

Course Objectives:

- To understand several important concepts in linear algebra, including linear mappings and isomorphisms; inner products and inner product spaces; orthonormal bases; orthogonal and symmetric matrices; orthogonal diagonalization; quadratic forms; vector spaces over \mathbb{C} ; unitary, Hermitian, and normal matrices; unitary diagonalization.
- To improve your ability to prove mathematical results.

Course Schedule

Week	Dates	Text Sections	Topics
1	Jan 5 – 9	7.1, 8.1	Fundamental Subspaces, General Linear Mappings
2	Jan 12 – 16	8.2, 8.3	Rank-Nullity Theorem, Matrix of a Linear Mapping
3	Jan 19 – 23	8.4, 9.1	Isomorphisms, Inner Product Spaces
4	Jan 26 – Jan 30	9.2, 9.3	Orthogonality, Orthogonal Matrix, Gram-Schmidt Procedure
5	Feb 2 – 6	9.4, 9.5	General Projections, Fundamental Theorem
6	Feb 9 – 13	9.6, 10.1	Method of Least Squares, Triangularization
7	Feb 16 – 20		READING WEEK
8	Feb 23 – Feb 27	10.2	Orthogonal Diagonalization
9	Mar 2 – 6	10.3, 10.4	Quadratic Forms, Graphing Quadratic Forms
10	Mar 9 – 13	10.5, 10.6	Optimizing Quadratic Forms, Singular Value Decomposition
11	Mar 16 – 20	11.1, 11.2	Complex Numbers, Complex Vector Spaces
12	Mar 23 – 27	11.3, 11.4	Complex Diagonalization, Hermitian Inner Products
13	Mar 30 – Apr 1	11.5	Unitary Diagonalization
	Apr 3		Good Friday
14	Apr 6	11.6	Cayley-Hamilton Theorem

Text Book: Linear Algebra Course Notes by Dan Wolczuk. Available in the bookstore. Editions 1.0, 2.0, or 3.0 are all acceptable.

Grades: Final Exam: 65%; Midterm: 25%; Assignments 10%.

Tests: Midterm: Tuesday February 10th, 4:30–6:20pm
Final Exam : TBA

Missed Exam Policy: Missed exams will count as 0 unless suitable medical documentation is provided. In the case of a missed final exam, an INC will only be awarded to students who have earned passing grades on both the midterm exam and assignments. There will not be any make-up tests.

Tutorials: The Monday tutorials will provide a recap of important topics and additional examples.

Assignments: Assignments are due on Wednesdays by 4:30 pm in the designated drop boxes in front of MC 4066/4067. It is your responsibility that you hand your assignment into the correct drop box. **Late assignments or assignments submitted to the wrong drop box will receive a grade of 0.** Your solutions should be legible and well-organized. Complete solutions will be posted on the LEARN website on Fridays. Note that the assignments will reflect our expectations as to

the tests and final exam; however, it is strongly recommended that you do additional problems to ensure a solid understanding of the material. Unclaimed assignments/midterms will be shredded at the end of term.

Additional Help: Tutors will be available in the tutorial center (MC 4067) on Mondays and Tuesdays (times TBA). Your instructor will let you know when they are available to answer questions.

Calculators: Calculators will not be allowed on tests.

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

[Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4,

<http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>.

When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic adviser, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline,

<http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>.

For typical penalties check Guidelines for the Assessment of Penalties,

<http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm>.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AccessAbility Services at the beginning of each academic term.