Linear Algebra

MATH - 2270 001

Introduction

Our Math 2270 class will be taught in a lecture format on the Redwood Campus. Class time will be a combination of lecture and guided practice that we will have on Tuesday and Thursday from 10:00 to 11:50 in room TB-018K on the Redwood Campus. It is expected you will attend each class lecture and complete the corresponding homework according to our course calendar.

Course Description

Theory and application of matrices, linear systems, determinants, inverses, vector spaces, linear independence, linear transformations, eigenvalues and eigenvectors, diagonalization, least squares approximation. Includes computer projects.

Pre-Requisite: Within the last year, MATH 1220 w/C grade or better.
Semester: Fall & Spring

Course Student Learning Outcomes

- Solve linear systems using elementary row operations, elementary matrices, and inverse matrices, and Cramer's rule.

- Compute determinants, minors, cofactors, inverse matrices using multilinearity, alternating, and skew symmetric properties of determinants.

- Determine/prove real and/or complex linear spaces and linear algebras (including but not limited to matrix algebra), subspaces, null spaces, row/column spaces of matrices, linear independence, span, bases, change of bases.

- Determine general linear transformations, e.g., the differential operator and definite integral, not just matrix transformations, but also finite-dimensional matrix representations.

- Determine eigenvalues, bases of general eigenvectors, similarity of matrices, diagonalizable matrices, and apply the Cayley-Hamilton theorem.

- Determine real and/or complex inner product spaces, orthogonal projections, and apply the Gram-Schmidt process.

Course Prerequisites

Within the last year, you must have completed a Calculus II course, i.e. Math 1220, with a C or above.

Guided Lecture Notes

We will use a set of Guided Lecture Notes to facilitate lectures for our Math 2270 class. The Guided Lecture Notes contain definitions, theory and examples to practice the concepts of the course. You should print the Guided Lecture Notes at the start of the course and organize them in a binder to use throughout the course. You could also choose to use the electronic versions and fill in the notes using a tablet and stylus. These will be an essential part of your course learning and will save valuable class time from copying theorems, pictures, and examples from the board.

 I will provide Guided Notes for the first week of class, but you should get the entire set as soon as possible as follows:

- Print the Guided Lecture Notes from the ORIENTATION MODULE.
- Download the entire set as a PDF to complete on a tablet
- Purchase the Guided Lecture Notes from the SLCC bookstore for approximately $15-$18.

Homework and Technology

Homework: Each section covered will have a homework assignment. Homework will come in a variety of forms including exercises from the book, projects, and analysis. Paper homework is due by the unit test. You will be able to submit homework in CANVAS

using CamScanner or other scanning software. CamScanner is a free app you can download on your Smartphone that will take pictures of your homework and combine them into a SINGLE PDF file. Information about CamScanner and a link to download it on your Smartphone are in the Orientation Module. Sloppy or irritating papers will not receive credit. There are two aspects to a good paper: content and presentation. This course emphasizes both since they are equally important. I may return an assignment to be "polished" if I feel it needs help with presentation or accuracy. To do well in this course you must complete the homework. Learn the why's of your homework, not just the how's !!

Specifics on how homework is to be presented:

- Not Accepted after unit test
- Sloppy work will not be accepted.
- Organized your approach to each problem
- Clearly separate problems and identify your answer, sometimes a box is appropriate. Present papers with pride—content and presentation are equally important.

Technology: There will be technology use required to complete assigned homework. All relevant software is accessible through our CANVAS course, or free online.

MATLAB Labs

In addition to traditional problem-solving methods that we see in our textbook and written homework, this course incorporates the use of Matlab to enhance students' understanding of linear algebra concepts. Matlab provides a powerful computational environment for visualizing vectors, matrices, and transformations, and for performing complex calculations efficiently. By integrating Matlab into homework assignments, you will gain hands-on experience with tools widely used in engineering, science, and applied mathematics. This augmentation not only reinforces theoretical knowledge but also builds practical skills that are essential for advanced study and professional applications.

The MATLAB labs can be found in the lab manual linked in the Orientation Module of the course and are listed individually on our calendar.

Required Text or Materials
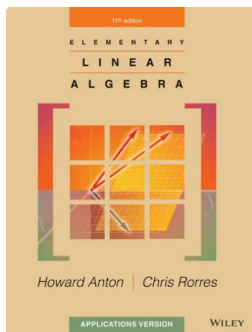
Title: Elementary Linear Algebra, 11th Edition, by Howard Anton

Authors: Howard Anton and Chris Rorres

Publisher: Wiley

Edition: 11th Edition

For more information on textbook accessibility, contact Accessibility & Disability Services at ads@slcc.edu.

Succeeding in Math 2270

Math 2270 is a challenging course, however, there are many things you can do and resources available to help us succeed. Consider the following as a starting point to create your success.

- PUT IN THE TIME, STAY ON SCHEDULE! It is very important in this class that you set aside time each day to work on the course so that you can remain on schedule. You can do a better job at both understanding and retaining the material if you learn at an even pace. Trying to "cram" too much in one sitting will result in frustration and lower retention of the material. Recognize that you need time both to learn the material and time to complete your homework, etc. It will take a significant investment of time each day to be successful in this course. It is important that you have the course calendar readily available and refer to it frequently.

- Come to class early. This may not happen every day because things happen, but coming to class late regularly does not lead to success. Arriving late creates anxiety, a feeling of being rushed and a diminished attention.

- Ask lots of questions in class. I love teaching and have never entered the class hoping people are silent and don't interact. We should ask question, discuss topics that might not be clear, and use our class time to get as familiar with this topic as we can.

Grading Scale

Grade Weights:

Your grade will be weighted according to the following:

- Homework – 20%
- MATLAB LABS - 5%
- 4 Proctored Midterm Exams – 50%
- Cumulative Final Exam – 25%

Notice that the 4 proctored exams and the cumulative final exam add up to 75% of your overall grade. This is important to understand and ensure adequate preparation for these exams.

Letter Grade:

Your weighted percent in the class will be converted to a letter grade via this scale:

A 100 - 93%	B- 82 - 80%	D+ 69 - 67%
A- 92 - 90%	C+ 79 - 77%	D 66 - 63%
B+ 89 - 87%	C 76 - 73%	D- 62 - 60%
B 86 - 83%	C- 72 - 70%	E below 60%

Midterm Exams and Final Exam

We will have 4 proctored mid-term exams and a proctored comprehensive final. Exams will be taken in the SLCC Testing Center on the Redwood Campus following our course calendar. We will need to make an appointment for each of these exams.

Testing Center Reservation

It is a SLCC Math Department rule that a student attaining a score of less than 60% on the final shall receive a grade no higher than "D" for the course.

STEM Tutoring

Math 2270 is a challenging course, however, there are many things you can do and resources available to help us succeed. Consider the following as a starting point to create your success.

- LEARN HOW TO LEARN AND WHERE TO GET HELP As with any math course, you need to find the best way for you to learn the concepts and skills. There are many options, including reading the textbook, taking notes, listening to an audio lecture, watching a video lecture, and many others. It is also crucial that you seek help when you need it. At the very beginning of the course, you should spend time familiarizing yourself with available resources.
- The STEM Learning Resources department works in collaboration with the mathematics department to provide free tutoring.

  Free in-person tutoring: Monday - Friday 9:00 am to 9:00 pm (SLCC STEM Tutoring Center)

  Free ONLINE tutoring is available through Tutor.com as a student at SLCC. Students will be given 8 hours of tutoring per month for a total of 32 hours for the semester. If a student needs more, they can contact eLearning for additional hours. The following video will guide us on how to utilize this resource

Learning Support and Tutoring Services

We are pleased to offer a range of tutoring and learning support services to help you achieve your academic goals. Whether you need assistance with a specific subject or want to improve your study skills, you have many options for tutoring or other support.

To learn more about the services we offer and how to access them, visit the Institutional Syllabus page under the Tutoring and Learning Support tab. We encourage you to take advantage of these resources to help you succeed in your studies. If you have any questions or would like to schedule a tutoring session, please don't hesitate to reach out to us. We are here to support you in any way we can.

Advising and Counseling Support Services

At our institution, we are committed to supporting your academic and personal growth. That's why we offer a range of advising and counseling services to help you navigate the challenges of college life. To learn more about the resources available to you and how to access them, visit the [Institutional Syllabus](#) page under the Advising and Counseling Support Services tab. Our advising team and the support centers across campus are here to support you in achieving your goals and overcoming any obstacles you may face.

Institutional Policies

As members of our academic community, we would like to invite you to review the Institutional Syllabus which covers important policies and procedures. This document contains important links for students on the code of student rights and responsibilities, academic integrity, and grading policies, Title IX and other important acknowledgements. By familiarizing yourself with this information, you can help us create a safe and respectful environment for everyone.

For more information, navigate to the Institutional Policies tab on the [Institutional Syllabus](#) page.

Student Academic Calendar

As students you should be aware of all important dates in the semester, such as the day that courses begin and end, as well as the drop date and the last day to withdraw. To learn more about those dates, navigate to the Student Academic Calendar below:

[SLCC Student Academic Calendar](#)

Assignment Schedule

Due Date	Assignment Name	Assignment Type	Points
8/26/25	[Orientation: Important CANVAS Settings](#)	Quiz	5

Due Date	Assignment Name	Assignment Type	Points
8/26/25	[Orientation: Practice Submitting Assignments](#)	Assignment	5
8/26/25	[1.1 Introduction to Systems of Linear Equations](#)	Assignment	10
8/28/25	[1.2 Gaussian Elimination](#)	Assignment	10
8/28/25	[MATLAB Lab 1 - Introduction to Matlab](#)	Assignment	20
9/2/25	[1.3 Matrices and Matrix Operations](#)	Assignment	10
9/2/25	[1.7 Diagonal, Triangular and Symmetric Matrices](#)	Assignment	10
9/4/25	[1.4 Inverses; Algebraic Properties of Matrices](#)	Assignment	10
9/4/25	[1.5 Elementary Matrices and a Method for Finding Inverses](#)	Assignment	10
9/4/25	[MATLAB Lab 2 - Solving Systems of Linear Equations with RREF](#)	Assignment	20
9/9/25	[1.6 More on Linear Systems and Invertible Matrices](#)	Assignment	10

Due Date	Assignment Name	Assignment Type	Points
9/9/25	MATLAB Lab 3 - Solving Systems of Linear Equations with Inverse Matrices	Assignment	20
9/11/25	Midterm Exam #1	Assignment	100
9/16/25	2.1 Determinants by Cofactor Expansion	Assignment	10
9/16/25	2.2 Evaluating Determinants by Row Reduction	Assignment	10
9/18/25	2.3 Properties of Determinants; Cramer's Rule	Assignment	10
9/18/25	MATLAB Lab 4 - Determinants and Solving Systems of Linear Equations with Cramer's Rule	Assignment	20
9/23/25	3.1 Vectors in 2-space, 3-space, and n-space	Assignment	10
9/23/25	3.2 Norm, Dot Product, and Distance	Assignment	10
9/25/25	3.3 Orthogonality	Assignment	10
9/25/25	MATLAB Lab 5 - Norm, Distance, Dot Product and Vector Projections	Assignment	20
9/30/25	3.4 The Geomtry of Linear Systems	Assignment	10

Due Date	Assignment Name	Assignment Type	Points
9/30/25	3.5 The Cross Product	Assignment	10
10/2/25	Midterm Exam #2	Assignment	100
10/7/25	4.1 Real Vector Spaces	Assignment	10
10/9/25	4.2 Subspaces of Vector Spaces	Assignment	10
10/9/25	MATLAB Lab 6 - Linear Combination, Span and Linear Independance	Assignment	20
10/14/25	4.3 Linear Independence	Assignment	10
10/21/25	4.4 Coordinates and Basis	Assignment	10
10/21/25	4.5 Dimension of a Vector Space	Assignment	10
10/23/25	4.6 Change of Basis	Assignment	10
10/23/25	MATLAB Lab 7 - Linear Independance, Basis and Coordinate Vectors	Assignment	20
10/28/25	4.7 Row Space, Column Space and Null Space	Assignment	10
10/30/25	4.8 Rank, Nullity and the Fundamental Matrix Spaces	Assignment	10

Due Date	Assignment Name	Assignment Type	Points
10/30/25	MATLAB Lab 8 - To be determined	Assignment	20
11/6/25	Midterm Exam #3 General Vector Spaces	Assignment	100
11/11/25	4.10 Properties of Matrix Transformations	Assignment	10
11/11/25	4.9 Matrix Transformations	Assignment	10
11/13/25	5.1 Eigenvalues and Eigenvectors	Assignment	10
11/18/25	5.2 Diagonalization	Assignment	10
11/18/25	MATLAB Lab 9 - To be determined	Assignment	20
11/20/25	6.1 Inner Products	Assignment	10
11/20/25	6.2 Angles and Orthogonality in Inner Product Spaces	Assignment	10
11/25/25	6.3 The Gram-Schmidt Process	Assignment	10
11/25/25	MATLAB Lab 10 - To be determined	Assignment	20
12/4/25	Midterm Exam #4	Assignment	100
12/15/25	Math 2270 Final Exam	Assignment	100