Faculty of Science | Department of Mathematics and Statistics
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Course Outline
MATH 211: Matrix Algebra I

Instructor

Lecturer Seth Chart

Research Area Ergodic Theory and Dynamical Systems

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Office David Turpin Building A455

General Course Information

Number of Units 1.5
Credit will be granted for only one of MATH 211, MATH 110, MATH 133, MATH 233A.

Pre-requisites Any of the following:

- A minimum grade of A in one of Principles of Mathematics 12, Pre-calculus 12, MATH 120, or MATH 151.
- MATH 100 or MATH 102.
- Permission of the department.

Office Hours and Assistance

Monday 2:00 pm to 4:00 pm, DTB A455

Thursday 2:00 pm to 4:00 pm, DTB A455

or By appointment (send email to book one)

Other Help The Mathematics & Statistics Assistance Centre is a large space where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see http://www.math.uvic.ca/~msassist/index.html for more information.

Math Club Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see http://www.uvic.ca/science/math-statistics/undergraduate/sums/index.php for more information.

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[1]Please use the CourseSpaces forum for all questions that are not private.

Learning Objectives

In this course we will strive to:

- Become familiar with the basic objects of linear algebra: systems of linear equations, vectors, matrices, sets of vectors, and spaces of vectors.

- Become proficient with the standard computations of linear algebra: row reduction of a matrix, scalar multiplication and addition of vectors, length of a vector, dot products and cross products of vectors, projections of vectors, finding the equations of lines and planes, finding the span of a set of vectors, sums and products of matrices, inverting a matrix, determinant of a matrix, LU decomposition of a matrix, finding eigenvalues and eigenvectors of a matrix, diagonalizing a matrix, Gram-Schmidt procedure.

- Become comfortable thinking about a problem in terms of geometry, vectors and matrices, and systems of linear equations.

- Become fluent in the fundamental definitions of linear algebra: orthogonality, linear independence, subspace, span, basis, dimension, linear mapping, null space, column space, row space, rank, elementary matrices, invertibility, eigenspaces, orthonormal bases.

- Become acquainted with mathematical logic: making and understanding precise definitions, constructing examples and counter examples, designing arguments to connect facts to foundational definitions.

Topics Covered

Vectors connection to euclidean geometry, linear combinations, norm, dot product, cross product, projections, vector equations of lines and planes.

Spaces and Subspaces linear independence, span, basis, dimension, change of coordinates.

Matrices row reduction, algebraic operations on matrices, connection to linear transformations, fundamental subspaces of a matrix, Rank-Nullity Theorem, elementary matrices, LU-decomposition, determinant of a matrix, Cramer's rule, connection between determinant and invertibility.

Diagonalization eigenvalues, eigenvectors, eigenspaces, diagonalization of a matrix.

Orthogonality orthonormal bases, orthogonal matrices, Gram-Schmidt procedure.

Course Material and Online Resources

Textbook *Introduction to Linear Algebra for Science and Engineering (2nd Edition)*, by Daniel Norman and Dan Wolczuk

Course webpage Go to `https://CourseSpaces.uvic.ca` and access **201605 MATH 211 A01**.

Calculator The only acceptable calculators are the Sharp EL-510R or the Sharp EL-510RNB. They may be purchased at the UVic Bookstore or elsewhere for about $12. A calculator is permitted in this course.

Class Meetings

Lectures will be held in David Turpin Building room A104 on Mondays and Thursdays from 11:30 and to 12:50 pm. Our first lecture will be on Monday May 2. Please see the course schedule for more information.

Evaluation and Grading

Homework There will be six homework assignments. These must be turned at the beginning of lecture on the dates indicated in the course schedule. Your lowest assignment score will be dropped. In addition to the graded assignments you are expected to work the required exercises from the book listed below.

Midterms There will be two midterm exams. Midterms will be held during lecture on May 26 and June 23.

Final Exam The final exam will be held during the exam period August 2 to 16. The date an location of the final will be determined by the university later in the semester.

Your final percentage grade will be computed according to the following scheme.

Homework Assignments	Midterms	Final Exam
10%	40%	50%

Each week we will have approximately three hours of lecture. In addition to this you are expected to spend eight to twelve hours working on the course, this includes reading the textbook, working practice problems, working on assignments, reviewing lecture notes, attending office hours, and making use of the math assistance center.

Accessibility Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations `http://rcsd.uvic.ca/`. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Grading Percentage scores will be converted to letter grades according to the university-wide standard table (`http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/Grad.html`).

Final Examination Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed: `http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/AcCo.html` and `http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/DeSt.html`.

Students are **strongly advised not to make plans for travel or employment during the final examination period** as special arrangements will not be made for examinations that conflict with such plans.

Supplemental Examinations. The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Policies and Ethics

Attendance The university Calendar states 'Students are expected to attend all classes in which they are enrolled.' (see `http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/AcCo.html`). Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change.

Guidelines on Religious Observances Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Missing work Homework assignments will not be accepted after the due date for any reason. Your lowest assignment mark will be dropped when final grades are computed. If you are unable to submit an assignment due to illness or other excused absence, then this will be the assignment that is dropped. Make up examinations will not be offered for midterm exams. If you are unable to write one of the midterm exams because of an excused absence, then you will receive a score corresponding to your course rank.

Academic Integrity Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage

through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the Universitys policy on academic integrity:
`http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcI.html`

How to Succeed in This Course

In order to succeed in this course you should:

- Prepare for each lecture by previewing the sections indicated in the course schedule, you should read through definitions and examples and take notes on any questions that you have about the material.

- Attend all lectures. Ask the questions that you noted while previewing the sections for the day in lecture.

- You should work all required exercises from the book. When you find exercises that you cannot complete on your own you should seek help in office hours, the math assistance center, tutorials, lecture, or on the course spaces forum.

- You should work assignments as far in advance of the due date as possible, if you have questions regarding the assignment please ask them during office hours.

- When your assignments are returned you should rework any exercises that you did not receive full credit for and review similar problems. If you are unsure how to solve a problem that you did not solve correctly, then you should visit office hours.

- It is important to study for exams starting several days prior to the date of the exam.

Course Schedule (Dates are approximate)

Week	Date	Event	Sections	Due
1	May 02	Lecture 1	1.1	
	May 05	Lecture 2	1.2	
2	May 09	Lecture 3	1.3, 1.5	
	May 12	Lecture 4	1.4	
3	May 16	Lecture 5	2.1, 2.2	HW 1
	May 19	Lecture 6	2.3	
4	May 23	*Victoria Day*		
	May 26	**Midterm 1**		HW 2
5	May 30	Lecture 7	3.1	
	June 02	Lecture 8	3.2, 3.3	
6	June 06	Lecture 9	3.4	
	June 09	Lecture 10	3.4	HW 3
7	June 13	Lecture 11	3.5	
	June 16	Lecture 12	3.6, 3.7	
8	June 20	Lecture 13	5.1, 5.2	HW 4
	June 23	**Midterm 2**		
9	June 27	Lecture 14	5.3, 5.4	
	June 30	*Reading Break*		
10	July 04	Lecture 15	6.1	
	July 07	Lecture 16	6.2	
11	July 11	Lecture 17	6.2, 6.3	HW 5
	July 14	Lecture 18	7.1	
12	July 18	Lecture 19	7.2	
	July 21	Lecture 20	7.2	
13	July 25	Lecture 21	7.3	HW 6
	July 28	Lecture 22	Review + Topics	
14-15	August 2-16	Final Exam		

Required Exercises

Section	B	D
1.1	1-10	1,2,4
1.2	1-5	1,2,4-6,8
1.3	1-10	1-4,6-8
1.4	1,2,5-6	1,2,3,5
1.5	1,3,5	None
2.1	1-7,9	2
2.2	1-4	1,3,4
2.3	1-7	1,2
3.1	1-8	4,5
3.2	1-11	1-4
3.3	1,3,4	1,3,4
3.4	1-8	2-4
3.5	1-4	1,2,4
3.6	1-4	1
3.7	1,2	1
5.1	1-5	2
5.2	1-4	1-6
5.3	1-3	2
5.4	1-5	1
6.1	1-3	1-5
6.2	1-3	1,2,4,5,7,8
6.3	1-4	1,2
7.1	1-5	1-4
7.2	1,3,4	None
7.3	1-3	None