
Information Sheet for **MATH1014 Introduction to Linear Algebra**

Web Sites

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

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

and the MATH1014 web site

<http://www.maths.usyd.edu.au/u/UG/JM/MATH1014>

Lectures

There are 2 different lecture streams. You should attend one stream (that is, two lectures per week), as shown on your personal timetable.

Times	Location	Lecturer
10 am Mon & Tue	E Ave Aud	Ms S Britton, room 534
11 am Mon & Tue	Carslaw 157	Weeks 1–6: Dr J Parkinson, room 614 Weeks 7–13: A/Prof A Molev, room 707

Lectures run for 13 weeks. The last lecture will therefore be on Tuesday 25 October.

Consultation times

Lecturers are available for consultation as follows:

- Mondays 1-2pm in Carslaw 534
- Tuesdays 1-2pm, weeks 1-6, in Carslaw 614
- Tuesdays 12 noon - 1pm, weeks 7-13, Carslaw 707*

* If you are unable to see A/Prof Molev during his scheduled consultation hour, other times may be possible by appointment.

Duty tutors will also be available. Check the MATH1014 webpage.

Text book

Linear Algebra: A Modern Introduction, by David Poole.

Available from the Co-op Bookshop. (Note: Any edition of this textbook is fine.)

Tutorials

Tutorials (one per week) start in week 1. You should attend the tutorial at the time given on your personal timetable. Attendance at tutorials will be recorded. Your attendance will not be recorded unless you attend the tutorial in which you are enrolled.

The tutorial sheets for a given week will be available on the MATH1014 webpage by the Friday of the previous week. **You must take the current week's sheet to your tutorial.** The sheet must be printed from the web.

Tutorial exercises may include exercises from the textbook. When that is the case, you will need to take your textbook (or a copy of the relevant pages) to the tutorial with you.

Assessment

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

- 65%: Exam at end of semester 2.
- 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 2. Further information about the exam will be made available at a later date.

Quizzes

There are two quizzes, each worth 15% of your final raw mark. Quizzes are held during tutorials, in **week 5** (beginning 22 August) and **week 10** (beginning 4 October).

You should put those dates in your diary now! 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 (unless you have made an arrangement with the Mathematics Student Office). If you miss a quiz, then you must go to the Mathematics Student Office as soon as possible afterwards.

Assignments

One assignment will be marked, and will be worth 5% of your final raw mark. The assignment will be due on **Thursday 13 October**. Please see page 26 of the Junior Mathematics Handbook for details relating to the submission of assignments.

Any questions?

Before you contact us with any enquiry, please check the FAQ page:

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

Where to go for help

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

For help with mathematics, see your lecturer, your tutor or a duty tutor. Lecturers guarantee to be available during their indicated office 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 (Carlsaw room 441).

Objectives

The objectives of this course are:

- to introduce the concept of a vector;
- to illustrate how vectors are used in real-life applications;
- to introduce the basic concepts of linear algebra – systems of linear equations, matrices, determinants, eigenvalues and eigenvectors;
- to apply these concepts to some real world phenomena;
- to improve your ability to think logically, analytically, and abstractly;
- to enhance your problem-solving skills.

Learning Outcomes

Students who successfully complete this course should:

- know how to represent vectors both algebraically and geometrically in \mathbb{R}^2 and \mathbb{R}^3 ;
- be able to perform operations on vectors (addition, scalar multiplication, dot and cross products);
- be able to find equations of lines and planes in \mathbb{R}^3 ;
- be able to perform arithmetic operations in \mathbb{Z}_n ;
- understand how to use a check digit code vector;
- know how to solve systems of linear equations using Gaussian elimination;
- set up systems of linear equations to model real world situations;
- know how to add and multiply matrices, and be able to find inverses;
- be able to find a steady state vector for a Markov process;
- understand how Leslie matrices are used to model population growth;
- be able to calculate eigenvalues and eigenvectors of 2×2 and 3×3 matrices.

Proposed week-by-week outline

Week	Topics	Text reference
1	Geometry and algebra of vectors	Section 1.1
2	Length, dot product, cross product	Section 1.2 Exploration: the cross product
3	Lines and planes	Section 1.3
4	Code vectors and modular arithmetic	Section 1.4
5	Systems of linear equations; elementary row operations	Sections 2.1, 2.2
6	Gaussian and Gauss-Jordan Elimination; applications	Section 2.2 Section 2.4
7	Matrices	Section 3.1 Section 3.2
8	The inverse of a matrix	Section 3.3
9	Markov chains Leslie population models	Section 3.7 Section 3.7
10	Introduction to eigenvalues and eigenvectors (one lecture only)	Section 4.1
11	Determinants	Section 4.2
12	Eigenvalues and eigenvectors	Section 4.3 Section 4.6
13	Revision	