

**About this Course**

**Why Study Matrix Methods/Linear Algebra?**

It is hard to overstate the importance of linear algebra (i.e., matrix methods) for mathematicians, engineers, and scientists. Historically, linear algebra was developed because of the need to solve elementary systems of linear algebraic equations (we will see plenty of applications that require solutions to such systems, but such problems can be interesting in their own right). Today, the study of linear algebra is much more general—and in some contexts, more abstract. For pure mathematicians, the theory is both intrinsically interesting, and useful as a tool in almost every other branch of pure mathematics (e.g., topology, functional analysis). For applied mathematicians, statisticians, engineers, and scientists, linear algebra is an essential tool for developing algorithms, modeling phenomena, and solving real-world problems. For these reasons, linear algebra provides an invaluable set of tools for the working professional in science and engineering.

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**APPm 3310**

**Matrix Methods and Applications**

**Section:** 001  
**Instructor:** Brian Zaharatos  
**Office:** ECOT 331  
**Office Hrs:** M/W: noon-1:15pm, Th: 12:30-2:00pm and by apt.  
**Email:** brian.zaharatos@colorado.edu

**Section:** 002  
**Instructor:** Brendan Fry  
**Office:** ECOT 338  
**Office Hrs:** T/Th: 1:30-3:30pm and by apt.  
**Email:** brendan.fry@colorado.edu

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"I did not look for matrix theory.  
It somehow looked for me."  
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Olga Taussky Todd

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**Important!**

This course has a course webpage.  
Assignments, solutions, policies, and other important information will be posted on our webpage. The link is:  
http://amath.colorado.edu/content/appm-3310-matrix-methods-and-applications-fall-2015
**Course Objective**

The objectives of this course are: (1) to demonstrate competence in the basic concepts of linear algebra, including systems of linear equations, vector spaces, subspaces, linear transformations, the fundamental subspaces of a matrix, eigenvalues, eigenvectors, and matrix decompositions (e.g. LU, QR, SVD, etc.); and (2) to recognize the importance of computational techniques in ‘real-world’ science and engineering problems.

**Assignments**

**Homework (20%)**

Homework is an essential part of this course. Math is best learned through practice, and one of your best opportunities for practice is homework. Collaboration is allowed, but learning from collaboration is crucial; copying homework is considered a violation of the honesty policies (see below). Assignments will be due in class every Wednesday at the start of lecture. See the class website for the schedule. A subset (often a non-empty proper subset) of problems on each assignment will be graded. The two homework assignments given before the midterm exams will not be graded. Of the remaining assignments, the two with the lowest scores will be dropped. Late homework will be penalized and will not be accepted after the answers have been posted.

**Two Midterm Exams (20% each)**

There will be two midterm exams during the semester. The first exam will take place on **Wednesday Sept. 30 at 5pm**, and the second exam will take place on **Wednesday Nov. 4 at 5pm** (rooms TBA). **Exam dates are fixed now so plan accordingly. There will be no make-up exams or early exams.** If you are sick during an exam, please bring a note from your doctor verifying your illness. The rest of your course work will then determine your course grade.

**Final Exam (25%)**

There will be a cumulative final exam. A two-sided sheet with handwritten notes will be allowed. The final exam date and place can be found here: [http://tinyurl.com/poev667](http://tinyurl.com/poev667).

**Final Project (15%)**

It might not seem so, but writing is an important skill in

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**Text**

- *Applied Linear Algebra* by Peter J. Olver and Chehrzad Shakiban. This text is on reserve in the Engineering, Math, and Physics Library. Corrections to the first, second, and third printings are available on the class website. (Required)
- *Linear Algebra and its Applications*, David C. Lay (Optional)
- *Linear Algebra Done Right*, Sheldon Axler (Optional; a pure math approach)

**Prerequisites**

A grade of C- or better in APPM 2350 (Calculus 3 for Engineers) or MATH 2400 (Calculus 3) or equivalent.

**D2L**

Grades will be posted on our D2L course page.

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**Important!**

Note that you must have an exam mean of 55% or higher to pass this course.
mathematics. For this reason, there will be a written class project. For the project you will work in **groups of two to three**. You will choose an application of matrix methods (of mutual interest to the group!) and prepare a paper on this application. Several choices of papers will be provided. The goals of the project are for you to:

- learn how matrix methods play a role in some topic of your interest
- use the material covered to explore current applications;
- gain experience with computational methods and programming;
- practice technical writing skills.

The detailed project requirements and a tentative list of topics can be found on the course webpage.

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**Final Grade**

If your exam average is less than a 55%, your final grade will be an F. Otherwise, your final grade will be determined according to the following weighting scheme:

\[
x = (\text{Homework}) \times 0.20 + (\text{Midterm Exam 1 Grade}) \times 0.20 + (\text{Midterm Exam 2 Grade}) \times 0.20 + (\text{Final Project Grade}) \times 0.15 + (\text{Final Exam Grade}) \times 0.25
\]

Your final grade will be converted to a letter grade based on a scale no less forgiving than this one:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
<th>Letter Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>( x \geq 92 )</td>
<td>C</td>
<td>( 72 \leq x &lt; 78 )</td>
</tr>
<tr>
<td>A-</td>
<td>( 90 \leq x &lt; 92 )</td>
<td>C-</td>
<td>( 70 \leq x &lt; 72 )</td>
</tr>
<tr>
<td>B+</td>
<td>( 88 \leq x &lt; 90 )</td>
<td>D+</td>
<td>( 68 \leq x &lt; 70 )</td>
</tr>
<tr>
<td>B</td>
<td>( 82 \leq x &lt; 88 )</td>
<td>D</td>
<td>( 62 \leq x &lt; 68 )</td>
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<tr>
<td>B-</td>
<td>( 80 \leq x &lt; 82 )</td>
<td>D-</td>
<td>( 60 \leq x &lt; 62 )</td>
</tr>
<tr>
<td>C+</td>
<td>( 78 \leq x &lt; 80 )</td>
<td>F</td>
<td>( x &lt; 60 )</td>
</tr>
</tbody>
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**Policies**

**Dropping the Course**

Dropping this course after the 3-week drop date will result in a W grade posted on the transcript, and full tuition and fees will be assessed. After the 10-week deadline, students must petition the dean in order to drop the course. See [http://tinyurl.com/q3uw6a6](http://tinyurl.com/q3uw6a6) for important dates.
Disability Accommodations

For disability accommodations, religious observances, and other academic policies, please see the links on the class website.

Academic Honesty

Students can work in groups however, all work turned in must be your own. Violation of the CU Student Honor Code (found here: http://tinyurl.com/ogw57sy) or the College of Engineering’s Academic Honesty Advising Guidelines (found here: http://tinyurl.com/na5n2yh) will result in an automatic final grade of F in the course.