MATH 226 Linear Algebra and Probability for Engineers
Section 04 – Credits 4
Mondays, Wednesdays, and Fridays: 1:40pm – 2:50pm
Elihu Burritt Library (EB) 30106

Instructor: Adam Scharfenberger, Ph.D.
Office Hours: Monday, 3:00pm – 4:30pm
Tuesday, 1:45pm – 3:45pm
Wednesday, 4:30pm – 6:00pm
Office: Marcus White Hall 120
Email: scharfenberger@ccsu.edu
Phone: (860) 832-2860

Description
Math 226 is a required course for engineering majors. The course will cover topics including linear systems of equations, matrix algebra, determinants, eigenvalues and eigenvectors, probability and statistics, random variables, binomial and normal distributions.

Prerequisite
MATH 221 (C- or higher)

Textbook
- This text is taken from two texts:

Calculator Use
You will be expected to use a calculator on homework, tests, and work done in class. The Texas Instruments TI 83 or TI 84 (and plus versions) is recommended. Bring a calculator to class.

Cell Phones and Other Communication Devices
- Must be turned on silent at all times during class

Course Requirements
You are expected to attend and participate in all class sessions and activities, complete assignments, and take examinations as scheduled. A general rule for any college course is that you are expected to put in at least 2 hours of work outside of class for every hour in class. For this course, the expectation is at least 8 hours per week outside of class. Please have your supplies for each class. Homework should be completed prior to coming to class. If an emergency occurs and you will not be able to attend class, please notify me by sending an email.
Evaluation

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
<th>Percentage of Final Grade</th>
</tr>
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<tbody>
<tr>
<td>Exam 1</td>
<td>Wednesday, September 22, 2021</td>
<td>25%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Wednesday, October 20, 2021</td>
<td>25%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>Wednesday, November 17, 2021</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Wednesday, December 8, 2021</td>
<td>25%</td>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>1:00pm – 3:00pm</td>
<td>25%</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>100%</strong></td>
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Exams
- Three exams will be given during the semester. You are required to take the exams on the scheduled dates. Make-up exams will be given only in extenuating circumstance and you must contact me before the scheduled exam time. Make up exams must be completed by the next scheduled class meeting.

Final Exam
- The final exam will cover material from the entire course and must be taken at the time designated during the final exam week.

Final Grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Point Range (Percentage)</th>
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<tbody>
<tr>
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<td>93—100%</td>
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<tr>
<td>A-</td>
<td>90—92.9%</td>
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<tr>
<td>B+</td>
<td>87—89.9%</td>
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<tr>
<td>B</td>
<td>83—86.9%</td>
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<tr>
<td>B-</td>
<td>80—82.9%</td>
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<tr>
<td>C+</td>
<td>77—79.9%</td>
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<tr>
<td>C</td>
<td>73—76.9%</td>
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<tr>
<td>C-</td>
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<tr>
<td>D-</td>
<td>60—62.9%</td>
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<tr>
<td>F</td>
<td>&lt; 60%</td>
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</table>
**Topics Covered and Tentative Semester Plan**

Chapter 1 - Linear Equations
- 1.1 System of Linear Equations
- 1.2 Row Reduction and Echelon Forms
- 1.3 Vector Equations
- 1.4 The Matrix Equation \( AX=b \)
- 1.5 Solution Sets of Linear Systems
- 1.6 Application of Linear Systems (optional)
- 1.7 Linear Independence
- 1.8 Introduction to Linear Transformations (optional)
- 1.9 The Matrix of a Linear Transformation (optional)

Chapter 2 - Matrix Algebra
- 2.1 Matrix Operations
- 2.2 The Inverse of a Matrix
- 2.3 Characterizations of Invertible Matrices (optional)
- 2.8 Subspaces of \( \mathbb{R}^n \)
- 2.9 Dimension and Rank

Chapter 3 - Determinants
- 3.1 Introduction to Determinants
- 3.2 Properties of Determinants
- 3.3 Cramer’s Rule, Volume and Linear Transformation

Chapter 5 - Eigenvalues and Eigenvectors
- 5.1 Eigenvectors and Eigenvalues
- 5.2 The Characteristic Equation
- 5.3 Diagonalization (optional)

Chapter 8 - Introduction to Probability and Statistics
- 8.1 Basic Counting Principle and Permutation
- 8.2 Combinations and Other Counting Principles
- 8.3 Sample Space and Events
- 8.4 Probability
- 8.5 Conditional Probability and Stochastic Processes
- 8.6 Independent Events
- 8.7 Bayes’s Formula (optional)

Chapter 9 - Additional Topics in Probability
- 9.1 Discrete Random Variable and Expected Value
- 9.2 The Binomial Distribution
- 9.3 Markov Chains (optional)

Chapter 16 - Continuous Random Variables
- 16.1 Continuous Random Variables
- 16.2 The Binomial Distribution
- 16.3 The Normal Approximation to Binomial Distribution (optional)

Please note: Adjustments might be made to the syllabus if the class is required to go online.
Important Dates

Nov. 17, 2021: Last day to withdraw from a full semester course without approval
Dec. 8, 2021: Final Exam: 1:00pm – 3:00pm, Elihu Burritt Library 30106
   • Final Exam Schedule: https://www.ccsu.edu/registrar/calendar/finalsSchedule.html

Resources Available

1. If you need help, take advantage of your instructor's office hours. Do not wait until just before the first test to do so.
2. The Learning Center is located in Room D-316, Diloreto Hall. A schedule for hours the Center is open will be posted soon after the beginning of the semester.
3. Form a study group with other students in your section. Explaining solutions to homework problems to each other is a good way to learn.
4. A list of private tutors for hire is available in the math department main office, Room 128 Marcus White, 832-2835.

University Policies

The Final Exam Policy
You must take the final examination at the time specified. The final exam dates are determined by the University. For this class the final will be on Wednesday, December 8, 2021, from 1:00pm – 3:00pm in Elihu Burritt Library 30106.

Academic Integrity
You are responsible for understanding and abiding by the University’s policy on academic integrity. Information on the policy may be found at http://www.ccsu.edu/AcademicIntegrity/. This policy is rigorously enforced by the Department of Mathematical Sciences.

Americans with Disabilities Act (ADA) Syllabus Statement
If you are a student with a documented disability, and would like to request academic accommodations, you are encouraged to contact Student Disability Services (SDS) at 860-832-1952, or email disabilitieservices@ccsu.edu. Please visit the SDS website at http://www.ccsu.edu/sds/ to download an Intake form and documentation requirements. Temporary impairments may also qualify for accommodations. Central Connecticut State University provides reasonable accommodations in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act for students with documented disabilities on an individualized basis.
Statement on Discrimination and Harassment
Central Connecticut State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon age; ancestry, color; gender identity and expression; intellectual disability; learning disability; mental disorder; physical disability; marital status, national origin; race; religious creed; sex, (including pregnancy, transgender status, sexual harassment and sexual assault); sexual orientation; or any other status protected by federal or state laws. Any student who has concerns about should contact the Office for Equity & Inclusion (OEI) at 860-832-1652, Student Affairs at 860-832-1601, or their faculty member. The OEI is located on the main floor of Davidson Hall, room 119.

Sexual Misconduct, Intimate Partner Violence and Stalking
Central Connecticut State University (CCSU) will not tolerate sexual misconduct against students, staff, faculty, or visitors in any form, including but not limited to: sexual assault, sexual exploitation, sexual harassment or stalking, as defined in CCSU policies. For additional information, please consult the CCSU policy at https://www.ccsu.edu/diversity/policies/index.html. All faculty members and staff have a duty to report incidents of sexual harassment including sexual misconduct, intimate partner violence and stalking to Pamela Whitley, Title IX Officer, Office for Equity & Inclusion, Davidson Hall, 119.

To file a report, contact: Equity & Inclusion (860-832-1652), Student Conduct (860-832-1667) or Student Affairs (860-832-1601). For criminal complaints, contact the University Police (860-832-2375).

For support and advocacy, contact: Office of Victim Advocacy at 860-832-3795; Student Wellness Services at 860-832-1945 (confidential); Women’s Center at 860-832-1655; the local YWCA’s Sexual Assault Crisis Services Hotline at 860-223-1787 (confidential) and Prudence Crandall Center for Domestic Violence (confidential) at 888-774-2900 (24-hour hotline).