



UNSW
THE UNIVERSITY OF NEW SOUTH WALES

FACULTY OF SCIENCE
SCHOOL OF MATHEMATICS AND STATISTICS

MATH2089
NUMERICAL METHODS and
STATISTICS

SESSION 1, 2009



Course information

- 6 UOC
- Prerequisites: MATH1231 or MATH1241 or MATH1251
- Exclusions: BEES2041, BIOS2041, CVEN2002, CVEN2025, CVEN2702, ECON2215, MATH2049, MATH2099, MATH2801, MATH2829, MATH2839, MATH2841, MATH2859, MATH2899, MATH2901, MINE270
- This course is only available to students for whom it is specifically required as part of their program.

Course structure

This course consists of two strands – one on **numerical methods** and one on **statistics**. Each strand has 2 lectures per week and one tutorial or laboratory class per week.

Course staff

- The course has two lecturers
 - A/Prof Rob Womersley (Numerical Methods)
RC-3062, phone 9385-7043, email R.Womersley@unsw.edu.au
 - Dr. Diana Combe (Statistics)
RC-1032, phone 9385-7022, email: diana@unsw.edu.au
 - Consultation times will be announced later.
- You will also be assigned a tutor for the Numerical Methods tutorials/laboratories and a tutor for the Statistics tutorials/laboratories. They should be your first point of contact for any questions about this course.

Location and Times

- Lectures
 - Tuesday 9 – 11 Rex Vowels (Statistics)
 - Thursday 4 – 6 Rex Vowels (Numerical Methods)
- Tutorials/Laboratory classes
 - Numerical Methods strand
 - Tutorial class odd weeks (except the WEEK 1 tutorial is in the computer laboratory RC-G012)
 - Laboratory class (RC-G012) even weeks
 - Statistics strand
 - Laboratory class (RC-G012) odd weeks (COMMENCING IN WEEK 1)
 - Tutorial class even weeks

The laboratory classes for both strands are held in the School of Mathematics and Statistics ground floor computer laboratory in the Red Centre.

Note that in **Week 1 both** the Numerical Methods and Statistics strands have laboratory classes.

Week 0

During Week 0 you should make sure you can logon to the computers in the ground floor laboratory (RC-G012). You will first need to set your Mathematics and Statistics password using the *Maths Info* link on the course home page. If you are having difficulties please go to the Computing Centre helpdesk on the mezzanine level of the Red Centre.

You must have set your password and be able to login to the Mathematics & Statistics computer laboratories BEFORE the first labs in Week 1.

Course Web Site

The MATH2089 course web site will be available through the My eLearning Vista web portal

<http://vista.elearning.unsw.edu.au/>

You should check the course web site regularly for new and updated information.

Announcements

Announcements may be made in lectures or through the course web site.

Course description

This course gives an introduction to numerical methods and statistics essential in a wide range of engineering disciplines.

- **Numerical methods:** Computing with real numbers. Numerical differentiation, integration, interpolation and curve fitting (regression analysis). Solution of linear and nonlinear algebraic equations. Matrix operations and applications to solution of systems of linear equations, elimination and tridiagonal matrix algorithms. Introduction to numerical solution of ordinary and partial differential equations
- **Statistics:** Exploratory data analysis. Probability and distribution theory including the Binomial, Poisson and Normal distributions. Large sample theory including the Central Limit Theorem. Elements of statistical inference including estimation, confidence intervals and hypothesis testing. One sample and two-sample t-tests and F-tests. Simple and multiple linear regression and analysis of variance. Design and analysis of experiments. Statistical quality control.
- Applications drawn from a variety of engineering disciplines.
- Matlab will be used extensively in this course.

Expected Learning Outcomes

The **Numerical Methods** strand will enable you to understand how mathematical models of problems arising in Engineering (and other areas) can be solved numerically. At the end of this course you will be able to

- identify risks associated with floating point computations
- demonstrate a basic knowledge of the techniques for accurate and efficient solution of models based on linear and nonlinear systems of equations, ordinary differential equations and partial differential equations.
- apply these techniques to practical problems in Engineering.
- use Matlab for the implementation and application of numerical methods and the visualization of results

The **Statistics** strand 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; and,
- 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 Course and Teaching Evaluation and Improvement (CATEI) Process. 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.

Assessment

The final grade in MATH2089 will be based on the sum of the scores from each of the assessment components in each of the Numerical Methods and Statistics strands. Final grades may be adjusted by scaling with the approval of the appropriate departmental meeting.

To pass this course, you need to have achieved a mark of at least 40 in both the statistics and numerical methods strands. If you do not get at least 40 in each strand, your overall mark will be capped at a maximum of 45. You will still be entitled to sit the concessional additional assessment exam if your final mark is 40 or above. See the section **Important Information for Undergraduate Students** on page 9 of this document.

Examples

- You get 60 in stats and 40 in numerical methods, averaging 50, which is a pass.
- You get 35 in stats and 65 in numerical methods, averaging 50. As the stats is less than 40 your final mark is 45, but you can sit the concessional additional assessment.
- You get 55 in stats and 23 in numerical methods averaging 39 which is your final mark, and you are not entitled to sit the concessional additional assessment.

Numerical Methods

ASSESSMENT	DETAILS	MARKS	DUE DATE
Class Tests	Two tests (25-minutes long) administered during tutorials	10+10	Week 6 (Lab) and Week 11 (Tut)
Lab attendance	Satisfactory participation in Numerical Methods labs	5	Throughout session
Final examination	During the exam period. 3 hours (including Statistics)	60	June 2009
Total		85	

Statistics

ASSESSMENT	DETAILS	MARKS	DUE DATE
Class Tests	Two tests (25-minutes long) administered during tutorials	10+10	Weeks 4 and 10 tutorials
Lab attendance	Satisfactory participation in Statistics labs	5	Throughout session
Final Examination	During the exam period. 3 hours (including Numerical Methods)	60	June 2009
Total		85	

Matlab (counting equally for Numerical Methods and Statistics strands)

ASSESSMENT	DETAILS	MARKS	DUE DATE
Online Matlab quizzes	Start as soon as possible from Week 0 at your own time. Go to the course web site	5+5	End of Week 2
Matlab computer Test	Lab test held in blocks in computer laboratory	10+10	Week 9

Rationale for assessment: The class tests will give students an opportunity to get feedback on their progress and mastery of the material. In particular the second Statistics class test in Week 10 will be used to test the students' understanding and formulation of hypothesis testing.

Details of the material to be assessed in each class test will be made available in the couple of weeks before the test. Note **that students must sit the test in the tutorial in which they are enrolled** unless they have prior written approval from the lecturer. Students who are unable to attend for a test must give a medical certificate to the tutor or lecturer. There will be no opportunity to resit 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 MATH2089 is assessed in the following ways:

- Online quizzes to get you started with the basics of Matlab.
- Satisfactory attendance at labs.
- Block laboratory test in week 9.

You will be required to arrange a time to do your block lab test through the School of Mathematics and Statistics' 'Student Web Portal', to which there will be a link on My eLearning Vista. Further details of the MATLAB test will be made available on My eLearning Vista and in lectures closer to the time. Students are advised to arrange the time for the Matlab block test as soon as possible as there are limited places available at each time. Students who are unable to attend for the test at the time at which they have booked must give a medical certificate to the lecturer.

Because of the block lab test in Week 9, your regular Statistics computer laboratory will **not be held that week, however the Numerical Methods tutorial will be held as usual.**

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

Numerical Methods Syllabus

The course will include material from the following. The course content is ultimately defined by the material covered in lectures.

Outline lecture notes for the numerical methods strand will be made available through the course web page. They are not a substitute for attendance at lectures.

Week	Topic	Math Content	Matlab Content
1	Computer arithmetic and Matlab	IEEE format, absolute and relative rounding errors, machine precision	help, ops, format, eps, realmax, realmin, inf, nan, script M-files
2	Polynomial approximation and interpolation <i>Online Matlab quizzes due</i>	Horner's method, review of Taylor polynomials and remainder formulae, order notation	linspace, plot, elfun, input, anonymous functions
3	Nonlinear equations	bisection method, fixed point iteration, Newton-Raphson and secant methods	function M-files, workspaces, argument passing, fzero
4	Numerical differentiation	Forward, backward and central difference approximations to derivatives, truncation vs rounding error, formatted output	diff, fprintf, for loops
5	Linear systems	LU factorization, multiple right-hand-sides, triangular linear systems	\, lu, linsolve, chol
	Mid session break		

6	Special linear systems <i>Class Test in Lab</i>	Diagonally dominant, tridiagonal, positive definite, sparse, fill-in, iterative methods	<code>sparse</code> , <code>spdiags</code> , <code>spy</code> , <code>symamd</code> , <code>colamd</code>
7	Sensitivity analysis, singular values, eigenvalues and least squares	Vector and matrix norms, condition numbers, pivoting Diagonalizing a symmetric matrix, singular values, SVD, pseudo-inverse, least squares Over-determined linear systems QR factorization, least squares fit	<code>norm</code> , <code>cond</code> , <code>rcond</code> <code>eig</code> , <code>svd</code> , <code>pinv</code> <code>qr</code>
8	Numerical integration	Midpoint, trapezoidal, Simpson and Gauss rules, error, convergence, degree of precision	<code>trapz</code> , <code>quad</code>
9-10	Ordinary Differential Equations <i>Week 9 Matlab lab test</i>	First order systems of ODEs, Euler method, Runge-Kutta methods, stiff problems, implicit Euler method, boundary value problems	<code>ode23</code> , <code>ode45</code> , <code>ode15s</code> , <code>ode23s</code>
11-12	Partial Differential Equations <i>Class Test in Week 11 Tut</i>	Parabolic, elliptic and hyperbolic equations, heat, wave and Laplace equations, finite difference approximation of heat equation (steady state, time dependant) in one space variable, explicit vs implicit methods	<code>meshgrid</code> , <code>surf</code> , <code>pdepe</code>

Numerical Methods Strand References

- Singiresu S. Rao, *Applied Numerical Methods for Engineers and Scientists*, Prentice Hall, N.J., 2002
- Cleve Moler, *Numerical Computing with Matlab*, SIAM, 2004
<http://www.mathworks.com/moler>
- John Mathews and Kurtis Fink, *Numerical Methods using Matlab*, (4th Edition), Pearson, N.J., 2004

Matlab software

Matlab R2008b 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.

The **Matlab and Simulink Student Version R2008b** is also available through the UNSW bookshop for \$119. This includes the Symbolic Math, Control Systems, Signal Processing, Statistics, Optimization and Image Processing toolboxes. It will be useful not only in this course but also in other courses. At <http://www.bookshop.unsw.edu.au> do a quick search for "Matlab student".

Matlab References

- School of Mathematics and Statistics, *Introduction to MATLAB*, 2009 (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.

Statistics

Required Text

- J. Devore and N. Farnum, Applied Statistics for Engineers and Scientists, 2nd Edition, Duxbury Press, Thomson Publishers.

Lecture notes for the statistics strand will be made available via course web site. They are not a substitute for attendance at lectures. In addition Laboratory and Tutorial material will be made available on this website.

Help with the course: Your lecturer will have regular consultation times which will be advertised in lectures and on My eLearning Vista. There will also be additional regular consultation times advertised with other members of the statistics department. At these times you are welcome to just turn up! For other consultation times, please email your lecturer for an appointment.

Peer Support in Statistics: There will be a peer support session through the Student Support scheme in the School of Mathematics and Statistics, where you can get help in the Statistics component of MATH2089. Details will be announced in lectures and on My eLearning Vista.

Syllabus and approximate schedule

Week of Session	Commencing	Topic	Text Reference
1	9 March 2009	Data and Distributions, Intro to densities	1.1, 1.2, 1.3,1.4
2	16 March 2009	Distributions, including normal, binomial and Poisson. numerical summaries of data	1.4, 1.5, 1.6, 2.1
		<i>Online Matlab quizzes due</i>	
3	23 March 2009	Numerical summaries of data. Obtaining valid data	2.2, 2.3, 2.4 Chapter 4
4	30 March 2009	Probability concepts	5.1,5.2,5.3
		<i>Class test</i>	
5	6 April 2009	Random variables and sampling distributions	5.4,5.5,5.6
Mid session Break			
6	20 April 2009	Quality and Reliability Estimation	Chapter 6 7.1, 7.2, 7.3
7	27 April 2009	Confidence Intervals Testing statistical hypotheses	7.4, 7.5 8.1, 8.2, 8.3
8	4 May 2009	The analysis of variance	9.1, 9.2, 9.3, 9.4
9	11 May 2009	Multivariate Data and Correlation	3.1, 3.2, 3.3, 3.4, 3.5
		<i>Matlab Lab test</i>	
10	18 May 2009	Inferential methods in Regression and Correlation – one predictor	11.1, 11.2, 11.3
		<i>Class test</i>	
11	25 May 2009	Inferential methods in regression and correlation – many predictors	11.4, 11.5, 11.6
12	2 June 2009	Experimental design	Chapter 10

Library

- The library has a mathematics subject guide on the web which is a good starting point for mathematical and statistical information. They are at <http://info.library.unsw.edu.au/> and <http://info.library.unsw.edu.au/psl/guides/math/mathkey.html>

Additional Assessment

- The School of Mathematics has a strict policy on [additional assessment](#). It can be found at <http://www.maths.unsw.edu.au/students/current/policies/studentpolicy.html>

Plagiarism and academic integrity

- Plagiarism is the presentation of thoughts or work of another as one's own, Issues you must be aware of regarding plagiarism and the university's policies on academic integrity can be found at <http://www.lc.unsw.edu.au/plagiarism> and http://www.lc.unsw.edu.au/plagiarism/plagiarism_STUDENTBOOK.pdf

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/students/current/policies/studentpolicy.html>.

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/students/current/policies/studentpolicy.html>.

Occupational Health and Safety

- Occupational Health and Safety policies and expectations: <http://my.unsw.edu.au/student/atoz/OccupationalHealth.html>

Equity and Disability

- 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 Student Equity and Disabilities Unit (9385 4734 or <http://www.studentequity.unsw.edu.au/>). 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.

SCHOOL OF MATHEMATICS & STATISTICS
Semester 1 2009

IMPORTANT INFORMATION FOR UNDERGRADUATE STUDENTS

The School of Mathematics and Statistics has adopted a number of policies relating to enrolment, attendance, assessment, plagiarism, cheating, special consideration etc. These are in addition to the policies of the University. Please take the time to read the following policies.

Individual courses may also adopt other policies in addition to or replacing some of the School ones. These will be clearly notified in the Course Initial Handout and on the Course Home Page on the School of Mathematics and Statistics web site.

<http://www.maths.unsw.edu.au/homepage.html>

Students in courses run by the School of Mathematics and Statistics should be aware of the School and Course policies by reading the appropriate pages School of Mathematics and Statistics web site.

<http://www.maths.unsw.edu.au/students/current/policies/studentpolicy.html>

The School of Mathematics and Statistics will **assume that all its students have read and understood the School policies** on the above pages and any individual course policies on the Course Initial Handout and Course Home Page. Lack of knowledge about a policy will not be an excuse for failing to follow the procedures in it.

The following is a brief outline of some of the most important Mathematics and Statistics School policies.

1. Course Enrolment, Tutorial Enrolment

It is each student's responsibility to know the rules for their degree program and be enrolled in the correct courses by the census date. This information can be found through the 2009 UNSW On-Line Handbook at the following web site:

<http://www.handbook.unsw.edu.au/2009/index.html>

The School of Mathematics and Statistics can advise students if needed, but is not responsible for the student's program as it is not the Program Authority for any undergraduate program.

Students must be enrolled in a tutorial with the School of Mathematics and Statistics no later than week 1 if there are tutorials for a course. All assessment is recorded by tutorial and marked tests and assignments are normally handed back through tutorials. If a student is not in a tutorial then the student's marks may not be recorded.

2. EMail

The University's official form of communication to student's is through email sent to the student's UNSW email account at z<student id>@student.unsw.edu.au. An email sent to student's at z<student id>@student.unsw.edu.au will be viewed as official and the School of Mathematics and Statistics will assume that it has been read within 3 working days. It is your responsibility to check these emails. You can organise your UNSW email to be redirected to your preferred e-mail account by logging on to the following: <https://wombos.unsw.edu.au/diy/> address and going to the Do-It-Yourself section. You will need your student number and Unipass to be able to do this.

3. Attendance and participation during term

Week Zero is an Official week for Semester 1. It is the week before the commencement of the main 12 week teaching period (Semester). All students should ensure that they are available to attend in Week Zero.

While no formal class teaching takes place in Week Zero, a range of compulsory academic activities are held in some programs and courses. The course activities in Mathematics and Statistics for commencing students will be stated on your Course Outline/Handout. Go to the course homepage at the following web site and check each of your courses for details regarding activities in Week Zero.

<http://www.maths.unsw.edu.au/students/current/currenthome.html>

It is UNSW policy that attendance at lectures and tutorials etc is compulsory unless the student has permission of the Registrar. Consequently the School expects students to fully participate in all classes during the semester.

In line with this, the School of Mathematics and Statistics marks the roll at all tutorials. If a student does not attend at least 70% of the tutorials then they may not be eligible for any special consideration if that is requested.

It is expected that students attempt all tests, assignments, etc during the semester unless prevented by illness or misadventure. Tests and assignments are designed to test students' current knowledge and to assist with ongoing learning. Special consideration for final exams will not be given to students who miss more than a small number of tests or assignments. An exception may be made for long-term documented illness or misadventure.

4. Cheating and Plagiarism

Cheating at tests, exams or copying of assignments or any other person's work are all treated as Academic Misconduct and are severely punished. The University also has a strong policy on plagiarism.

See <http://www.lc.unsw.edu.au/plagiarism/index.html>

Also see

<http://www.maths.unsw.edu.au/students/current/policies/misconductpolicy.html>

5. Release of Marks, Disputes over Marks

The School endeavours to return student's tests and assignments within a short time and the marks for these are then displayed on the MathsStats secure student web portal within 7 days of the work being returned.

If a student has a dispute over the mark awarded then they must take the matter up as soon as possible with the tutor who marked the piece of work (or otherwise the Course Convenor). If it is not resolved at that time, then the student may appeal. For information see:

<http://www.maths.unsw.edu.au/students/current/policies/studentpolicy.html>

Disputes over incorrect recording of marks must be taken up no later than the first Friday following the end of semester. For Semester 1 2009 this cut-off date is Friday 12th June. After that day no recorded during-semester mark will be changed even if we have made an error.

The provisional final marks in each Mathematics and Statistics course will be available on the MathsStats secure student web portal by the Friday following the last day of exams. Note that this is earlier than the official final marks are released by the University so as to give students notice of possible additional assessment. The marks are not official until they are released by the University, usually a week after this.

Disputes over final marks awarded must be taken up following UNSW guidelines with the Course Convenor, Director of First Year or Director of Undergraduate Studies, as appropriate, and if necessary UNSW Student Central within 15 working days of the release of the results.

6. Special Consideration for Illness or Misadventure

Special consideration may be granted for an illness or misadventure (that is, some other event that occurs that is outside the student's control) that affects a student's study in more than a minor way. This does not apply to

anything that affects a student's study that is employment related as the University expects that employment will not affect a student's study. Anything related to a student's social or sporting life is also not included.

See also <http://www.maths.unsw.edu.au/students/current/policies/illnesspolicy.html>

In all cases where a student wishes to ask for special consideration, then the student must present proper documentation – either a doctor's or counsellor's certificate for an illness or suitable documentation of the misadventure (such as a police report).

The procedure in cases of illness or misadventure is:

- a. If you miss a lecture, you do not need to notify us.
- b. If you miss a tutorial, give the tutor documentation at the next tutorial and ask that it be indicated on the roll.
- c. If you miss a class test at a tutorial, give the tutor documentation at the next tutorial and ask that they indicate it on the mark list and roll. If the test is at a lecture, give documentation to the Course Convenor.
- d. If you miss a class test worth at least 20% of the final mark, then apply for special consideration through UNSW Student Central and give the Course Convenor a copy of the application as soon as possible.
- e. If you miss an assignment, give documentation to the Course Convenor. Note that as assignments are available for an extended period, the illness or misadventure must be of an extended nature and not just on the last day or so before the due date.
- f. If you miss a final exam through illness or misadventure or are significantly affected by such during the exam period, then apply for special consideration through UNSW Student Central. There is no need to give a copy to the School.
- g. If you have long-term illness or misadventure then you should consult and register with the School Director of First Year or Director of Undergraduate Studies, as appropriate, as early as possible. Claims for long-term problems will normally not be accepted once the examination period has started and definitely not after the results are released.

7. Additional Assessment Exams

See the full policy at <http://www.maths.unsw.edu.au/students/current/policies/addasspolicy.html>

There are two types of Additional Assessment: Normal and Concessional. The actual exam is the same for both.

The School runs all its Additional Assessment Exams on the first Tuesday to Thursday after the official marks are released by the University. The detailed Timetable is normally available on the MathsStats web site the week before the Additional Assessment Exams are held. Additional Assessment Exams for Semester 1 will be held 14th and 15th July.

If awarded an Additional Assessment Exam you must take it at the announced time within that period (unless you have two Mathematics or Statistics exams at the same time). For Normal Additional Assessment only, exceptions to this rule may be made if there is a long-term illness or misadventure registered in advance with the Director of First Year or Director of Undergraduate Studies, as appropriate, as early as possible. Students do not need to notify the School that they are attending.

a. Normal Additional Assessment

Permission to take a Normal Additional Assessment Exam may be granted to students who miss the final exam through illness or misadventure. For such students the Additional Assessment Exam mark will take the place of the final exam mark. Permission to take a Normal Additional Assessment Exam may also be granted to students who are seriously affected by illness or misadventure during the exam period and who have failed or whose

performance is significantly less than expected on the basis of during-semester assessment. For such students any Additional Assessment Exam mark will replace the final exam mark and the final mark re-calculated (**up or down**) accordingly (unless that reduces the final mark from a pass to a fail in which case the final mark will be 50). In both cases the student must apply and provide proper documentation through UNSW Student Central.

Note that NO Normal Additional Assessment Exam will be awarded unless the student has adequately participated in their class during the semester. This is taken as meaning: attending at least 70% of the tutorials and having an overall during-semester (before final exam) mark of at least 40%.

Permission to take the Normal Additional Assessment Exams will be shown on the provisional and official final marks by a **grade of WC**.

The School will try to notify students who are awarded Normal Additional Assessment by email, but it is still the student's responsibility to check if they have been awarded it.

Disputes over non-awarding of Normal Additional Assessment must be taken up with the Director of First Year or Director of Undergraduate Studies **before** the Additional Assessment exam period commences.

b. Concessional Additional Assessment

Concessional Additional Assessment is **automatically awarded** to any student taking a MATH2### or MATH3### course (but to no others) who gets a mark of 40 to 49. The maximum mark that can be awarded after Concessional Additional Assessment is 50. Permission to take Concessional Additional Assessment is **not notified in any way other than this notice**. Students do not need to notify the School that they are attending.

John Steele,
Director of Undergraduate Studies, for the Head of School

January 2009