CENTRAL CONNECTICUT STATE UNIVERSITY  
DEPARTMENT OF MATHEMATICAL SCIENCES  
MATH 228 SECTION 01  
FALL 2019

READ THIS SYLLABUS CAREFULLY. YOU ARE RESPONSIBLE FOR KNOWING THIS INFORMATION!

I. Basic course information

- **Title:** Introduction to Linear Algebra

- **Course Description:** Vector spaces, systems of linear equations, determinants, linear transformations, and matrices are considered.

- **Prerequisite:** MATH 152 (Calculus I) and MATH 218 (Discrete Mathematics), both with a grade of C− or higher.

- **Instructor:** Prof. Frédéric Latour

- **Office Phone:** 860-832-2855

- **E-mail:** latourfre@ccsu.edu

- **Office:** Marcus White 119

- **Office Hours:**
  - Monday: 08:00am–09:15am; 11:00am–12:00noon
  - Wednesday: 08:00am–09:15am; 11:00am–12:00noon
  - Thursday: 02:30pm–04:00pm
  - Friday: 11:00am–12:00noon
  - Other times by appointment.


- **Class Meeting Times:** Mondays, Wednesdays, and Fridays, 09:25am–10:35am, in Ebenezer D. Bassett Hall room 206.

- **Course Requirements:** Attend and participate in class regularly; complete homework assignments; take quizzes and tests, 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.

- **Calculator Use:** The recommended calculator for this course is the TI-83+. Similar calculators such as the TI-83, TI-84, TI-84+ and TI-86 are also acceptable and may be used for examinations. Calculators with a symbolic capability such as the TI-89 and TI-92 are not allowed on examinations. If you are wondering whether your calculator is acceptable, please ask the instructor.

- **Cell phones and other communication devices:** Must be turned off at all times during class. No texting in class.
II. COURSE OBJECTIVES

After taking this course, the student should be able to:

1. Use linear algebra to solve systems of linear equations;
2. Perform basic matrix operations and calculations, including addition, multiplication and computation of the inverse, and apply the results;
3. Evaluate the determinant of a matrix and use its properties;
4. Perform basic vector operations and calculations, including addition, scalar multiplication, norm, dot product and cross product, and apply the results;
5. Apply basic definitions and perform basic computations related to vector spaces, subspaces, linear independence, bases, dimension, matrix spaces;
6. Prove statements in linear algebra, including ones involving vector spaces, bases and linear transformations;
7. Calculate the eigenvalues and eigenvectors of a small matrix.

III. EVALUATION

Minimum averages have been established for each of these grades:

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<tr>
<th>Grade</th>
<th>Minimum Average</th>
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<tr>
<td>A</td>
<td>93%</td>
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<td>A−</td>
<td>90%</td>
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<tr>
<td>B</td>
<td>83%</td>
</tr>
<tr>
<td>B−</td>
<td>80%</td>
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<tr>
<td>C</td>
<td>73%</td>
</tr>
<tr>
<td>C−</td>
<td>70%</td>
</tr>
<tr>
<td>D</td>
<td>63%</td>
</tr>
<tr>
<td>D−</td>
<td>60%</td>
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<tr>
<td>B+</td>
<td>87%</td>
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<tr>
<td>C+</td>
<td>77%</td>
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The average for the course will be based on the following weights:

<table>
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<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework</td>
<td>12%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Exam # 1</td>
<td>17%</td>
</tr>
<tr>
<td>Exam # 2</td>
<td>17%</td>
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<td>Exam # 3</td>
<td>17%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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IV. SCHEDULE OF IMPORTANT DATES

- **Exam # 1**: Friday, September 27, in class;
- **Exam # 2**: Friday, October 25, in class;
- **Exam # 3**: Monday, November 28, in class;
- **Final Examination**: Monday, December 9, in class.

*Please note:* The final examination for this course is cumulative. It covers the entire course.

Quizzes will be on Fridays of weeks without an exam, beginning on September 6. There will be no quiz in the first week. Usually, the quiz will be based on the homework problems that are due on the day it is given (exceptions will be announced in class).

Homework will normally be due on Fridays. You are allowed to collaborate with other students on homework, but the solutions that you submit must be your own. Simply copying another student’s work (or allowing another student to copy your work) is considered cheating and is not acceptable. Late homework will be penalized (see VI. Course Policies).

Occasionally, there may be changes to the course schedule (for example, if classes are cancelled because of bad weather). Changes will be announced in class.
Final Examination Policy. You must take the final examination on Monday, December 9, 08:00am–10:00am.

Course Accommodations Policy. Please contact me privately to discuss your specific needs if you believe you need course accommodations based on the impact of a disability, medical condition, or if you have emergency medical information to share. I will need a copy of the accommodation letter from Student Disability Services in order to arrange your class accommodations. Contact Stephanie Scapeccia in Student Disability Services at: 860-832-1952, Willard-DiLoreto Hall, Room W201, if you are not already registered with them. Student Disability Services maintains the confidential documentation of your disability and assists you in coordinating reasonable accommodations with your professors.

Inclement Weather Policy. At the discretion of the President of the University, classes may be cancelled or delayed because of inclement weather conditions or special circumstances. The most accurate cancellation and delay information for Central Connecticut State University will be made available on the Storm Phone: 860-832-3333 and on the Web at www.ccsu.edu.

Course Withdrawal Policy. The last day to withdraw from a course is Monday, November 18. Approvals for withdrawal are not required; however, it is strongly recommended that students consult with their instructor and academic advisor prior to deciding to withdraw. Cessation of attendance, notice to the instructor, or telephone calls to the Enrollment Center are not considered official notice of a student’s intention to drop the course.

Beginning on Tuesday, November 19, withdrawals are allowed only under extenuating circumstances and require approval of the course instructor and of the Chair of the Department of Mathematical Sciences.

Poor academic performance is not considered an extenuating circumstance.

Basic Needs and CCSU Community Pantry. Any student, faculty or staff who faces challenges securing food, baby items, toiletries, or school supplies and believes this may affect his or her performance in the course can visit our on-campus pantry. Maria’s Place CCSU Community Pantry is available for this purpose. For more information, call the pantry’s office at (860) 832-3662, email the coordinator at mariaspantry@ccsu.edu, or visit our online website at http://compassion.ccsu.edu/foodpantry/.

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 this should contact the Office of Diversity and Equity (ODE) at 860-832-1653, Student Affairs at 860-832-1601, or his/her faculty member. The ODE is located on the main floor of Davidson Hall, room 119.

Statement on 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 policies at http://www.ccsu.edu/diversity/policies/index.html. All faculty members and staff have a duty to report incidents of sexual harassment, including sexual violence, to the Title IX Officer, Office of Diversity and Equity, Davidson Hall, room 119.

To file a report, contact: Diversity and Equity (860-832-1653); Student Affairs (860-832-1601); Student Conduct (860-832-1667) or the University Police (860-832-2375).

For support and advocacy, contact: Office of Victim Advocacy & Violence Prevention (Willard-DiLoreto Hall room D305) at 860-832-3795 to speak with Joanna Flanagan (jflanagan@ccsu.edu); Student Wellness Services at 860-832-1945 (confidential), the Women’s Center at 860-832-1655, the local YWCA’s Sexual
Statement on Academic Integrity. All students are expected to demonstrate integrity in the completion of their coursework. Academic integrity means doing one’s own work and giving proper credit to the work and ideas of others. It is the responsibility of each student to become familiar with what constitutes academic dishonesty and plagiarism and to avoid all forms of cheating and plagiarism. Students who engage in plagiarism and other forms of academic misconduct will face academic and possibly disciplinary consequences. Academic sanctions can range from a reduced grade for the assignment to a failing grade for the course. From a disciplinary standpoint, an Academic Misconduct Report may be filed and a Faculty Hearing Board may impose sanctions such as probation, suspension or expulsion.

For further information on academic misconduct and its consequences, please consult the Academic Misconduct Policy (http://www.ccsu.edu/AcademicIntegrity) and the Student Code of Conduct (http://web.ccsu.edu/StudentConduct). This policy is rigorously enforced by the Department of Mathematical Sciences.

VI. Course Policies

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 D316, Willard-DiLoreto Hall. Free tutoring is available. 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 office, Room 128, Marcus White, 860-832-2835.

Late Homework Policy. If you submit written homework after the due date, it will be graded with a penalty equal to a percentage of the points earned, depending on how late the homework is submitted:

- Fewer than seven days late: 15% penalty.
- At least seven days but fewer than fourteen days late: 30% penalty.
- At least fourteen days late, but is handed in on or before the last day of the semester: 50% penalty.
- Handed in after the end of the semester’s final exams: no credit.

Absence Policy. It is your responsibility to learn the material that you missed if you are absent from class. There are no make-up quizzes; if you have a valid excuse for missing a quiz, you may be given an “excused absence”, at the instructor’s discretion. An “excused absence” means that your missed quiz will be excluded from your quiz average (and thus will not count against your grade).

- Missing an examination is a very serious matter. If you know in advance that you will have to miss an examination, you MUST inform your instructor at least two weeks before the examination. In that case, you will normally be offered an alternate time for the examination.
- If you miss an examination because of an emergency, you need to contact your instructor as soon as possible, either in person or by e-mail, within 24 hours of the beginning of the examination. DO NOT wait until the next class to contact your instructor!

Academic Dishonesty Policy (cheating). The standard penalty for academic dishonesty is a grade of 0% on the homework, quiz or examination. The following are examples of academic dishonesty:

- Copying another student’s, or a tutor’s homework solutions, or copying solutions from the internet;
- Using, in any way, an instructor’s solutions manual (an instructor’s solutions manual is for use by your instructor only, and not by students or tutors;
- Bringing an unauthorized formula sheet to an examination (whether or not you plan on using it);
- Writing formulas on your hand, calculator, etc., or storing programs, notes or formulas or any other course-relevant information in your calculator’s memory.
If you are thinking of doing anything that you think is ethically ambiguous, you should ask your instructor if it is cheating. There is no penalty for asking!

The following are NOT cheating:

- Getting help from another student on homework, or working with another student on homework problems, provided that each student writes his/her solutions individually;
- Getting homework help from tutors (Learning Center or private tutors), your professor, or another instructor, provided that you write your solution by yourself.

VII. Course Material

I am planning on covering the material contained in the following sections of the textbook:

**Chapter One: Linear Systems**
- I. Solving Linear Systems: Gauss’s Method
- II. Linear Geometry; Vectors in Space; Length and Angle Measures
- III. Reduced Echelon Form; Gauss-Jordan Reduction

**Chapter Two: Vector Spaces**
- I. Definition of Vector Space; Subspaces and Spanning Sets
- II. Linear Independence
- III. Basis and Dimension

**Chapter Three: Maps Between Spaces**
- I. Isomorphisms of Vector Spaces
- II. Homomorphisms (Linear Transformations) of Vector Spaces; Null Space
- III. Computing Linear Maps; Representing Linear Maps with Matrices
- IV. Matrix Operations and Inverses
- V. Change of Basis
- VI. Projection; Gram-Schmidt Orthogonalization

**Chapter Four: Determinants**
- I. Definition and Properties
- II. Geometry of Determinants
- III. Laplace’s Formula

**Chapter Five: Similarity**
- I. Complex Vector Spaces
- II. Similarity; Diagonalizability; Eigenvalues and Eigenvectors
- III. Nilpotence
- IV. Jordan Canonical Form
### VIII. Academic Calendar

#### AUGUST 2019

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