1. Course Information


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Office Hours: Rm 924 HE; Thursdays 4 - 5pm

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Class Website: http://math.hunter.cuny.edu/sjubaed/260.html

Course Objective: The student will learn about vector spaces and linear transformations between vector spaces, and be able to prove important results relating to such spaces. The student will also learn about matrices, how they apply to vector spaces, and how to manipulate them to yield solutions to systems of linear equations.

Expectations: In order to do well in this course, you must be comfortable with mathematical proofs. Linear algebra is often thought of as the first ”serious” math class one takes in pursuit of a math degree. To that end, we will be stating and proving theorems quite a bit, which will include proof techniques taught in Math 156. There will be some actual calculation in the form of matrices, but the ratio of proofs to calculation will be high. Math 150 and 155 are also prerequisites for the course, while Math 250 may be a corequisite. This will allow us to use calculus examples, where appropriate, to illustrate some linear algebra topics. Please be sure to brush up on all these topics as soon as possible in order not to fall behind as the semester wears on.

2. Grading Policies

There will be two in-class exams and a final exam. The final exam will be cumulative. The in-class exams will be the length of a class period. The final exam will be two hours long.

The breakdown for grading is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Problem Sets</td>
<td>20%</td>
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<tr>
<td>In-class Exam (lower)</td>
<td>15%</td>
</tr>
<tr>
<td>In-class Exam (higher)</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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Letter grades will be assigned as follows:
A+: 97.5 - 100  A: 92.5 - 97.4  A-: 90 - 92.4
B+: 87.5 - 89.9  B: 82.5 - 87.4  B-: 80 - 82.4
C+: 77.5 - 79.9  C: 70 - 77.4
D: 60 - 69.9  F: < 59.9

**Problem set submissions.** Homework will be posted on the class website and will be due in class every Thursday starting with the second week of class. You may work with others on the problems but you must submit your own individual work. Be sure to complete all homework assignments, as they comprise an important part of your course grade.

Homework must be submitted on a clean sheet of paper (either white printer paper or looseleaf paper is fine) and must be legible and follow a logical order. What the latter means is that you shouldn’t do half of problem 2 on one part of the page and the other half three sheets later, with arrows serving as guides through the maze. Work through the problems on scrap paper before writing them up neatly for submission. Late homework will not be accepted.

An illegible, illogical assignment will be returned ungraded and you will be marked as not having completed the work. The lowest two (2) homework grades will be dropped before calculating your final class grade.

**Absences/Missed Exams.** Please attend all lectures as this is a fundamental course and builds cumulatively throughout the term. If you miss an in-class exam without a valid excuse, you will be given a 0 for the exam. If you miss the final exam, you will receive a grade of WU (Unofficial Withdrawal) on your transcript.

You may request a makeup in-class exam with a valid excuse with the proper documentation and with at least a two week advance notice.

If you wish to receive an INCOMPLETE grade, you must put the request in writing and have at least a C average.

**Credit/No Credit.** You may elect to take the course on a credit/no credit basis if you are eligible, but this is subject to the College’s rules, which means that you will not be eligible for credit/no credit grading unless you have attended most class periods, taken all the exams, including the Final Exam, and completed most of the homework.

3. **Tentative Schedule**

   **Chapter 1: Vector Spaces**
   1.1 Introduction
   1.2 Vector Spaces
   1.3 Subspaces
   1.4 Linear Combinations and Systems of Linear Equations
   1.5 Linear Dependence and Linear Independence
   1.6 Bases and Dimension

   **Chapter 2: Transformations and Matrices**
   2.1 Linear Transformations, Null Spaces, and Ranges
   2.2 The Matrix Representation of a Linear Transformation
   2.3 Composition of Linear Transformations and Matrix Multiplication
In-class Exam 1
2.4 Invertibility and Isomorphisms
2.5 The Change of Coordinates Matrix
*2.6 Dual Spaces

Chapter 3: Elementary Matrix Operations and Systems of Linear Equations
3.1 Elementary Matrix Operations and Elementary Matrices
3.2 The Rank of a Matrix and Matrix Inverses
3.3 Systems of Linear Equations - Theoretical Aspects
3.4 Systems of Linear Equations - Computational Aspects

Chapter 4: Determinants
4.4 Summary Important Facts about Determinants

In-class Exam 2

Chapter 5: Diagonalization
5.1 Eigenvalues and Eigenvectors
5.2 Diagonalizability

*Chapter 6: Inner Product Spaces
*6.1 Inner Products and Norms
*6.2 The Gram-Schmidt Orthogonalization Process
*6.3 The Adjoint of a Linear Operator
*6.4 Normal and Self-Adjoint Operators
*6.5 Unitary and Orthogonal Operators and Their Matrices
*6.6 Orthogonal Projections and the Spectral Theorem

*Chapter 7: Canonical Forms
*7.1 The Jordan Canonical Form I
*7.2 The Jordan Canonical Form II
*7.3 The Minimal Polynomial

The starred sections will be covered if we have time. You will not be responsible for those sections if we do not cover them in class.

The final will be cumulative. The exact date of the final will be made available to you in advance on the class website.

4. Additional Info

The last day to officially withdraw from a course and receive a grade of W is April 11, 2016. If you do not attend classes after this date and have not officially withdrawn from the course, you will receive a grade of WU, which is akin to failing the course.

Cheating. If you are caught cheating on an exam or a project, you will fail the course and disciplinary charges may be brought against you. Hunter College regards acts of academic dishonesty (e.g. plagiarism, cheating on examinations, obtaining unfair advantage and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.
Disability. In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (emotional, medical, physical and/or learning) consult the Office of AccessABILITY located in Room HE 1124 to secure necessary academic accommodations. For further information and assistance, please call 212-772-4857 / TTY 212-650-3230.