Welcome to Linear Algebra

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What is Linear Algebra?

Linear algebra is the study of **linear maps**.

- In Calculus, you learn how to approximate any function by a linear function.
- In Linear Algebra, we learn about how linear maps behave.
- Combining the two, we can approximate how any function behaves.

What is Linear Algebra good for?

- In an abstract sense, linear algebra is arguably the most used tool in higher math.

- In computer graphics, linear algebra is used to help represent 3-dimensional objects in a two dimensional grid of pixels.

- Differential equations are often very difficult (or impossible) to solve exactly; we use linear algebra to understand approximate solutions in a vast number of engineering applications such as fluid flows, vibrations, heat transfer, etc.

- Google's famed Page Rank algorithm is based on linear algebra

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- Perform fundamental operations in the algebra of matrices, including multiplying and inverting matrices.

- Use and apply algebraic properties of a linear transformation.

- Determine geometric information about a linear transformation, including computing determinants, eigenvalues, and eigenvectors.

Standards Based Grading

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You will be given several opportunities to demonstrate mastery throughout the semester, and if at first you don't succeed, you can try again without any penalty.

SBG

The course material is broken down into 23 learning **standards**.

- Each attempted exercise will be simply marked according to whether or not your solution demonstrates mastery of the relevant standards.

- Each solution that demonstrates complete mastery counts as a **checkmark** for that standard.

- Up to two checkmarks may be earned for each standard. Your grade depends on the total number of checkmarks you earn this semester (up to 46).

- Standards will be assessed several times, and there's no penalty for incorrect solutions. So, if you don't succeed the first time, keep studying and try again!

Assessment Opportunities

Checkmarks may be earned as follows.

- **Quizzes**: Each day at the end of class we will have a quiz.
  This is how you should earn most of your checkmarks.

- **Midterm**: There will be a single midterm exam the week
  of Fall Break to give you the chance to catch up on missed
  standards.

- **Final Exam**: Your final opportunity to demonstrate
  mastery, cumulative over the entire course.

- **Out-of-class Reattempts**: A limited number of
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The assessment method (quiz/exam/etc.) you used to earn a checkmark isn't important: I only care that you learn the material and demonstrate that mastery to me before the end of the semester!

Interpreting Feedback

On each assessment, for each standard you will receive one of the following marks.

- **M** means you demonstrated **Mastery** of that standard. Great job! Check off another box on your progress sheet.

- ***** means you have a minor mistake, but if you can correct it, this mark will be changed to **M**.

- **R** means you made a good faith effort and demonstrated partial understanding, but not complete mastery. You are eligible to **Reattempt** the standard outside of class.

- **B** means there was **No Significant Evidence** of understanding.

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Marks other than **M** do not improve your course letter grade,
but they don't hurt you either.

Course Grades

A
- Earn 40 mastery checkmarks.
- Complete 10 homework reports.
- Have a 90% Class Participation Score.

OR 45

B
- Earn 35 mastery checkmarks.
- Complete 8 homework reports.
- Have a 80% Class Participation Score.

OR 40

C
- Earn 30 mastery checkmarks.
- Complete 6 homework reports.
- Have a 70% Class Participation Score.

OR 35

Homework

Homework is practice.

- I will not collect or grade homework problems.
- A list of suggested exercise for practice is in Sakai, sorted by standard. You should work as many or as few of these as you need to master the material.
- **Caveat discipulus**: Most students do not work as many homework exercises as they should.
- If you need help or feedback, come to my office hours.
- I will collect homework reports each week (blank form in Sakai).

Team-Based Learning

In this class we will use **Team-Based Learning**.

- The course is divided into six modules, each lasting about 2 weeks.

- At the beginning of each module is the **Readiness Assurance Process**. The first day of the module will consist of individual and team Readiness Assurance Tests

- The next 3-4 class days will consist of guided activities with you working in your team.

- Research in other STEM disciplines show that TBL leads to improved student learning.

Readiness Assurance Process

- In Sakai, you will find a list of the skills you should have
  before each module starts, along with a list of resources
  to help you prepare.
    - Sometimes these skills are from previous courses.
    - Sometimes these skills are standards from earlier in this
      course.

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  - Sometimes these skills are from previous courses.
  - Sometimes these skills are standards from earlier in this course.
- On the first day of the module, the Readiness Assurance Tests will ensure you have these skills.
  - First, you will individually take the RAT
  - After everyone is done, you will take the RAT again collaboratively as a team.
- **The first Readiness Assurance day is Tuesday!**

Teams

Stand up. Line up in alphabetical order by last name, with A at the front left of the room.

What makes a good team member?

Create a list of criteria that make an effective team member.

Peer Evaluation Questions

Create a list of questions your team thinks should be on the peer evaluation surveys. Answers to the questions should be on a scale from 1 to 5.

Class Participation Score

There will be four components to your participation score

iRAT (individual)	%
tRAT (team)	%
Peer Evaluation	%
Attendence	%

In your teams, decide what percentage each of the four components should have. They should add to 100%.

Office Hours

Choose up 3 one-hour long periods your team would like me to have an office hour during. Rank them in order of your preference.

I have the following constraints:

- They must be during business hours, i.e. 8-5.
- I teach another class from 12:30-1:45 on TR
- I have departmental meetings/seminars 3:30-5 on Thursdays