Welcome to
CS 1112 Intro to Computing Using MATLAB!

Instructor: Dominic Diaz
Announcements

● Check out the course website:
  https://www.cs.cornell.edu/courses/cs1112/2022fa/
  ○ Pay attention to Syllabus
  ○ Website is public–can read info even if not yet enrolled

● Discussion sections start TOMORROW
  ○ All sections are in computer labs
Who is Dominic?

PhD student in applied mathematics interested in fluids, machine learning, and birds!
About you… in CS 1112

- Undergraduates, graduates, researchers, and professionals who want (need) to learn computing
- No prior programming experience necessary but some “mathematical maturity”
- You will
  - Learn programming concepts and good programming habits
  - Practice problem analysis and decomposition
CS 1112 or CS 1110?

- Both courses are designed to prepare students for CS 2110 and future computer science courses
- Both teach you programming fundamentals that you use in any other programming language

<table>
<thead>
<tr>
<th>CS 1112 (MATLAB)</th>
<th>CS 1110 (Python)</th>
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<tbody>
<tr>
<td>- Slight emphasis on scientific computation</td>
<td>- Slight emphasis on software application development</td>
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<tr>
<td>- No too much math background required</td>
<td>- Stronger math background required</td>
</tr>
<tr>
<td>- Coziness of being a smaller class</td>
<td>- Huge class</td>
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Today’s agenda

- Course syllabus, logistics, and policies (highlights)
- What is computer programming and what is MATLAB?
- An illuminating problem (first MATLAB code!)
CS 1112 Requirements

- Attend lecture and answer Poll Everywhere questions
- Attend discussion - complete weekly exercises and get help from course staff
- Do homework: 6 programming projects
- Take 2 preliminary exams and 1 final
How to do well in this class

- Do the *highly recommended* reading
- Find a buddy in the course
- Think about what you’ve learned after leaving this lecture hall
Course Materials

- Insight through Computing: A MATLAB Introduction to Computational Science and Engineering
- MATLAB Student Version
  - Use MATLAB Online or download MATLAB onto your own computer—it’s free for students!
  - Tomorrow’s discussion section will help you with this
Let’s check out the course website quickly…

https://www.cs.cornell.edu/courses/cs1112/2022fa/

CS 1112: Introduction to Computing Using MATLAB

Course homepage (Fall 2022)

Quick announcements
- The first day of lecture is 8/23/2022. See you there!
- Discussion section will be held on during the first week of classes.

See Announcements for more details.
What is computer programming?

- A tool used by computer scientists, engineers, and other professionals
- The process of writing instructions for computing devices and systems.
  - These instructions are written in different languages (for example, MATLAB, Python, …)
Computer programming in MATLAB

Using MATLAB, you can easily:

- Develop computer programs
- Display results and ideas graphically
- Interact with large data sets (process text, image, other files)

MATLAB has extensive libraries of mathematical, statistical, simulation, and other tools. It is heavily used in engineering and sciences, both in industry and academia.

Which image shows a lion?
CS 1112 has a focus on computational science and engineering

Approximation, randomness,
model building, sensitivity of models
By learning the fundamentals in this course you can…

Approximate complex systems with less complex systems
By learning the fundamentals in this course you can...

Analyze the randomness of a system

By learning the fundamentals in this course you can...

Build models to approximate what is happening in the real world

Gif courtesy of https://gfycat.com/deafeningflimsyheterodontosaurus
Some past programming projects in this course

- Pointilizing images
- Draw the Betsy Ross flag
- Root finding
Course goals

- Develop your “computational senses”, senses that you need in computer problem-solving
- Develop a facility with the MATLAB programming environment

Help you go from this…

To this!

If you were not in lecture, check out the gif here: https://tenor.com/search/ears-hair-gifs
Algorithms and programs?

- **Algorithm**: A step-by-step procedure that takes you from a prescribed set of inputs to a prescribed set of outputs
- **Program**: The algorithm expressed in a specific coding language (for example, MATLAB)
Example: downloading Bad Bunny’s new album to apple music

1. Open the app
2. Type “Bad Bunny”
3. Click on the new album
4. Add the album to your library

Not specific enough!
Example: downloading Bad Bunny’s new album to apple music

1. Click “Add to library”
2. Click on “Un Verano Sin Ti”
3. Open Apple Music
4. Click on Search in the bottom right corner
5. Type “Bad Bunny” into the search bar
6. Click on the three dots button on the top right of the screen

Directions out of order
Example: downloading Bad Bunny’s new album to apple music

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Steps here are good!
Easy example: compute the midpoint of a line

\[(x_1, y_1) \rightarrow (x_m, y_m) \rightarrow (x_2, y_2)\]

\[
(x_m, y_m) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)
\]
Easy example: compute the midpoint of a line

\[(x_2, y_2)\]

\[(x_m, y_m) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)\]

% the first point
x1 = 1;
y1 = 1;

% the second point
x2 = 10;
y2 = 3;

% the midpoint
xm = (x1 + x2)/2;
ym = ???
What to do now?

- Consider optional Academic Excellence Workshop (AEW)
- Check out course website
- Do the *highly recommended* pre-lecture reading!
- Attend the discussion section in which you are enrolled TOMORROW!