found here:

<http://www.maths.unsw.edu.au/currentstudents/assessment-policies>

Academic Misconduct

The University of New South Wales has rules relating to Academic Misconduct. They can be found at <http://www.maths.unsw.edu.au/currentstudents/policy-academic-misconduct>

Rules for the Conduct of Examinations

The University of New South Wales has rules for the conduct of examinations. They can be found at <http://www.maths.unsw.edu.au/currentstudents/rules-exams>

Occupational Health and Safety

Occupational Health and Safety policies and expectations: <http://www.ohs.unsw.edu.au/>

Equity and Diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit <http://www.studentequity.unsw.edu.au> (9385 4734). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.