MATH 254 INTRODUCTION TO LINEAR ALGEBRA FALL 2023

INSTRUCTOR

Dr. Collins

WEBSITE

www.collinscalculusclass.org

OFFICE

Virtual

OFFICE HOURS

By appointment as necessary, my Zoom link is on the website.

CONTACT

E-mail collinscalculusclass@gmail.com

LECTURE

Lectures are on YouTube, the link is on my website.

PREREQUISITES

Math 151 with a grade of "C" or better, or equivalent.

TEXT

Optional, see Class Policy

DESCRIPTION/CONTENT

This course serves as an introduction to the theory and applications of elementary linear algebra, and is the basis for most upper division courses in mathematics. The topics covered in this course include matrix algebra, Gaussian Elimination, systems of equations, determinants, Euclidean and general vector spaces, linear transformations, orthogonality and inner product spaces, bases of vector spaces, the change of basis theorem, eigenvalues and eigenvectors, the rank and nullity of matrices and of linear transformations.

STUDENT LEARNING OBJECTIVES

Upon successful completion of the course the student will be able to:
Solve systems of linear equations using several algebraic methods.
Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal, upper triangular or lower triangular matrices.
Apply all the algebraic matrix operations, including multiplication of matrices, transposes, and traces. 4. Calculate the inverse of a matrix using various methods, and perform application problems involving the inverse.
Compute the determinant of square matrices and use the determinant to assess invertibility.
Derive and apply algebraic properties of determinants.
Perform vector operations on vectors from Euclidean Vector Spaces including vectors from $\mathbb{R}^n$.
Compute the equations of lines and planes and express them in vector form.
Perform linear transformations in Euclidean vector spaces, including basic linear operators, and determine the standard matrix of the linear transformation.

Derive whether a given structure is a vector space and identify whether a given subset of a vector space is itself a vector space.
Analyze whether a set of vectors spans a space, and if such a set is linearly dependent or independent.
Assess if a set of functions is linearly independent using various techniques including calculating the determinant of the Wronskian.
Solve for the basis and the dimension of a vector space.
Determine the rank, the nullity, the column space and the row space of a matrix.
Identify orthogonality between vectors in an abstract vector space by means of an inner product, and compute the inner product between vectors of any inner product space.
Calculate the QR-decomposition of a matrix using the Gram-Schmidt process.
Express a vector space via change of base, including computation of the transition matrix and determining an orthonormal basis for the space.
Compute all the eigenvalues of a square matrix, including any complex eigenvalues, and determine their corresponding eigenvectors.
Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix whose eigenvalues are easily calculated.
Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.

QUESTIONS

Problems with residency or registration should be resolved with Karina Sandoval (ksandoval@sdccd.edu) Student Services, I-400, 7250 Mesa College Drive, San Diego, 92111.

CLASS POLICY

Since there is no text, access and familiarity with my website will be crucial to your success in this course. You will visit the Math 254 tab which will direct you to the Math 254 homepage. All of the necessary material will be provided here to include the syllabus, class notes, worksheets, important dates, HW problems and any video links. You will read through the notes and watch any accompanying videos BEFORE any Zoom sessions. The Zoom sessions are intended to supplement and/or clarify any issues, I will not be providing an entire lecture again.

EVALUATION

There will be approximately 10-15 homework assignments throughout the semester. They will be evenly spaced throughout and each will be graded out of 100%. The homework grade you earn constitutes almost half of your grade for the course. Obviously, homework is crucial to success in this class. You WILL be allowed to ask me questions about the homework and you WILL be encouraged to work together as well. However, you must write up and hand in YOUR OWN WORK. If I find that x number of students hand in the same homework and get 100%, then each will get 100/x for that assignment, no exceptions. Any further evidence of plagiarism will result in a 0 for that assignment. The exams will consist of some computation and mostly general theory. I will let you know what I expect before each exam.

GRADING WILL BE BASED ON THE FOLLOWING PERCENTAGES:

HW	40%
EXAM 1	20%
EXAM 2	20%
EXAM 3	20%

LETTER GRADES WILL BE ASSIGNED AS FOLLOWS:

90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

IMPORTANT DATES

To withdraw without a W, the deadline is September 12th. The last day to withdraw from the course is October 30th.

ATTENDANCE

Attendance is required and you are responsible for all material covered. There are NO make-ups on any material unless you have spoken to me previously with regards to an excused absence. Exam make-ups will only be given in extreme emergencies and only if you contact me BEFORE the exam begins. If you happen to miss a class, contact a fellow student to find out what was covered, check the website or contact me. It is the student's responsibility to drop all classes in which he/she is no longer attending. It is at my discretion to withdraw a student after the add/drop deadline due to excessive absences. Students who remain enrolled beyond the withdrawal deadline will receive an evaluative letter grade in this class. This is an SDCCD class and it is critical you read and understand the following references. They can be found in the college catalog online or at the Office of Student Affairs (Room H-500).

Policy 3100: Student Rights, Responsibilities, and Administrative Due Process
Procedures 3100.1: Student Grievance Procedures
Procedures 3100.2: Student Disciplinary Procedures
Procedures 3100.3: Honest Academic Conduct Procedures

ACCOMODATION OF DISABILITY

Students that have any disability, either permanent or temporary, which might affect their ability to perform in this class should contact me as soon as possible so that I can adapt methods, materials or tests as needed to provide for equitable participation.