

Mathematical Methods – 577

Unit Outline 2009

Faculty of Information Sciences and Engineering

University of Canberra

*Australian Government Higher Education (CRICOS)
Registered Provider number: #00212K*

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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**
Mathematical Methods
- 1b Unit number**
577
- 1c Semester and year offered**
Semester One 2009
- 1d Credit point value**
3
- 1e Unit level**
1
- 1f Name of Unit Convener and contact details (including telephone and email)**
Yvonne Wisbey, 11C8, +61 2 6201 2951, Yvonne.Wisbey@canberra.edu.au
- 1g Name of Unit Moderator and contact details (including telephone and email)**
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- 1h Administrative contact details (including name, location, telephone and email)**
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2: Academic Content

2a Unit description and learning outcomes

This unit will introduce students to fundamental mathematical fields such as calculus, matrices and geometry. Topics may include equations, graphs, exponentials and logarithms, sequences and series, geometric ideas (tessellations, fractals, symmetry), and applications such as chemical kinetics, ecology and catastrophe theory, mathematical genetics. Each topic will be motivated and illustrated by its application to science and society.

Students will be expected to demonstrate an understanding of the topics covered, and to be able to apply this understanding to real problems in the areas covered.

This unit primarily addresses the UC graduate attributes/generic skills to do with Problem Solving. These are stated in the following terms.

Graduates are expected to be able to apply problem solving processes:

- a. *identify problems and analyse the main features of problems relevant to their professional field;*
- b. *apply appropriate problem solving processes, arguments, critical and creative thinking;*
- c. *implement and evaluate strategies for the resolution of problems;*

2b Prerequisites and/or co-requisites

None.

Assumed Knowledge: High School mathematics to the level of ACT College Major – Mathematics General.

3: Delivery of Unit and Timetable

3a Delivery mode

The unit is delivered in face-to-face mode at UC Bruce campus over the standard semester as per the University Timetable – up to 52 hours of classes per semester. It is also assumed that students can retrieve documents from the unit website, and by email at their UC student account.

Schedule of classes

Lecture A	Wednesday	10:30 – 11:30	5C58
Lecture B	Thursday	12:30 – 13:30	2B11
Tutorial	Wednesday	09:30 – 10:30	11C33
Tutorial	Wednesday	09:30 – 10:30	2C8
Tutorial	Wednesday	14:30 – 15:30	6B46
Tutorial	Wednesday	17:30 – 18:30	11B24

Students should attend all lectures, and one tutorial group. Tutorials will start in Week 2 and will meet each week after that.

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

Wk: Lecture Dates	Activity
1: 25 th & 26 th Feb	Introduction. Mathematics and models. The straight Line. Functional Notation. Special Functions. Polynomials. §3.1, 3.2; §2.1, 2.2, 3.3
2: 4 th & 5 th Mar	Useful functions: exponential and logarithmic. §4.1- 4.2 Inverse of a function. §2.4.
3: 11 th & 12 th Mar	Logarithms §4.3. Using Exponentials and Logarithms §4.4.
4: 18 th & 19 th Mar	Limits. Continuity. §10.1-10.3. Lead into Calculus' first principles.
5: 25 th & 26 th Mar	Calculus I: limits, difference quotients. The Derivative. §11.1 Some differentiation rules. §11.2
6: 1 st Apr 2 nd Apr	Calculus II: Displacement and velocity. Examples of rates of change and relation to derivatives. §11.3. Class Test 1 Topics covered to §11.2
7: 8 th & 9 th Apr	Calculus III: Product Rule. Quotient Rule. §11.4. Chain Rule §11.5. Derivatives of logarithmic & exponential functions. §12.1, 12.2, 12.5... to be continued if necessary.
8 & 9	CLASS FREE PERIOD
10: 29 th & 30 th Apr	Calculus IV: Derivatives of logarithmic & exponential functions. §12.1, 12.2, 12.5. Higher order derivatives, §12.7; Maxima and minima, curve sketching and applications to elementary optimization problems. §13.1- 13.4.
11: 6 th & 7 th May	Calculus V: Elementary optimization problems. §13.6. Matrices I: Matrix arithmetic. §6.1- 6.2
12: 13 th May 14 th May	Matrices II: Matrix multiplication. §6.3 Class Test 2 Topics covered: Calculus II to Matrices I inclusive.
13: 20 th & 21 st May	Matrices III: Linear Systems. §3.4. Solving linear systems of equations by reduction §6.4, 6.5
14: 27 th & 28 th May	Matrices IV: Inverse of a square matrix and applications. §6.6
15: 3 rd & 4 th June	Matrices IV: Matrix Algebra. Applications – Leslie Matrices. Final Exam Practice Test - Revision Lecture.

4: Unit Resources

4a Lists of required texts/readings

Recommended Textbook: E.F. Haeussler Jr, R.S. Paul & R.J. Wood, *Introductory Mathematical Analysis for Business, Economics and the Life and Social Sciences*, 12th Edition, Prentice-Hall, 2008.

4b Materials and equipment

- Textbook
- Scientific calculator -- non-alpha keyboard. Your calculator should have square root, powers, exponentials and logs.
- You will also need access to a computer with e-mail, a web browser, and Adobe Acrobat Reader v5.0 or later.

The computers in the PC labs in Buildings 11 and 10 and in the Building 11 Student Learning Resource Centre (SLRC) are suitable.

4c Unit website

Linked from <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, and cannot serve as a substitute for attendance at face-to-face classes.

5: Assessment

5a Assessment overview

Assessment Item (including exams held in the exam period)	Due Date of Assignments	Weighting (total to equal 100%)
Class Test 1	Thursday Week 6	15% or 25%
Class Test 2	Thursday Week 12	15% or 25%
Tutorial Work/Participation	Tutorial	10%
Final Exam	During Exam Period	50%

5b Details of each assessment item

Class Tests

The two tests will be held during the normal lecture time, and will each be 50 minutes in duration. The permitted materials for each class test are: 1xA4 side of original handwritten notes, scientific calculator (non-alpha) and language dictionary. The scientific calculator is assumed.

The weighting scheme is as follows. If your score on Test 1 is higher than your score on Test 2, then your Test 1 mark will be scaled to a mark out of 25, and your Test 2 mark to one out of 15. If your score on Test 2 is the higher, the weights will be reversed. In effect, if you do poorly on one of the Tests, you have some opportunity to recover on the other.

Tutorial Work/Participation

Tutorial work and participation are essential for mastery of the material delivered in lectures and for students to achieve this unit's learning outcomes. You are expected to have attempted set problems before you attend the weekly tutorial and to contribute to the tutorial discussion. A mark out of 10 will be awarded for each tutorial. At the end of the semester your tutorial marks will be averaged (a minimum of seven sessions will be included in the averaging). Tutorial marks will undergo a moderation process across all tutorials.

Final Exam

The Final Exam will be 3 hours long, and will be held during the exam period at the end of semester. The permitted materials for the final exam are: 2xA4 sides of original handwritten notes, scientific calculator (non-alpha) and language dictionary. It is assumed you will have a scientific calculator at the exam.

5c Special assessment requirements

Satisfactory performance on the Final Exam is required to achieve passing grades. The definition of 'satisfactory' is as follows:

Grade:	Overall Scaled Score	Scaled Final Exam Score
HD	≥ 85	≥ 75
DI	≥ 75	≥ 65
CR	≥ 65	≥ 50
P	≥ 50	≥ 40

Therefore to obtain one of the above grades in Maths Methods, it is required that you meet both the criteria in the corresponding row of the table.

5d Supplementary assessment

None

5e Text-matching software

None

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 or the Disabilities Office as soon as possible so the necessary arrangements can be made.

6c Attendance requirements

The primary delivery mode is face-to-face, and it is expected that you attend the classes.

6d Required IT skills

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

Apart from normal fees, students should expect to pay purchase costs for textbook and calculator. Some printing costs may also be incurred.

6f Additional information

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, generic skills and survival 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 Centre for the Enhancement of Learning Teaching and Scholarship (CELTS).

8: Authority of this Unit Outline
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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 him/herself to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convener.