

**Mathematics for Information Sciences– 7089
Unit Outline 2009**

Faculty of Information Sciences and Engineering

University of Canberra

Australian Government Higher Education (CRICOS)

Registered Provider number: #00212K

This Unit Outline must be read in conjunction with:

- a) *Studying at the University of Canberra: A Guide to Policies and Procedures*, which sets out University-wide policies and procedures, including information on matters such as plagiarism, grade descriptors, moderation, feedback and deferred exams, and is available at <http://www.canberra.edu.au/student-services>
- b) *Guide to Student Services at the University of Canberra*, and is available at <http://www.canberra.edu.au/student-services>
- c) Any additional information specified in section 6f.

1: General Information

1a Unit title: **Mathematics for Information Sciences**

1b Unit number: **7089**

1c Semester and year offered: **Semester 2, 2009**

1d Credit point value: **3**

1e Unit level: **1**

1f Name of Unit Convenor and Lecturer and contact details

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Name of Unit Moderator and contact details

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1g Administrative contact details

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2: Academic Content

2a Unit description and learning outcomes

This subject is concerned with mathematics and statistics and their application in computing and information technology. Topics covered will be drawn from probability and statistics (counting, probability, descriptive statistics, correlation and regression, hypothesis testing statistical computer packages) and from mathematics (linear systems, transformations and matrices, fractals, differentiation, maxima and minima, Bezier curves).

Learning outcomes: Students will be expected to understand mathematical and statistical models and their applications in graphics, IT and other contexts; to appreciate essential differences in continuous and discrete mathematical problems; and have acquired skills needed to analyse data and solve mathematical problems in the areas studied.

Generic Skills: This unit contributes to the development of generic skills such as your ability to apply appropriate problem solving processes, arguments, critical and creative thinking and to implement and evaluate strategies for the resolution of problems.

2b Prerequisites and/or co-requisites

Prerequisites: NIL

Assumed Knowledge: ACT Mathematical Applications major; NSW Mathematics major; or equivalent.

2c Generic Skills

This unit contributes to the development of skills such as the ability to think analytically and critically about mathematics and its applications.

3: Delivery of Unit and Timetable

3a Delivery mode

Standard face-to-face teaching at UC Bruce campus and online.

	Day	Time	Room
Lecture A	Monday	11:30	2B2
Lecture B	Tuesday	11:30	12B2
Lecture C	Thursday	11:00	9A1
Tutorial/Lab	Tuesday	10:30	11C43/11B37
Tutorial/Lab	Tuesday	12:30	11C43/11B37
Tutorial/Lab	Thursday	17:30	2C5/11A46

The pattern of tutorials and computer labs is:

W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
-	T	T	C	T	T	C	-	-	T	C	T	C	T	T

Each week students should attend all lectures and 1 tutorial/laboratory. For the most part, Lecture B will be reserved for class tests and thus you will only be required to attend this lecture for class tests or if the unit convener wishes to use this time slot for the delivery of course material. For this reason the time slot for Lecture B should be kept clear of other commitments throughout semester. In the latter case an announcement will be made in class and on the unit website. Note that there will be **no** tutorial/laboratory in week 1.

3b Schedule of topics/lectures/tutorials/practicals/field classes by week

Week	Activity
1	Trigonometry and Transformations: Trigonometry; Rotations, other transformations
2	Matrices and their applications: matrix inverse; determinants
3	Solving linear systems; 3-dimensional analytic geometry
4	3-dimensional analytic geometry; Rotations in 3-dimensional space
5	An introduction to calculus;
6	Review, Test 1 (weeks 1-4); Bezier curves
7	Bezier curves; Introduction to Statistics
8	Mid-semester break
9	Mid-semester break
10	Introduction to Statistics – graphical and numerical summaries of data; Probability
11	Probability; Review
12	(Monday holiday) Test 2 (Weeks 5,6,7,10) Random Variables
13	Random Variables/Hypothesis Testing
14	Hypothesis Testing/Regression
15	Regression Review

Note that this schedule may vary slightly over the semester.

4: Unit Resources

4a Lists of required texts/readings

Recommended Textbook: J.M. Utts, R.F. Heckard, *Mind on Statistics*, Thomson, 2nd Edition, Thomson, 2004

This will be required from Week 7 onward.

4b Materials and equipment

Some materials will be posted on the unit website. Students will need access to a computer with Matlab, web browser and Acrobat reader. The computers in Building 11 are suitable.

4c **Unit website:** <http://learnonline.canberra.edu.au/> . Your OSIS site will have all your units listed and linked to their respective websites.

Note that the website will not be a comprehensive site. Course materials such as lecture notes, tutorial questions and tutorial solutions will be posted. These resources supplement but certainly do **not** replace face-to-face classes.

5: Assessment

5a Assessment overview

Assessment Item (including exams held in the exam period)	Date	Weighting (Total to equal 100%)
Test 1	Aug.25 (Week 6)	15%
Test 2	Oct. 6 (Week 12)	15%
Statistics Assignment	Oct. 23 (Week 14)	15%
Test 3 (Final Exam – Part A)	Exam Period	15%
Final Exam – Part B	Exam period	30%
Tutorial participation	Throughout semester	10%

5b Details of each assessment item

All assessment items contribute to your composite score, which will be converted to a numerical grade from which your grade will be determined.

Test 1 and Test 2 will each be of 50 minutes duration and each covers 4 weeks work. The blocks of lectures covered are indicated in the attached lecture schedule.

Permitted materials for the Tests are:

- 1). **One A5** (half-A4) side of original handwritten notes.
- 2) A basic scientific **calculator** -- non-alphabetic keyboard. This is *required* for Tests
- 3) Language dictionary -- non-electronic & non-annotated.

Final Examination.

There will be a 3 hr exam in the exam period at the end of semester. This exam will have two parts: Part A is essentially a Test 3 covering the final lecture block (Weeks 11-14), while Part B covers the whole semester's work.

Permitted materials for the final exam are:

- 1) **Two A4** sides of original handwritten notes

- 2) A (non-electronic) language dictionary.
- 3) A basic scientific **calculator** – non-alphabetic keyboard is *required*. A calculator with alphabetic keypad is strictly forbidden

For full marks in the tests and final exam, all working should be shown.

Participation in tutorials and laboratories is considered essential in this unit for mastery of material delivered in lectures. Note well that this is not an attendance mark, although participation presupposes attendance, and your tutor will record attendance each week. At the end of semester you will receive a tutorial participation mark calculated as follows:

Tutorial Mark = minimum(10, # tutes/labs attended)*Participation factor

where the 'participation factor' will be determined by your tutor on a scale from 0 (for no participation) to 1 (for full participation), meaning regular substantial preparation before tutorials and helpful contributions to discussions. There are 12 tutorials/labs in all, so you can miss 2 without affecting your mark. Note carefully the 'no penalty' clause below.

The tutorial participation mark will not penalize any student. If it should happen that your Tute mark is lower than your total on Tests and Exams, the tute marks will be disregarded, and your composite score will be based on your Tests and Exam only. For instance, suppose a student scored 54/90 on Tests and Exam and 4.5/10 for Tutorial Participation. Instead of getting $54+4.5 = 58.5$, they would be given a composite score of 60 (since $54/90 = 60/100$). Grades will be awarded on the following basis:

Grade	Numerical Grade Equivalent
HD	85 and above
DI	75 - 84
CR	65 - 74
P	50 - 64
Fail	0 - 49

5c Special assessment requirements

None

5d Supplementary assessment

For the University policy on supplementary assessments refer to

<https://guard.canberra.edu.au/cocoon/policydb/downloadSelect?DocumentReferenceId=388>

If students miss an assessment item due to illness or misadventure and wish to apply for deferred assessment then the unit convenor must be informed within three working days of the missed assessment item. Please refer to the document on the front page of this guide in relation to deferred examinations.

5e Text-matching software

This is not relevant to this unit.

6: Student Responsibility

6a Workload

The amount of time you will need to spend on study in this Unit will depend on a number of factors including your prior knowledge, learning skill level and learning style. Nevertheless, in planning your time commitments you should note that for a 3cp Unit the total notional workload over the fifteen week semester is assumed to be 150 hours or an average of 10 hours per week. These hours include time spent in classes. The total workload for Units of different credit point value should vary proportionally. For example, for a 6cp Unit the total notional workload over a fifteen week semester is assumed to be 300 hours or an average of 20 hours per week.

6b Special needs

Students who need assistance in undertaking the unit because of disability or other circumstances should inform their unit convener.

6c Attendance requirements

It is expected that students will attend all lectures and participate in the tutorial to which they are assigned.

6d Required IT skills

It is expected that students have some familiarity with the use of a computer. It is assumed that all students can access the unit's website, and can read and print the documents there. Most documents will be published in PDF (Adobe Acrobat) format.

It is also assumed that all students can and will regularly read e-mail received at their UC accounts -- at least twice a week. Announcements to the group may be made this way, and it is assumed that such an announcement will be received in a timely way by all students.

6e Costs

A suitable non-programmable scientific calculator will be useful. There may be some printing costs.

6f Additional Information

Any material posted on the unit website, including announcements, will be deemed to have been received by the whole class. It is your responsibility to ensure that you are fully informed. Also, it is your responsibility to ensure that you bring a working, non-programmable scientific calculator to tests and the final exam. We will not be supplying these and no consideration can be given to those who come to tests without one. Also, it is your responsibility to read email sent to your student account. If you do not read your student email please ensure that email to that address is forwarded to an email address that you do read. Once again, if email is sent to your student account I will assume that you've read it. No consideration can be given for unread email.

The Faculty of Information Sciences and Engineering's **Student Learning Resource Centre (SLRC)** provides weekly sessions (starting week 2) when you can drop-in and ask for help from the tutor on duty. The SLRC is also a great place to study. Revision, test & exam prep workshops will also be held in the SLRC – look out for the timetables, which will be posted outside the Centre and on the ISE web; www.canberra.edu.au/faculties/ise/student_support/ISE_Learning_Centre/timetable

7: Student Feedback

All students enrolled in this Unit will have an opportunity to provide anonymous feedback on the Unit at the end of the Semester via the Unit Satisfaction Survey which will be presented to you on OSIS. Your lecturer or tutor may also invite you to provide more detailed feedback through an anonymous questionnaire administered through the University's Teaching and Learning Centre (TLC).

8: Authority of this Unit Outline

Any change to the information contained in Section 2 (Academic content), Section 3 (Delivery of Unit and timetable) and Section 5 (Assessment) of this document, will only be made by the Unit Convener if the written agreement of staff and a majority of students has been obtained; and if written advice of the change is then forwarded to each student enrolled in the Unit at their registered term address. Any individual student who believes himself/herself to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convener.

9: Unit Design

1. **Unit:** 7089 Mathematics for Information Sciences, Semester 2, 2009

2. **Time (hours per week)**

Lecture attendance	3
Tutorial/Lab attendance	1
Tutorial Questions	2
Self-study	4
Total	10

3. **Scholarship**

This unit consists of an introduction to some of the basic mathematical ideas that underpin aspects of information sciences. Fields such as computer graphics, computer vision, error correction, data compression and computer security are built on fundamental mathematics.

This unit provides some of this mathematics and consists of two parts. Firstly, it will develop mathematical knowledge that is essential for later work in computer graphics. This includes elementary geometry in dimensions two and three as well as the basics of linear algebra and calculus. Secondly, it will lay the foundation for the application of statistics to the information sciences.

4. Relevance

Analytical skills and mathematical knowledge are foundational for most professionals but they are particularly useful for IT. The mathematical experience that this unit aims to provide is part of the development of those skills and foundational knowledge. Accordingly, the choice of topics in the unit is motivated by their usefulness to the information sciences. In particular, any student who wishes to undertake a serious career in research in the information sciences will be hampered without the basic knowledge that this unit provides. This includes a working knowledge of statistics and for those interested in visual computing, a knowledge of 3d geometry.

5. ICT

The computer package Matlab will be used in tutorials. Mathematics for Information Sciences website will be available for teaching support. This website, rather than WebCT, was chosen because of its flexibility.

6. Teaching

The main pedagogical tools employed in this unit are lectures and tutorial questions. Both routine questions as well as more challenging problems are posed, encouraging students to strengthen their problem solving skills.

Lectures: Basic theory and practice is discussed

Tutorials: Students have the opportunity to learn the theory and the practice. The tutorial question sets, distributed each week and attempted by students, constitute the most important part of the unit.

7. Generic skills

Generic skill	taught	assessed
Analytical thinking	Tutorial exercises both routine and less routine	Class tests, assignment and final exam
Appreciate the role that mathematical reasoning plays in the intellectual process.	Principally in the lecture presentations but also in tutorial exercises	Class Tests and Final Exam

8. Learning

Learning outcome	taught	assessed
Ability to apply analytical	Every lecture and tutorial	Class tests and final exam

thinking to both “theoretical” and “practical” problems	will demonstrate this	
Implement the mathematical method of abstraction	Every lecture and tutorial will demonstrate this	Class tests and final exam