THE UNIVERSITY OF
SYDNEY

MATH1014: Introduction to Linear Algebra

Intensive January, 2020 (Int Jan) | 3 Credit points | Mode of delivery: Block mode | Unit type: Standard

Coordinator: Nathan David Brownlowe

Faculty of Science (SCIE), Mathematics and Statistics Academic Operations

Unit description

This unit is an introduction to Linear Algebra. Topics covered include vectors, systems of linear equations, matrices, eigenvalues and eigenvectors. Applications in life and technological sciences are emphasised.

Prohibitions: MATH1002 or MATH1902

Pre-requisites : None

Co-requisites : None

Assumed knowledge: Coordinate geometry, basic integral and differential calculus, polynomial equations and algebraic manipulations, equivalent to HSC Mathematics

Learning outcomes

At the completion of this unit, you should be able to:

LO1. represent vectors both algebraically and geometrically in R2 and R3
LO2. perform operations on vectors (addition, scalar multiplication, dot and cross products)
LO3. find equations of lines and planes in R3
LO4. perform arithmetic operations in Zn
LO5. understand how to use a check digit code vector
LO6. solve systems of linear equations using Gaussian elimination
LO7. set up systems of linear equations to model real-world situations
LO8. add and multiply matrices, and be able to find inverses
LO9. find a steady-state vector for a Markov process
LO10. understand how Leslie matrices are used to model population growth
LO11. calculate eigenvalues and eigenvectors of 2 × 2 and 3 × 3 matrices.

Graduate qualities

The Graduate Qualities are the qualities and skills that all University of Sydney graduates must demonstrate on successful completion of an award course. As a future Sydney graduate, the set of qualities have been designed to equip you for the contemporary world. Please see https://sydney.edu.au/students/graduate-qualities.html

Study commitment

- Typically, there is a minimum expectation of 1.5-2 hours of student effort per week per credit point for units of study offered over a full semester. For a 3 credit point unit, this equates to roughly 60-75 hours of student effort in total.

Teaching staff and contact details

Coordinator   :   Nathan David Brownlowe, nathan.brownlowe@sydney.edu.au

Teaching Staff   :

Administrative and professional staff: MATH1014@sydney.edu.au

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Learning activities schedule

Week	Topic	Learning activity type	Learning outcomes
Week 1	Geometry and algebra of vectors	Block teaching	LO1
Week 1	Length, dot product, cross product	Block teaching	LO2
Week 2	Lines and planes	Block teaching	LO3
Week 2	Modular arithmetic	Block teaching	LO4
Week 2	Code Vectors. Systems of linear equations	Block teaching	LO5
Week 3	Gaussian and Gauss-Jordan Elimination and applications	Block teaching	LO6, LO7
Week 3	Matrices	Block teaching	LO8
Week 3	The inverse of a matrix	Block teaching	LO8
Week 4	Markov chains	Block teaching	LO9
Week 4	Leslie population models. Introduction to eigenvalues and eigenvectors	Block teaching	LO10, LO11
Week 5	Determinants	Block teaching	LO11
Week 5	Eigenvalues and eigenvectors	Block teaching	LO11

Assessments

Assessment title	Assessment category	Assessment type	Assessment type description	Individual or group	Weight	Due date & time	Closing date	Length/duration	Learning outcomes
Final exam	Exam	Final exam		Individual	65%	-		1.5 hours	LO1, LO2, LO3, LO4, LO5, LO6, LO7, LO8, LO9, LO10, LO11
Quizzes	In-class assessment	Tutorial quiz, small test or online task	Held Week 3 and Week 5	Individual	30%	-		40 minutes each	LO1, LO2, LO3, LO4, LO5, LO6, LO7, LO8, LO9, LO10, LO11
Assignments	Submitted work	Assignment	Due Week 2 and Week 4	Individual	5%	-		Week each	LO1, LO2, LO3, LO4, LO5, LO6, LO7, LO8, LO9, LO10, LO11

Assessment summary

Detailed information for each assessment can be found on Canvas.

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Prescribed readings

- **Recommended text:** A First Course in Linear Algebra, 3rd edition, by David Easdown.

Late penalties

The [Assessment Procedures 2011](#) provide that any written work submitted after 11:59pm on the due date will be penalised by 5% of the maximum awardable mark for each calendar day after the due date. If the assessment is submitted more than ten calendar days late, a mark of zero will be awarded.
However, a unit of study may prohibit late submission or waive late penalties only if expressly stated below.

Special consideration

A [special consideration application](#) can be made for short-term circumstances beyond your control, such as illness, injury or misadventure, which affect your preparation or performance in an assessment.

If you are eligible for special consideration, you must submit an online application and supporting documents within three working days of the assessment, unless exceptional circumstances apply.

Assessment grading

The University awards common result grades, set out in the [Coursework Policy 2014](#) (Schedule 1).

As a general guide, a high distinction indicates work of an exceptional standard, a distinction a very high standard, a credit a good standard, and a pass an acceptable standard.

Result name	Mark range	Description
High distinction	85 - 100	Representing complete or close to complete mastery of the material.
Distinction	75 - 84	Representing excellence, but substantially less than complete mastery.
Credit	65 - 74	Representing a creditable performance that goes beyond routine knowledge and understanding, but less than excellence.
Pass	50 - 64	Representing at least routine knowledge and understanding over a spectrum of topics and important ideas and concepts in the course.
Fail	0 - 49	When you don't meet the learning outcomes of the unit to a satisfactory standard.

For more information see sydney.edu.au/students/guide-to-grades.

Educational integrity

While the University is aware that the vast majority of students and staff act ethically and honestly, it is opposed to and will not tolerate academic dishonesty or plagiarism and will treat all allegations of dishonesty seriously.

All written assignments submitted in this unit of study will be submitted to the similarity detection software known as Turnitin. Turnitin searches for matches between text in your written assessment task and text sourced from the Internet, published works and assignments previously submitted to Turnitin. If such matches indicate evidence of plagiarism or other forms of dishonesty to your teacher, they are required to report your work for further investigation.

Further information on academic honesty, academic dishonesty, and the resources available to all students can be found on the academic integrity pages on the current students website: https://sydney.edu.au/students/academic-integrity.html

Work, health and safety requirements

We are governed by the Work Health and Safety Act 2011, Work Health and Safety Regulation 2011 and Codes of Practice. Penalties for non-compliance have increased. Everyone has a responsibility for health and safety at work. The University's Work Health and Safety policy explains the responsibilities and expectations of workers and others, and the procedures for managing WHS risks associated with University activities.

Attendance and class requirements

- **Attendance:** Unless otherwise indicated, students are expected to attend a minimum of 80% of timetabled activities for a unit of study, unless granted exemption by the Associate Dean. For some units of study the minimum attendance requirement, as specified in the relevant table of units or the unit of study outline, may be greater than 80%. The Associate Dean may determine that a student has failed a unit of study because of inadequate attendance.
- **Tutorial attendance:** Tutorials (one per week) start in Week 1. You should attend the tutorial 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. While there is no penalty if 80% attendance is not met we strongly recommend you attend tutorials regularly to keep up with the material and to engage with the tutorial questions. Since there is no assessment associated with the tutorials do not submit an application for Special Consideration or Special Arrangements for missed tutorials.

Site visit guidelines

Additional costs

Closing the loop

No changes have been made since this unit was last offered.

Links to important information and resources

- Academic appeals: sydney.edu.au/students/academic-appeals.html
- Canvas: canvas.sydney.edu.au
- Expectations of student conduct: sydney.edu.au/students/student-responsibilities.html
- Financial support: sydney.edu.au/students/financial-support.html
- Learning and Teaching Policy: sydney.edu.au/policies/
- Libraries: sydney.edu.au/students/libraries.html
- Student administration: sydney.edu.au/study/student-administration.html
- Study resources: sydney.edu.au/students/learning-services.html
- Wellbeing and support: sydney.edu.au/students/health-wellbeing.html

Other relevant information

Other links

Science student portal (canvas.sydney.edu.au/courses/7114)

Mathematics and Statistics student portal (canvas.sydney.edu.au/courses/7913)