Contents

1. Staff

Roll	Name	Email	Office
Director of First Year	A/Prof Jonathan Kress	j.kress@unsw.edu.au	RC-3073
Course Authority	A/Prof Jonathan Kress	j.kress@unsw.edu.au	RC-3073
MATH1231 Lecturers			
Algebra	Dr Michael Watson	michael.watson1@unsw.edu.au	
Calculus	Prof. John Roberts	jag.roberts@unsw.edu.au	

3. Course information

Units of credit: 6

Pre-requisite(s): For MATH1231 a pass or better is required in MATH1131 or MATH1141. For MATH1241 a credit in MATH1131 or MATH1141 is required.

Exclusions for MATH1231: MATH1031, MATH1241, MATH1251 and ECON1202

Exclusions for MATH1241: MATH1031, MATH1231, MATH1251and ECON1202

Teaching times and locations: see the central timetable web pages:

MATH1231 Timetable:

4.

Möbius lessons

The Möbius Lesson

End of Term Examination

In Term 3 2022 the End of Term Examination will be conducted using Möbius. **The exam will be conducted under supervised conditions in the Red-Centre computer labs during the official exam period.** Very limited exceptions will be allowed for students who are offshore during Term 3 and unable to travel to Sydney. The date and time of the final examination will be available on myUNSW and further details of the exam arrangements, including for students unable to come to Sydney, will be available on Moodle when the final exam timetable is released.

The final exam covers material from the whole of the algebra, calculus and computing (Maple) syllabi. The best guide to the style and level of difficulty is the past exam papers. Past exam papers will be provided on Moodle. Some have worked solutions and others do not. Examination questions are, by their nature, different from the short test questions. They may test a greater depth of understanding. The questions will be longer, and sections of the course not covered in other assessments will be examined. The end of term exam may contain some parts requiring knowledge of Maple.

This term's exam will be closest in format to the 2020, 2021 and 2022 exams. Earlier exams are also good for practice. More specific information on the format will be provided on Moodle close to the end of Term.

The assessment tasks during the term allow repeated attempts over an extended period and focus more on basic skills. As a result, students should be aiming for a high mark in the pre-exam assessment, and this indicates significant progress towards achieving the learning outcomes of this course. The exam is time limited and has more compf1 0 0 1

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use and manage information effectively to accomplish a specific purpose
better manage your time
understand your rights and responsibilities as a student at UNSW
be aware of plagiarism, copyright, UNSW Student Code of Conduct and Acceptable Use of UNSW ICT Resources Policy
be aware of the standards of behaviour expected of everyone in the UNSW community
locate services and information about UNSW and UNSW Library

Some of these areas will be familiar to you, others will be new. Gaining a solid understanding of all the related aspects of ELISE will help you make the most of your studies at UNSW.

The *ELISE* training webpages:

https://subjectguides.library.unsw.edu.au/elise/aboutelise

Equitable Learning Services (ELS)

If you suffer from a chronic or ongoing illness that has, or is likely to, put you at a serious disadvantage, then you should contact the Equitable Learning Services (previously known as SEADU) who provide confidential support and advice.

They assist students:

¶ living with disabilities D 2 BDf0000088874 0 595.5 842 rl5F1 1 2014.58ef* EMC /Span <</MCID 42/Lan5 (en-AU)>>BDC q0.000008874 0 595
¶ with long- or short-term health concerns and/or mental health issues
¶ who are primary carers
¶ from low SES backgrounds
¶ of diverse genders, sexes and sexualities
¶ from refugee and refugee-like backgrounds
¶ from rural and remote backgrounds
¶ who are the first in their family to undertake a bachelor-level degree.

Their web site is: https://student.unsw.edu.au/els/services

Equitable Learning Services (ELS) may determine that your condition requires special arrangements for assessment tasks. Once the School has been notified of these, we will make every effort to meet the arrangements specified by ELS.

Additionally, if you have suffered significant misadventure that affects your ability to complete the course, please contact your Lecturer-in-charge in the first instance.

Academic Skills Support and the Learning Centre

The Learning Centre offers academic support programs to all students at UNSW Australia. We assist students to develop approaches to learning that will enable them to succeed in their academic study. For further information on these programs please go to:

http://www.lc.unsw.edu.au/] TJ0.2 G[deonditi

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10. Algebra Syllabus and Lecture timetable (MATH1231/1241)

The algebra course for both MATH1231 and MATH1241 is based on chapters 6 to 9 of the Algebra Notes. Lecturers will not cover all of the material in these notes in their lectures as some sections of the notes are distributions. The main distributions studied are the binomial and geometric in the discrete case, and the normal distribution in the continuous case. These are applied to solving a range of problems.

15	Revision of set theory and mathematical probability.	9.1, 9.2.1, 9.2.2
16	Conditional probability, Bayes' rule, statistical independence.	9.2.3, 9.2.4
17	Random variables, discrete random variables, mean of a discrete random variable.	9.3.1, 9.3.2
18	Variance of discrete random variable, special distributions, the binomial distribution.	9.3.2, 9.4.1
19	Geometric distribution, sign test.	9.4.2, 9.4.3
20	Continuous random variables.	9.5
21	The Normal distribution, approximations to the binomial distribution.	9.6
22	Review	

Extra Algebra Topics for MATH1241

The extra topics in the MATH1241 syllabus, marked [X] in the notes, will be selected from the following:

Vector spaces. Matrices, polynomials and real-valued functions as vector spaces. (6.8). Coordinate vectors (6.7). The theoretical treatment of vector spaces in MATH1241 will be at a slightly more sophisticated level than that in MATH1231.

Linear transformations. Linear maps between polynomial and real-valued function vector spaces (7.5). Matrix representations for non-standard bases in domain and codomain (7.6). Matrix arithmetic and linear maps (7.7). Injective, surjective and bijective linear maps (7.8). Proof the rank nullity theorem (7.9).

Eigenvalues and eigenvectors. Markov Chain Processes (8.3.3). Eigenvalues and eigenvectors for symmetric matrices and applications to conic sections.

Probability and statistics. The Exponential distribution. (9.6.2).

Problem Sets

At the end of each chapter there is a set of problems. Some of the problems are very easy, some are less easy but still routine and some are quite hard. To help you decide which problems to try first, each problem is marked with an **[R],** and **[H]** or an **[X].** The problems marked **[R]** form a basic set of problems which you should try first. Problems marked **[H]** are harder and can be left until you have done the problems marked **[R].** Problems marked with **[V]** have a video solution available via Moodle. You *do* need to make an attempt at the **[H]** problems because problems of this type will occur on tests and in the exam. If you have difficulty with the **[H]** problems, ask for help in your tutorial.

The problems marked **[X]** are intended for students in MATH1241 – they rela

Chapter 7. Linear function, kernel and nullity of a linear function, image and rank of a linear function.

Chapter 8. Eigenvalue and eigenvector, diagonalizable matrix.

Chapter 9. Probability, statistical independence, conditional probability, discrete random variable, expected value (mean) of a random variable, variance of a random variable, binomial distribution, geometric distribution.

You should be able to give **STATEMENTS** of the following theorems and propositions.

Chapter 6. Theorem 1 of §6.3, Propositions 1 and 3 and Theorem 2 of §6.4, Proposition 1 and Theorems 2, 3, 4, 5 and 6 of §6.6.

Chapter 7. Theorem 2, 3, and 4 of §7.1, Theorem 1 and 2 of §7.2, Proposition 7 and Theorems 1, 5, 8, 9 and 10 of §7.4.

Chapter 8. Theorems 1, 2 and 3 of §8.1, Theorem 1 and 2 of §8.2.

You should be able to give **PROOFS** of the following theorems and propositions.

Chapter 6. Theorem 2 of §6.4, Theorems 2 and 3 of §6.5, Theorem 2 of §6.6.

Chapter 7. Theorem 2 of §7.1, Theorem 1 of §7.2, Theorems 1, 5 and 8 of §7.4.

Chapter 8. Theorem 1 of §8.1.

3.

11. Calculus syllabus for MATH1231 Mathematics 1B

In this syllabus, the references to the textbook are *not* intended as a definition of what you will be expected to know. They are just a guide to finding the relevant material. Some parts of the subject are not covered in the textbook and some parts of the textbook (even in the sections mentioned in the references below) are not included in the subject. The scope of the course is defined by the content of the lectures and problem sheets. The approximate lecture time for each section is given below. References to the 8th and 10th editions of Salas & Hills are shown as SH8 and SH10.

	SH8	**SH10**
1. **Functions of several variables**. (3 hours)	14.1-14.4	15.1-15.4
Contours and level curves, partial derivatives.	14.6	15.6
Mixed derivative theorem, increment estimation.		
Chain rules, tangent planes.		
2. **Integration techniques**. (4 hours)		
Trigonometric integrals and reduction formulae.	8.3	8.3
Trigonometric and hyperbolic substitutions.	8.4	8.4
Rational functions and partial fractions.	8.5	8.5
Further substitutions.	8.6	8.6
3. **Ordinary differential equations**. (6 hours)		
Particular, general, explicit and implicit solutions.	18.1	
First order equations; separable, linear, exact.	8.9, 18.2,	9.1, 9.2,
	15.9	19.1, 19.2,
Modelling with odes		9.1, 9.2
Second order linear equations with constant coeffts:		

Homogeneous, non-rs6 0 595 842 re 0 595 842 r0 590 0 1 70s)ModellQq0.000008866 0 595 842 reW* nBT/F2 10 Tf1 (

4. **Taylor series**. (7 hours)

Taylor polynomials, Taylor's theorem.

The assessment in the Computing Component is linked to topics in algebra and calculus so knowledge of other parts of the course is required.

Finally, the end of term exam may contain one or two sub-questions requiring knowledge of Maple.

Student-owned computers for Mathematics courses

The School of Mathematics and Statistics is committed to providing, through its own laboratories, all t owl9aa