

THE UNIVERSITY OF SYDNEY
Semester 1, 2009

Information Sheet for **MATH1002 Linear Algebra**

Web Site

It is important that you check the Junior Mathematics web site regularly.

It may be found by following links from the University of Sydney front page, or from WebCT, or by going directly to

<http://www.maths.usyd.edu.au/u/UG/JM/>

Important announcements relating to Junior Mathematics are posted on the site, and there is a link to the MATH1002 page, where you will find on-line resources and other useful links. Announcements regarding assessment tasks will be made on this page at various times throughout the semester. Make sure you check the page weekly.

Lectures

There are 3 different lecture streams. You should attend one stream (that is, two lectures per week), as shown on your personal timetable.

Times	Location	Lecturer	Consultation
8 am Mon & Tue	E Ave Aud	A/Prof W Gibson, Carlaw room 634	Mondays, 1-2pm
11am Mon & Tue	E Ave Aud	Dr B Crossman, Carlaw room 621	Tuesdays, 1-2pm in Carlaw 361
11am Mon & Wed	Carlaw 157	A/Prof D Easdown, Carlaw room 619	Wednesdays, 1-2pm

Lectures run for 13 weeks, and the last lecture will be on Tuesday 2 June, or Wednesday 3 June.

Tutorials

Tutorials (one per week) start in week 1. There is no tutorial in week 13. You should attend the tutorial given on your personal timetable. Attendance at tutorials will be recorded. Your attendance cannot be recorded unless you attend the tutorial in which you are enrolled. Your attendance record will be taken into account in the event that you apply for special consideration at any stage.

Tutorial sheets

The tutorial question sheets for a given week will be available on the MATH1002 web page. **You must print out the current week's tutorial sheet from the web, and take it to your tutorial with you.** Solutions to tutorial exercises for week n will usually be posted on the web by Friday of week n .

Assessment

Your final raw mark for this unit will be calculated as follows:

- 65%: Exam at end of semester 1.
- 30%: Quiz mark.
- 5%: Assignment mark.

Your final raw mark is then scaled to produce your final mark. Marks are scaled so that the distribution of grades is consistent with the quality of the class, and the difficulty of the unit, as required by the University.

Examination

There is one examination of 1.5 hours duration during the examination period at the end of semester 1. Further information about the exam will be made available at a later date.

Quizzes

Two quizzes will be held during tutorials, in the **weeks beginning 30 March and 4 May**. Each quiz is worth 15% of your final raw mark. You must sit for the quiz during the tutorial in which you are enrolled. Your quiz mark will not be recorded if you sit for the quiz in a tutorial in which you are not enrolled.

Assignments

One assignment will be marked, and will be worth 5% your final raw mark. The assignment will be due on **Thursday 21 May**. Please see page 26 of the Junior Mathematics Handbook for details relating to the submission of assignments.

Another set of assignment questions will be made available, but these will not be marked, and will not count towards your final mark. Solutions and a marking scheme will be provided, and you are encouraged to mark the questions yourself, or ask a friend to mark it for you (using the marking scheme provided). This will provide you with valuable feedback on how you are handling the material, and help you prepare for the exam.

Text book

David Easdown. *A First Course in Linear Algebra*. Available from the Co-op Bookshop.

Course notes - extra reference material

CJ Durrant. *Lecture Notes for MATH1002/1902: Vectors*. School of Mathematics and Statistics, University of Sydney, Sydney, NSW, Australia.

J Henderson and R Howlett et al. *Lecture Notes for MATH1002/1902: Linear Algebra*. School of Mathematics and Statistics, University of Sydney, Sydney, NSW, Australia.

Both sets of notes are available from KOPYSTOP, 55 Mountain St Broadway. (It is not essential to buy these notes.)

Where to go for help

For administrative matters, go to the **Student Office, Carlaw room 520**.

For help with mathematics, see one of the MATH1002 lecturers. Lecturers guarantee to be available during their indicated consultation hour, but may well be available at other times as well.

If you are having difficulties with mathematics due to insufficient background, you should go to the Mathematics Learning Centre (Carlaw room 455).

Week-by-week outline

Week	Topics
1	Geometric vectors in the plane and space. Scalar multiples. Position vectors. Parallelogram, commutative and associative laws of vector addition. Zero vector. Negative vectors and subtraction. Properties and applications to geometry.
2	Unit vectors. Hat of a vector. Cartesian form and component-wise operations. Parallel vectors and linear independence of two vectors.
3	Dot product: geometric and algebraic formulae. Commutativity of dot product. Distributivity. Vector projection. Scalar components. Vector components. Orthogonal components.
4	Cross product: geometric and algebraic formulae. Anti-commutativity of cross product. Distributivity. Area of a parallelogram inscribed by two vectors.
5	Lines and planes in space. Parametric vector equation, parametric scalar equations and cartesian equations of a line. Vector and cartesian equations of a plane. Normal vector to a plane.
6	Revision leading up to First Quiz. Linear equations. Systems of linear equations. Solutions of a system. Homogeneous systems. Inconsistent systems.
7	Augmented matrices. Elementary row operations. Row echelon form and Gaussian elimination. Leading variables and back substitution. Reduced row echelon form and Gauss-Jordan elimination.
8	Matrices. Row and column vectors. Matrix addition, subtraction and multiplication. Scalar multiplication. Zero matrix. Identity matrix. Negative of a matrix. Properties of matrix operations.
9	Inverse of a matrix. Determinant of a two-by-two matrix. Powers of a matrix. Formula for inverse of a two-by-two matrix. Using augmented matrices to invert a matrix. Using the inverse matrix to solve a system of equations.
10	Revision leading up to Second Quiz. Determinants. Expansion along the first row. Expansion along any row or down any column. Determinant method for cross products.
11	Multiplicative property of determinants. Invertibility criterion using determinants. Effect on determinants by using row and column operations. Transpose of a matrix. Determinant of a triangular matrix.
12	Eigenvalues and eigenvectors of a matrix. Eigenspace corresponding to an eigenvalue. Characteristic polynomial of a matrix. Solving homogeneous systems to find eigenvectors.
13	Diagonal matrices. Diagonalisation and applications. Revision.