

Math 270 – Section 0397:

Differential Equations and Linear Algebra

Lecture Course Times: No set time, except for test days (July 7, July 28, and August 11)

Lecture Course Location: Videos on the Math 270 Canvas course site

To access Canvas, use the following URL and click on "Canvas Login Page":

<https://www.elcamino.edu/academics/online-education/canvas-students.aspx>

Instructor: Dr. Jasmine Ng

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Office Hours: Zoom: M 6:45-8:45 a.m. at <https://elcamino-edu.zoom.us/j/95265160024>

Catalog Description

This course consists of a study of first-order ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, linear second-order ordinary differential equations, power series solutions, numerical methods, Laplace transforms, eigenvalues, eigenvectors, systems of linear differential equations and applications.

Prerequisite

Mathematics 220, Multi-Variable Calculus

Required Materials

- *Differential Equations & Linear Algebra* (2nd Edition), by Farlow, Hall, McDill, and West
- An active email that is tied to MyECC. Students are expected to check this email frequently and heed any announcements made via email or on the Canvas course page.

Course Objectives

Upon completion of this course, the student will be able to:

1. Solve various types of ordinary differential equations: separable; exact; first-order linear; two special types of second-order; linear, higher-order differential equations with constant coefficients; Cauchy-Euler equations, and nonhomogenous equations.
2. Solve differential equations using the following numerical methods, including: Euler method, Taylor series methods, and Runge-Kutta methods.
3. Find power series solutions to differential equations.
4. Perform operations on matrices and prove theorems involving matrices.
5. Prove theorems about determinants and solve problems involving determinants.
6. Solve linear systems of equations, both dependent and independent.

7. Determine whether a given set constitutes a vector space or a subspace of a known vector space.
8. Determine whether a given set of vectors or functions is independent.
9. Determine whether a set of vectors spans a given vector space.
10. For some common vector spaces find a basis and the dimension, and prove the result.
11. Use the Gram-Schmidt procedure to find an orthonormal basis for a given subspace.
12. Determine whether or not a given operator is a linear transformation.
13. Carry out a variety of proofs and problems involving the kernel, range, composition and inverse of linear transformations.
14. Work with differential operator notation.
15. Find eigenvalues and eigenvectors of a matrix.
16. Solve systems of first-order linear differential equations using eigenvectors.
17. Find the Laplace and inverse transformations of various functions using the definition, tables and shifting theorems.
18. Solve differential equations using Laplace transforms.
19. Use a computer algebra system to solve problems in differential equations and linear algebra; and solve application problems.

Student Learning Outcomes

Upon successful completion of the course, students will be able to:

SLO #1 Understanding Concepts: Students will explain and demonstrate the key concepts of linear algebra, including determinants, vector spaces and linear transformations.

SLO #2 Solving Problems: Students will use differential equations and linear algebra to solve a variety of problems, including application problems.

SLO #3 Graphs: Students will use graphical techniques to solve differential equations or systems of differential equations.

SLO #4 Proofs: Students will analyze and construct proofs relevant to differential equations and linear algebra.

Structure of this course:

Here is what a student needs to do for this course each week.

- Go to the Math 270 Canvas course site.
- The tasks for each week are posted under the "module" for that week on the Math 270 Canvas course site. We will have videos, maybe an assignment, and maybe an exam.
- Students should
 - Go to "Modules" on the side navigation bar on the course Canvas site and complete all the tasks for that week.
 - This includes
 - reading through all the pages.
 - watching all the videos.
 - participating in the assignment or discussion (if there is one).
 - **NOTE: While all the video lectures are available at the beginning of the course, the assignment or discussion for each week (if there is one) will only show up under that week's module at the beginning of THAT WEEK.**
 - Do all the homework on for the sections covered that week. (More details about the homework will be given below.)

- Take the exam if there is an exam that week (exams dates are on the schedule at the end of the syllabus).

Attendance:

- You may be dropped if you lose more than 4 attendance points.
 - If it is an exam week, taking the exam will automatically earn your 2 attendance points. There will be no discussion on a test week.
 - If it is not a test week, doing the discussion that week will earn you up to 2 attendance points.
- **Withdrawal** from the class through the Admissions Office is the student's responsibility.

Emailing Policy

When emailing me, remember to include **Math 270** in the subject line. During Monday – Thursday, I will usually answer your email within 24 hours. If you email me during Friday – Sunday, expect a response the following Monday.

ADA Statement

Accommodations: It is the policy of the El Camino Community College District to encourage full inclusion of people with disabilities in all programs and services. Students with disabilities who believe they may need accommodations in this class should contact the campus Special Resource Center as soon as possible. This will ensure that students are able to fully participate. As well one may contact the instructor privately to discuss your specific needs. The Special Resource Center is located in the southeast wing of the Student Services Center, (310) 660-3295. More guidelines for students with disabilities may be found on their website at www.elcamino.edu/academics/src.

Academic Integrity

El Camino College places a high value on the integrity of its student scholars. When an instructor determines that there is evidence of dishonesty in any academic work (including, but not limited to cheating, plagiarism, or theft of exam materials), disciplinary action appropriate to the misconduct as defined in BP 5500 may be taken. A failing grade on an assignment in which academic dishonesty has occurred and suspension from class are among the disciplinary actions for academic dishonesty (AP 5520). Students with any questions about the Academic Honesty or discipline policies are encouraged to speak with their instructor in advance.

Homework

Homework is NOT graded and is NOT for credit in this course. The list of suggested problems are posted on the Canvas course site. Note that even though there is no credit for homework, doing the homework problems will help students prepare for the exams. Most of the homework problems are odd-numbered exercises, so their answers are in the back of the book.

I will not give solutions to the homework, but students can come to office hours for help on homework problems.

Exams

There will be 3 exams. Each of the exams will be given on Canvas as an assignment on a Thursday from 9 a.m. – 11:30 a.m. More details will be given out about each exam when we get closer to it.

At 9 a.m. on exam day, students will be able to access the pdf file with the exam questions on the Math 270 Canvas course site under the "Exams" module and the appropriate exam assignment page. (The exam assignment page will be locked until exam time.) Students will then write the answers to the questions by hand and submit one pdf file to the exam assignment page by 11:30 a.m. The instructions on how to scan and submit exam answers will be provided on the Math 270 Canvas course site. The "Exam 0: Introductions" assignment (which doesn't count toward your grade, but counts toward your attendance) will serve as practice for submitting answers to an exam.

There are no make-up exams. If you do not take the exam during the scheduled time due to any reason (sickness, family emergency, technology trouble, power outage, etc.), then you miss the exam. If you miss an exam for any reason, your final exam score will replace the first (and only the first) missed exam's score. That means if you miss two exams, the second missed exam will be a score of 0! If you take all 3 exams and your final exam score is higher than at least one of your scores for exams 1-2, then it will replace your lowest score from exams 1-2.

I will proctor exams via Zoom. That is, I will require that you log into a Zoom meeting with your webcam (or cell phone) during the exam so that I can see you while you are taking the exam. The link to the Zoom meeting for proctoring is given on the Math 270 Canvas course site.

I advise you to make sure that you have a good enough internet connection and that you test your equipment to be on video on Zoom before the exam. You can test all this stuff during our weekly Zoom office hours!

On the day of an exam, if you cannot be on video on the Zoom meeting (i.e. I can't see you or you keep freezing on screen), then I will consider that exam a missed exam even if you complete the exam. So make sure everything works before exam day, maybe by coming to a Zoom office hour to make sure that your camera works.

Final Exam

The final exam cannot be made-up.

Grading (Tentative)

Regular Exams	60% (30% each)
Final Exam	40%
Total	100%

A	B	C	D	F
100-90%	89.9-80%	79.9-70%	69.9-60%	< 60%

I will round your total percentage to the nearest tenth.

Make-up Policy

Exams: There are no make-up exams. You can have your final exam score replace one (and only one) of your missed regular exams.

Significant Dates

Jun. 27	Last day to drop for an enrollment fee refund and to drop classes without a "W"
Jul. 4	Holiday
Jul. 28	Last day to drop classes with a "W"
Aug. 11	Last day of semester

Math 270 Schedule

These dates are tentative to change. Changes will be announced via email. Note that we don't have any live classes, except for the exams. The video lectures and notes for each section that is covered during a week will be posted on Canvas. The schedule of the sections covered below is just to help you space out your studying, but you can view the videos whenever you like during the week. The exam days are set, though, unless otherwise notified.

Week	Tasks
1 (Jun. 20-23)	Videos: 1.1, 1.2, 1.3, 1.4, 1.5, 2.1 HW, and Exam 0: Introductions
2 (Jun. 27-30)	Videos: 2.2, 2.3, 2.4, 3.1 HW and discussion
3 (Jul. 4-7)	Videos: 3.2, 3.3, 3.4, 3.5, 3.6 HW Exam 1 (Ch. 1 and 2) on 7/7
4 (Jul. 11-14)	Videos: 4.1, 4.2, 4.3, 4.4, 4.5 HW and discussion
5 (Jul. 18-21)	Videos: 5.1, 5.2, 5.3, 5.4, 6.1, 6.2 HW and discussion
6 (Jul. 25-28)	Videos: 6.3, 6.4, 6.5, 6.6, 6.7, 8.1 HW Exam 2 (Ch. 3, 4, and 5) on 7/28
7 (Aug. 1-4)	Videos: 8.2, 8.3, 8.4, 8.5 HW and discussion
8 (Aug. 8-11)	Videos: 7.1, 7.2 No HW for 7.1 and 7.2 Final Exam on 8/11

