MACQUARIE UNIVERSITY
Division of Information and Communication Sciences
MATH235 MATHEMATICS IIA (2004 D1)
STUDY GUIDE.

Lecturers
Dr. Gerry Myerson (Linear Algebra)  E7A415,  9850 8952  gerry@maths.mq.edu.au
Dr. Tanya Schmah (Vector Calculus)  E7A416,  9850 8949  schmah@maths.mq.edu.au

Lectures
Lecture 1  Tuesday  9am  E6A102  (linear algebra)
Lecture 2  Tuesday  10am  E6A102  (linear algebra)
Lecture 3  Thursday  12noon  E7B100  (calculus)
Lecture 4  Friday  12noon  E6A102  (calculus)

The section schedule (linear algebra vs. calculus) may change from time to time. On Tuesday 6 April, both lectures will be on calculus. Further changes may be announced during the semester.

Unit web-page: http://www.maths.mq.edu.au/~gerry/Math235
We will post assignments, assignment solutions and tutorial questions on this page throughout the term, as well as possible additional material.

Unit outline
The unit consists of two sections:

Linear Algebra (G. Myerson):
Inner product spaces
Fourier series
Change of basis
Orthonormal diagonalization
Applications to least squares approximation and quadratic forms
Linear transformations
Matrix representation of linear transformations
Complex vector spaces
Jordan canonical forms (time permitting)

Vector Calculus (T. Schmah):
Calculus as a tool for understanding the properties of functions with $n$ inputs and $m$ outputs. Limits and continuity of such functions. Differential calculus: partial derivatives, the derivative as a local linear approximation, chain rule, directional derivatives, gradients, Jacobians. Applications to: Taylor series, implicit and inverse functions, critical points, extrema, Lagrange multiplier methods. Integral Calculus: Multiple Integrals, iterated integrals, change of variables in multiple integrals.

Reference books for Linear Algebra:
Anton, "Elementary Linear Algebra",
WWL Chen, Linear Algebra MATH 235

Reference books for Vector Calculus:
WWL Chen, Multivariable Analysis MATH 235
Tutorials
Tutorials commence in Week 2. Tutorial rooms will be posted on the Mathematics notice board on Level 2 above the courtyard in Building E7B. There are three time slots: Tuesday 12noon, Wednesday 2pm, and Friday 11am. Tutorial questions will be provided in advance. During the tutorials you will have the opportunity to ask your tutor for help with these or any other questions. To get the most out of the tutorials, you should spend some time attempting to solve the questions prior to the tutorial session.

Assignments
There will be five (5) assignments. Each will contain questions from both strands of the unit. Make a serious attempt on all questions. Start working on the questions well before the due date, you may need several attempts before you can solve the problems. Do not be discouraged if you cannot solve them at your first attempt. Firstly devise a plan, then try to carry it out, then check it out; if it wasn't successful choose another plan, repeat the cycle.

Assignments are due by **12noon** on the following days:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Week</th>
<th>Due Date</th>
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<tr>
<td>1</td>
<td>3</td>
<td>Monday 15 March</td>
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<tr>
<td>2</td>
<td>5</td>
<td>Monday 29 March</td>
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<td>3</td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
<td>12</td>
<td>Monday 31 May</td>
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The problems in the assignments are the bare minimum needed to consolidate the material in this unit. Performance on the final exam is highly correlated with the number of problems successfully attempted during the unit. Assignments should be written neatly on one side of the paper and stapled together. They are to be placed in the relevant assignment box near Room E7B 363. Assignments are due by noon on the days indicated. Late assignments will not be marked. If you are unable to complete an assignment, it is better to submit partial answers on time than nothing at all. Your answers should indicate that you have thought about what is written, and the marks will reflect the quality of your presentation as well as the accuracy of your arguments. Take care that your answers are plausible; in particular it is expected that you should check your solutions.

Plagiarism: It is permissible, and indeed you are encouraged, to discuss the assignment questions with other people, but you must then write out your solutions independently, without reference to anyone else’s work. If in the course of writing up your answer, you realise you need more help, then you may get that help, but you should ensure that the end result is that you have understood your entire answer and are able to reproduce it independently.

Students who are found to have participated in deliberate copying will be subject to disciplinary action which may include the forfeiture of all assignment marks or failure in the unit. Please see the section concerning plagiarism on pages 42-43 in the 2004 Handbook of Undergraduate Studies.

Tests:
There will be two (2) tests, conducted in Weeks 5 and 10.
Test 1: Friday 2 April in the 12noon lecture in E6A102.
Test 2: Friday 21 May in the 12noon lecture in E6A102.

You are expected to attempt both of these tests. Please contact one of the lecturers in case of difficulty over this. Warning: see “Expected Participation” below.
How to Contact the Lecturers

Gerry Myerson: I’m in my office most of the time from 9am to 5pm on most weekdays when the university is in session. Drop in, or make an appointment to ensure that I’m available.

Tanya Schmah: I would prefer that you visit during my office hours. These will be announced in lectures and posted on my door and are subject to change throughout the semester. The provisional schedule is as follows: Tuesday 3-5pm, Wednesday 3-5pm Friday 3-4pm

You may also contact us by email or phone. Telephone numbers, office numbers and email addresses are given on the first page of this study guide.

Learning Outcomes In this unit, you are expected to develop a good understanding of the topics outlined on the first page of this study guide. You should improve your skills in the following areas common to all mathematical studies:

- Solving problems, including: formulating a precise mathematical question from a “real world” problem; and identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Expressing yourself clearly and logically in writing.

More broadly, you are expected to improve your generic skills in the following areas: literacy and numeracy, self-awareness and interpersonal skills, communications, critical analysis, problem solving and creative thinking.

By the end of this unit, you should be able to give clear and complete answers to questions of a similar level of difficulty to those on your assignments. This includes being able to formulate logical arguments more complex than have been expected of you in earlier mathematical units. Your grades will reflect your understanding of the subject and your ability to answer questions clearly and logically. For an explanation of the interpretation of grades, please see Rule 10 of Bachelor Degree Rules, on pages 88-89 in the 2004 Handbook of Undergraduate Studies.

Note:
A grade of at least a P in MATH235 is a prerequisite for the unit MATH236 and for some 300-level Mathematics units. This prerequisite will not be waived.

Assessment
The 5 assignments will count for 10% of the final grade. The two tests will count for 20% of the final grade. The final exam will count for 70% of the final grade.

Withdrawal from course
Your attention is drawn to the following deadline:
Wednesday 31 March: Last day for students to lodge a “Change of Program” form to discontinue the unit and to be regarded as not effectively enrolled (NE). See page 89 of the 2004 Macquarie University Handbook of Undergraduate Studies.

If you submit a form to withdraw after 31 March, you will be awarded the grade FW. A grade of W (withdrawal without academic penalty) will only be awarded in the case of fully documented “unavoidable disruption”. See pages 36 & 89 of the 2004 Macquarie University Handbook of Undergraduate Studies.
Student feedback and evaluation of the unit
There will be a formal evaluation of the unit towards the end of the semester. You are also encouraged to give feedback to the lecturers during the semester; in particular, any comments like “I can’t read your writing” should be made as early as possible!

Expected Participation
Students are expected to submit all 5 assignments and to sit both tests. Requests for “special consideration” will not be looked on with favour if the student making the request has not submitted reasonable attempts on at least 4 assignments and sat both tests. Please contact one of the lecturers in case of difficulty over the participation requirements. Past experience clearly indicates that students who do not attempt assignments throughout the semester rarely perform well in the final examination.

Special Consideration
If illness or misadventure makes it impossible for you to sit for the final examination, or interferes significantly with your performance in the examination, then you are permitted to request "special consideration". If you have demonstrated satisfactory participation (see above), and if we are satisfied (eg, by your previous performance in the unit, or by the quality of work you have been able to produce in the examination) that there is evidence that you have not been able to show your true ability, then we may decide to invite you to sit for a special examination to resolve your grade for the unit. You should note the following:

* See Rule 9 (1) and 9 (2) of Bachelor Degree Rules, concerning examinations, on page 88 in the 2004 Handbook of Undergraduate Studies.

* Every student is entitled to apply for special consideration, and each application is considered on its merits. However, it is the decision of the Division whether to offer a special examination or not. As a general rule, a special examination is offered if illness or misadventure interferes with an otherwise satisfactory performance. Consequently, a special examination is not offered unless all criteria concerning expected participation have been satisfied.

* The examination period for this semester is between 16-06-2004 and 30-06-2004. Please note that special consideration cannot be made for those who have merely made inappropriate travel arrangements.

* It is essential that you notify the Registrar in writing of the misadventure, accompanied by any appropriate documentary evidence. It is also advisable for you to let us know informally that you have applied to the Registrar.

* The purpose of the special examination is to resolve the temporary difficulty caused by your illness or misadventure, not to give you an advantage over other students by allowing you extra time to study. We will therefore hold the special examination as soon as possible. In determining your grade for a special examination, we may also take into account the possibility of extra study time available to you.

* In view of the previous paragraph, you must make sure that you are readily available to be contacted, and must hold yourself available to attend the special examination at short notice on the date and time the Division sets. This is provisionally set for 16-07-2004.

* If you elect to be away from Sydney during the special examination, or cannot be contacted, or are unavailable to attend the special examination, then the Division will accept this as a firm indication that any request you may have submitted for special consideration does not apply to this unit.