Math 342 **Elementary Linear Algebra II** **Winter 2018**

12:00-12:50pm; MTWF 105 Fenton Hall

Instructor: Jennifer Thorenson

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Office Hours: Monday and Wednesday at 10-11am, Tuesday at 2-3pm or by appointment.

Textbook: *Linear Algebra and Its Applications*, 5th edition, David C. Lay, Steven R. Lay, and Judi J. McDonald.

Prerequisite: C- or better in Math 341.

Homework: Homework will be due at the beginning of class every Tuesday starting the second week of class. The assignments will be from the text book and can be found on the canvas page for the class. Late homework assignments will not be accepted.

Exams: There will be two in-class exams during the term; the first exam is on February 9 and the second exam is on March 9. The final exam is cumulative. It is scheduled for 10:15-12:15pm on Tuesday, March 20 in our regular classroom, 105 Fenton Hall. Exams can only be taken other than the scheduled time if arrangements are made in **advance** and a valid and admissible reason for not attending the scheduled time is provided. However, the final exam will not be administered early.

Bring your UO student ID to all exams.

Grade: The final grade will be based on homework (25%), midterm exams (20% each) and the final exam (35%). Based on the following table, you are guaranteed to earn at least that grade, but grades may be adjusted at the end of the term depending on the outcomes of the course.

Percentage	Grade	Percentage	Grade	Percentage	Grade
90-92%	A-	93-96%	A	97-100%	A+
80-82%	B-	83-86%	B	87-89%	B+
70-72%	C-	73-76%	C	77-79%	C+
60-62%	D-	63-66%	D	67-69%	D+
0-59%	F				

Learning Environment: The University of Oregon strives for inclusive learning environments. Please notify me if the instruction or design of this course results in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Classroom Environment: Disruptive behavior in the classroom will not be tolerated. Leaving class early or arriving late, unless by prior agreement with the instructor, is considered disruptive behavior. All cell phones and music players must be turned off during the class period.

Calculator and Electronic Device Policy: Calculators are not required for this course but students are encouraged to use calculators and computers as educational aids. However, calculators and other portable electronic devices (laptops, tablets and cellphones) cannot be used during exams.

Academic Misconduct: The code of student conduct and community standards is at conduct.uoregon.edu. In this course, it is appropriate to help each other on homework as long as the work you are submitting is your own and you understand it. It is not appropriate to help each other on exams, to look at other students' exams, or to bring unauthorized material to exams. In the event of academic dishonesty, the offense will be reported to the Office of Student Conduct and Community Standards and the student will be sanctioned up to receiving a failing grade in the course.

Tentative Schedule

We will cover most of chapters 4-7 during the course.

Week 1	Review of Vector Spaces : 4.1-4.6	Week 6	6.3-6.5
Week 2	4.7, 5.1	Week 7	6.5, 6.7, 6.8
Week 3	5.2-5.3	Week 8	7.1-7.2
Week 4	5.4-5.6	Week 9	7.3 (exam 2)
Week 5	6.1, 6.2 (exam 1)	Week 10	review

Learning Outcomes: Math 342 begins with a brief review of vector spaces, subspaces, basis, and linear transformations from the end of Math 341. The new material for the course begins with change of bases for a vector space. Then there will be a discussion on eigenvalues and eigenvectors of a matrix, how and when they can be used to diagonalize a matrix, and applications to dynamical systems. Finally, inner products and inner product spaces will be introduced. An inner product is used to define length, distance, and orthogonality within the space. An application of inner products that can be discussed as time allows is finding the best fit solution to an inconsistent linear system. Symmetric matrices, quadratic forms, and applications of quadratic forms will be discussed as time permits. A successful student in the course should have an understanding of the following concepts.

1. Understand the definitions of a vector space, subspace, and linear transformation.
2. Understand how to find the change of coordinate matrix needed to change bases of a vector space.
3. Find the eigenvalues and eigenvectors of a matrix over the real and complex numbers.
4. Find the eigenspaces of a matrix corresponding to its eigenvalues.
5. Understand how to use eigenvalues and eigenvectors to diagonalize a square matrix when possible.
6. Understand how the rectangular matrix of a linear transformation from one vector space to another transforms when you change basis.
7. Understand how the square matrix of a linear transformation from a vector space into itself transforms when you change basis.
8. Use the definition of an inner product on $\mathbb{R}^n$ to define the length of a vector, determine the distance between vectors, determine if vectors are orthogonal, and calculate the orthogonal projection of a vector onto a subspace of $\mathbb{R}^n$.
9. Use the Gram-Schmidt process to find an orthogonal basis.
10. Understand the Spectral Theorem for Symmetric Matrices and its implications for quadratic forms.