

# ENGR-215: Computational Methods for Engineering and Scientists

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Getting Started

Prof. Gaby Mendoza

# Welcome to Computational Methods for Engineers and Scientists!

Introduce yourself:

- Name
- Engineering major, if declared
- What are you looking forward to this class?
- What are you least excited about this class?
- How many semesters until you transfer and what school would you like to transfer to?



# About the instructor

## Professional:

- Estigmergia: CEO, Founder (February 2022 – Present)
  - Swarm (collaborative) robots to solve environmental problems.
- Cañada College: Part-time Engineering Faculty (Fall 2022)
- Machine Learning content creator at Dataquest (2022)
- Research Scientist: Lockheed Martin (2017 – 2022)
  - Experience in aerothermodynamics for hypersonic systems, machine learning, multi-agent systems, space robotics

## Education:

- M.S. in Aeronautical and Astronautical Engineering from Purdue University
- B.S in Mechanical Engineering from University of Southern California (USC)
  - Undergraduate research at USC Impact Laboratory
  - Exchange research at the Tsinghua University in Beijing, China
  - Awards:
    - The Tony Maxworthy Award at USC for Combined Experimental and Analytical Elegance in Fluid Mechanics Experiment
    - AIAA Third Place Presentation of Technical Paper: “Reduction of Semi-Truck Aerodynamic Drag”
- Associate in Mathematics and Physics – College of the Canyons



# Course Information

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- Course Title: Computational Methods for Engineers and Scientists
- Virtual Lecture
- Class Meeting Days: Wednesday
- Class Meeting Times: W 9:10 am - 12:00 pm
- Instructor: Prof. Gaby Mendoza
- E-mail: [mendozamaría@smccd.edu](mailto:mendozamaría@smccd.edu)
- Office Hours
  - In-person Wednesdays 12:00 – 12:30 PM [BLDG 23-137A](#)
  - Zoom TBD
- Course Delivery: Canvas LMS
- Textbooks
  - Multiple free available for download in Canvas

*Detailed information on  
your Syllabus!  
The Syllabus is your  
friend!*


# Canvas Home Page

Spring 2023

ENGR-215-HAA-Comput. Methods Engr/Scientist-  
CRN 42012

Home  
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New Analytics  
Cañada CARES  
Item Banks  
LIDOIT  
Google Drive  
Panopto Video  
Cañada Tutors  
NetTutor  
Early Alerts

Canada College  
Welcome to Computational Methods for Engineers and Scientists!



Instructor: Prof. Gaby Mendoza  
Email: [mendozamaría@smccd.edu](mailto:mendozamaría@smccd.edu)  
I'll be responding to email, Canvas Inbox messages, and voice mail within 48 hours, not counting weekends and holidays.

Table containing links to different areas in the course and a description of their links.

Link Name	Link Description
<a href="#">Start Here</a>	Begin the course here.
<a href="#">Announcements</a>	Read the latest announcements in this course.
<a href="#">Course Syllabus</a>	View the syllabus for the course.
<a href="#">Course Schedule</a>	View assignments, due dates, and schedule
<a href="#">Modules</a>	Access the course modules here. You can also access the modules directly by clicking on the Modules tab in the left navigation menu.
<a href="#">Meet Your Instructor</a>	Learn about your instructor for this course and the best ways to communicate with each other.
<a href="#">Grades</a>	Monitor your progress in the course.
<a href="#">Technical Support</a>	New to Canvas or online learning? Find resources and contact information for technical support.
<a href="#">Student Services</a>	Explore the available campus resources to support your academic and personal success.

Getting Started Module

Announcements

To access Syllabus

All content

Check your grades

Support

Schedule, dates

# Syllabus

To access  
Syllabus

To download PDF  
version of the  
Syllabus

Contains  
Hyperlinks

## Table of Contents

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Spring 2023

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## Course Syllabus

[Jump to Today](#)

[Edit](#)

[Download Course Syllabus as a .PDF](#)

### Class Logistics

This course will be taught using a hybrid model that uses both in-person activities and synchronous on-line lessons. However, be prepared for the possibility that the teaching as well as labs will be on-line at the discretion of the instructor.

#### Class Day/Times:

- Virtual Lectures
- Wednesday 9:10 AM - 12:00 PM (01/17 - 05/26), Building 16, Room 110
  - We will generally meet in-person and occasionally move to on-line. Any changes can be found in the Announcement sections.

#### Office Hours

- TBD

#### Final Exam

- TBD

### Table of Contents

- [Welcome](#)

# Your Turn!

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- Go to CANVAS course
- Go to Syllabus
- Make sure you can read the content
- Make sure you can download the PDF version
- 👍 if you can do previous steps successfully.

# Course Description and Outcomes

## Description:

This course covers the fundamentals of procedural programming and computational methods for science and engineering. Topics include induction, iteration and recursion, approximations, floating-point computations, introduction to data structures and object-oriented programming. Students will be given laboratory projects that use the MATLAB programming language to solve problems and examples drawn from algebra, trigonometry, calculus, and elementary physics.

**Lecture hours per semester:** 32-36

**Lab hours per semester:** 48-54

**Homework hours per semester:** 64-72

**Recommended or Required Prerequisites:** MATH 251, Eligibility for ENGL 100

**Corequisites:** None

**Transfer Credit:** CSU, UC

**C-ID:** ENGR 220

## Student Learning Outcomes

Upon successful completion of this course, a student will meet the following outcomes:

- Apply a top-down design methodology to develop computer algorithms.
- Apply an object-oriented design methodology to develop computer algorithms.
- Apply numeric techniques and computer simulations to analyze and solve engineering-related problems.
- Use MATLAB / Octave effectively to analyze and visualize data.
- Perform statistical/probability analysis and interpolation of data.
- Create graphics (2D and 3D plots) for displaying data.
- Solve simple matrix algebra problems.
- Solve optimization problems involving single and multivariable functions.



# Textbooks & Software

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## Textbooks

PDF textbooks available for download in Canvas:

1. Introduction to Octave for Scientists and Engineers by Sandeep Nagar

If you need additional information:

1. GNU Octave by John Eaton et al.
2. GNU Octave Beginner's Guide by Jesper Schmidt
3. Octave and MATLAB for Engineers by Andreas Stahel, Bern University
4. Programming Computations - MATLAB/Octave, Springer
5. Introduction to GNU Octave by Lachniet

## Recommended Software

1. Install the canvas-integrated free chat app called Pronto (on your phone) as this will be used as a means of communication with you and between students.
2. Octave - a free open-source engineering computational program that is the clone of MATLAB (proprietary and paid software)
  1. Install on Mac, Windows, or Linux from here: <https://wiki.octave.org/Category:Installation>. This will be available on the school laptops but would be good if you also installed it on your personal devices.
  2. A student version of MATLAB is available for \$49 at [http://www.mathworks.com/academia/student\\_version](http://www.mathworks.com/academia/student_version)

# Grading

## Grading

### Points Possible

In this course, you will be evaluated in the following way:

#### Grades Percentage Breakdown

Assignment	Weight
Participation	5%
Homework	20%
Quizzes	20%
Midterm Exam	30%
Final Exam	25%
<b>Total</b>	<b>100%</b>

You can check  
your grades on  
Canvas

Letter Grade	Percentage
A	93 - 100%
A minus	90 - 92%
B plus	87 - 89%
B	83 - 86%
B minus	80 - 82%
C plus	77 - 79%
C	70 - 76%
D plus	67 - 69%
D	63 - 66%
D minus	60 - 62%
F	59% and below

# Course Requirements

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Students are expected  
**to complete the lectures videos  
and the reading assignments  
before the laboratory**

# Quiz (20%)

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- Weekly
- Quizzes are due **before lab** and they test you content from video lectures and reading
- You are allowed to re-take the quiz up to two times only if you first attempt is before the Lab.
  - This allows students to ask questions on a topic that wasn't clear during lecture video.
- 15 quizzes total
  - 10 higher scores towards the 20%
  - The remaining points can be used towards extra credit

# Homework (20%)

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- Homework is essential to understanding the material covered in this course and to learn MATLAB.
- Each homework assignment will be posted in Canvas with an available date and a due date.
- All homework must be submitted at the beginning of class on the due date.
- There will be a total of 11 homework
  - Ten will count towards the 30%
  - The lowest score will be dropped
- Collaboration on homework is allowed **but copying is not.**
- Each homework assignment must have the following information in the top left corner of each page:
  - Student Name**
  - Due Date**
  - Chapter and Problem Numbers**

# Participation (5%)

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- Attendance to laboratory on time is required.
- Consistent tardiness is disruptive and disrespectful and will lower your grade.
- Students are expected to prepare for each lecture by reading the appropriate sections of the textbook to better understand the material presented in class.
- Students are expected to participate in class discussions and are encouraged to ask questions about any of the material.
- Notify me by email or in person prior to any expected late arrivals or absences.

# Late Work

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You will be using the Canvas site to turn in most of your assignments and due dates will be posted online. Late assignments will be accepted only up to seven days past the due date, but only for partial credit a **-10% penalty will be applied each day a graded item is late beyond its due date.** If you are having a personal emergency, please let me know immediately and I can make an exception.

# Course Schedule

## Getting Started | Course Schedule

### Course Schedule

To access  
Course  
Schedule

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Course Schedule and Important Dates

Week Number	Week	Topic	Due before Lab	Wednesday Lab / Assignment(s)
0	01/18	Getting Started		Pre-course Survey, Discussion 1: Introduce yourself
1	01/25	Introduction to MATLAB/ Octave	Lecture Video and Quiz 1 Reading assignment on Canvas	Homework 1
2	02/1	Numeric, Cell, and Structure Arrays	Lecture Video and Quiz 2 Reading assignment on Canvas	Homework 2
	02/05	Last day to drop class with no "W" recorded		
3	02/8	Functions	Lecture Video and Quiz 3 Reading assignment on Canvas	Homework 3
4	02/15	Programming Techniques	Lecture Video and Quiz 4 Reading assignment on Canvas	Homework 4, part 1
5	02/22	Programming Techniques II	Lecture Video and Quiz 5 Reading assignment on Canvas	Homework 4, part 2
6	03/1	Advanced Plotting	Lecture Video and Quiz 6 Reading assignment on Canvas	Homework 5, part 1
			Lecture Video and Quiz 7	



# Course Modules

## ▼ Getting Started (Pre-course information)

- Getting Started | Overview
- Getting Started | Meet Your Instructor and Communication Commitment
- Getting Started | How To Navigate This Course
- Getting Started | Course Schedule
- Getting Started | Online Etiquette
- Getting Started | Preparing for Success
- Getting Started | Course Q & A Forum
- Student Services & Resources
- Getting Started | Canvas and Online Course Technical Support
- Getting Started | Cañada College | Building 9 | Virtual Student Support Services
- Getting Started | Summary

## ▼ Weekly Content

- Week 0: Course Introduction

## ▼ Textbooks

- GNU Octave - Eaton.pdf
- GNU-Octave-for-beginners - Schmidt.pdf

## Week 0: Course Introduction

### Overview

### Lecture Content

### Additional Content

### Assignments

## Overview

In this lecture we will get a course introduction, go over the syllabus, and more information required to succeed in this course.

### Topics:

- Syllabus
- Navigating Canvas
- Grading
- Scheduling
- Succeeding in this course
- Network with peers

## Objectives for this Week

By the end of this week you will be able to:

- Understand expectations for this course
- Find important information for this course
- Organize your weekly schedule for your courses
- Meet some of your peers

## Reading

Syllabus

## Weekly Schedule

Wednesday at 9:10 AM, we will meet in-person at Room 16-110.

# Check!

- Can you see the modules successfully?
- Can you see the course schedule?
- Is everything clear to me about the course schedule and the modules?
- Can you go to Week 0: Lecture and download slides or view the slides?

The screenshot displays a course website interface. At the top, there are four navigation tabs: "Overview", "Lecture Content", "Additional Content", and "Assignments". Below these is a "Lecture Slides" section. A red rectangular box highlights a slide preview window. The slide title is "ENGR-215: Computational Methods for Engineering and Scientists". Below the title, it reads "Lecture 1: Introduction to MATLAB / Octave" and "Prof. Gaby Mendoza". The preview window includes a toolbar with "Page 1 of 50", a refresh icon, and zoom controls. Below the slide preview is a "Lecture Video" section, which is circled in blue.

# Accessing Lecture Videos

- Go to the Lecture Content Tab in Week's Module
- There is a link at the bottom for Lecture Video, it will take you to the quiz assignment.
- Every lecture has embedded quizzes that you must take (see Quiz policy)

## Quiz 1

Please watch the video entirely. Questions to the quiz are embedded in the lecture. You are only allowed TWO re-attempts to improve your score.

L1 Introduction, applications, command window, scalar arithmetic

### Objectives

1. Interactive sessions
2. MATLAB / Octave Toolstrip and interface
3. Built-in functions
4. Working with files
5. The Help System
6. Problem-Solving Methodologies



Powered by Panopto



# Communication

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## **Announcements**

Announcements will be posted in Canvas on a regular basis, often weekly on Mondays. They will appear under the Announcements area in this course from Canvas. Please make certain to check them regularly, as they will contain any important information about upcoming projects or class concerns.

## **Email**

In this course we will use the Inbox feature to send email for private messages. The [Inbox](#) link is in the global navigation menu located on the left side of every page in Canvas. You can either check your messages in the Canvas system or set your notifications to your preferred method of contact. Please check your messages regularly. When submitting messages, please do the following:

- Put a subject in the subject box that describes the email content with your name, week, and message subject. For example: YourNameWk2Assignment
- Do not submit your assignments by message
- Make certain to check your messages frequently
- I'll be responding to email, Canvas Inbox messages, or any other communication method specified in the course within 48 hours, not counting weekends and holidays.

# Questions

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In online courses it is normal to have many questions about things that relate to the course, such as clarification about assignments, course materials, or assessments. **Please use the discussion forums in Canvas to ask questions about the lecture content and homework before you send me an email.** I'll be checking these forums twice a week, but I encourage you to respond to your classmates' questions if you know the answer!

If there are any other personal questions that you do not wish to post in the Discussion forum you can email me through the Canvas [Inbox](#). Be sure to include your name in the subject line.

# Safety Policy

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The San Mateo County Community College District is committed to maintaining safe and caring college environments at Cañada College, College of San Mateo and Skyline College. The District has established policies and procedures regarding Sexual Misconduct, Harassment, and Assault. A District website has also been developed which provides you with important information about sexual misconduct and sexual assault.

Link to [Title IX Website](#).

# Other Resources

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## Educational Equity

- The faculty at Cañada College affirm that students are entitled to an equitable learning environment that celebrates their voice, fosters their agency, and develops their capacity for self-advocacy, and that is free of unfair practices.
- If you feel you are in an environment that is not conducive to your learning or you want to learn more about educational equity, please come talk to me. You may also contact [Academic Committee for Equity & Success](#) to explore your options.

## Student Accommodations and Inclusive Learning

- Cañada College is committed to equal access for all students in accordance with the Americans with Disabilities Act of 1990. If you are registered with the Disability Resource Center (DRC) and would like to use accommodations in midclass, please make an appointment with me as soon as possible or contact The Disability Resource Center (DRC) for assistance. The [canadadrc@smccd.edu](mailto:canadadrc@smccd.edu) or visit the [DRC web page](#) for more information.

Link to shuttle: <https://canadacollege.edu/shuttle/>



Cañada College is offering FREE shuttle service to campus from East Palo Alto and Menlo Park

## Shuttle Boarding Times

Effective August 17, 2022 through December 16, 2022

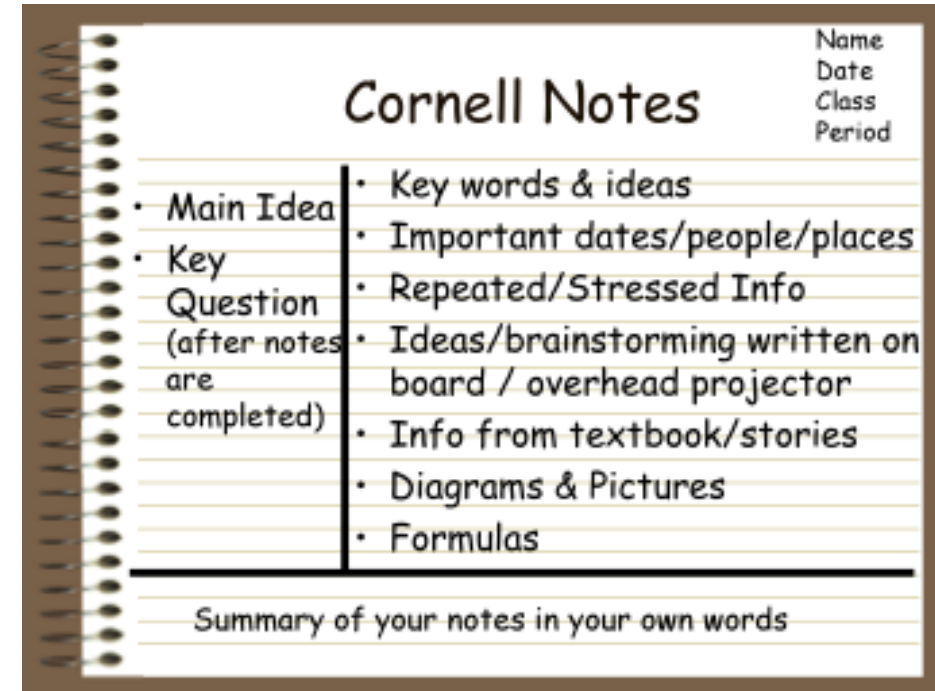
*Departure times are estimates and schedule is subject to change. Buses are subject to delays based on traffic and other conditions. Always arrive at your stop 5 minutes before the scheduled time.*

Shuttle operates on Monday - Friday

**[Check the website for schedule](#)**

# How to Succeed in the Course?

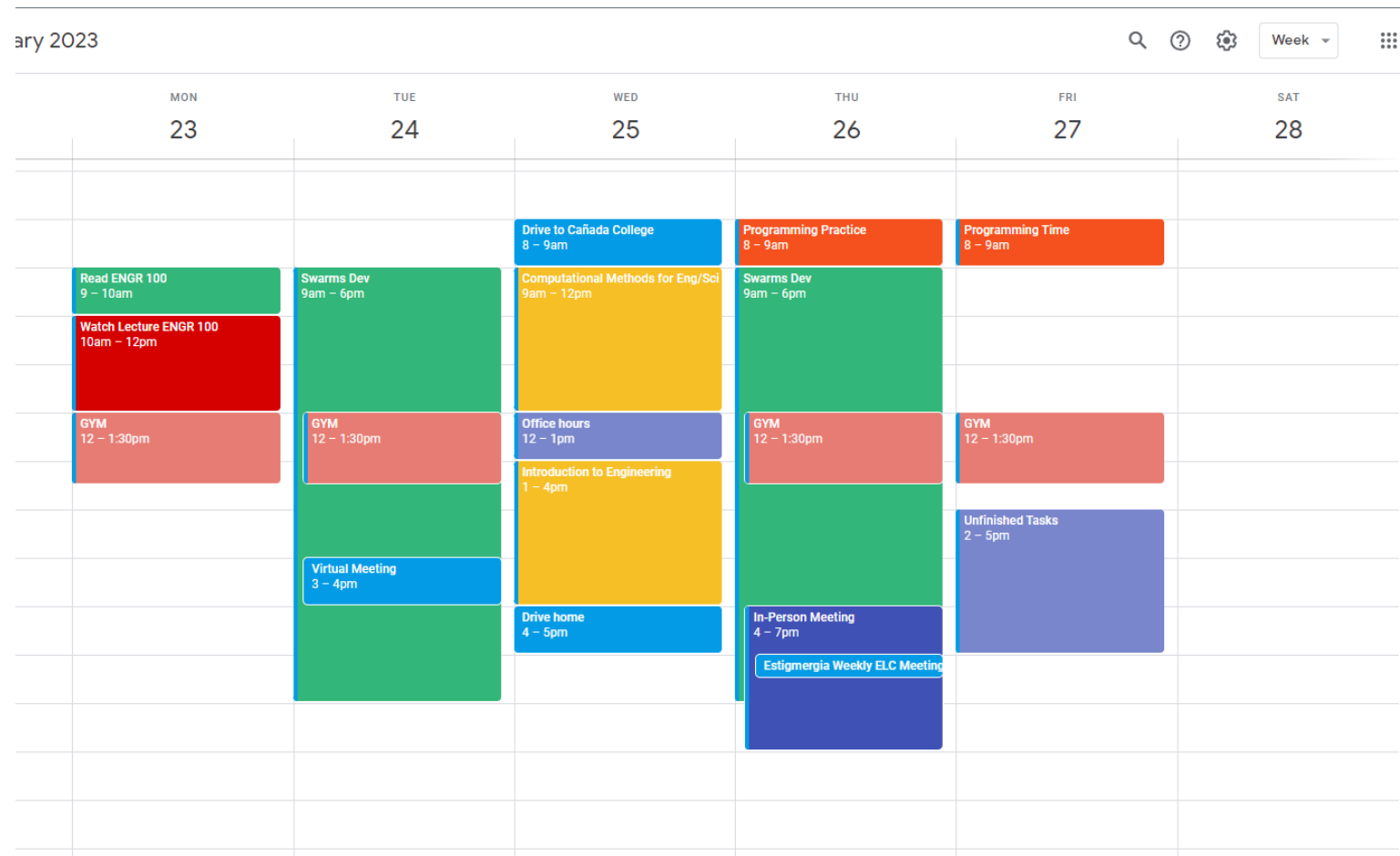
1. Organize your calendar and setup weekly time for each course
2. Get all the tools necessary
3. Read the assigned chapter
4. Watch lectures
5. Take notes with important concepts, rules, syntax
6. Take Quiz
7. Come to lab and attempt homework problems
8. Ask questions
9. Study with friends
10. Practice more problems 2-3+ days a week





# Organize time

1. Sign into your SMCCCD Google account
2. Open Google Calendar
3. Add all your courses class meeting times, commitments, and commuting time
4. Separate 3 hours to watch lecture and takes notes before Wednesday
5. For every class, separate at least 2 hours of studying / homework



# TODOs

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## Assignments:

- Getting Started Module
- Pre-course Survey
- Go to Canvas and complete Discussion 1: Introduce yourself
- Familiarize with course schedule
- Read the syllabus and ask any questions
- Decide whether you want to install Octave or purchase MATLAB
  - Regardless of the option, install them in your personal computer **now. Instructions can be found under Week 0 Additional Content tab.**
  - If you do not have a computer, use this time to request it in the Technology Loan Program: <https://canadacollege.edu/library/technology-services.php>

# Get tools

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1. Once you have your computer or a computer to use for the semester
2. Create a folder in your Documents (or any folder you prefer) and create the following folders:
  1. ENGR215-Spring23
    1. Lectures
    2. HWs
      1. HW1
      2. HW2...
    3. Exams
      1. Midterm
      2. Final
    4. Textbooks
    5. Optional: Notes. You can also do handwritten notes if you prefer
    6. Download [here](#) the syllabus and course schedule

# Two-minute network

Let's standup and arrange in a speed-dating manner, you will ask the person in front of you. (two minutes each- swap places so the other person can face the board)

1. Name
2. Ethnicity or where you are from?
3. Your favorite restaurant
4. Your favorite place to travel
5. What high school you attended?
6. Hobby
7. Do you spend time at the Learning Center? Which days?

# TODOs

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Before next Wednesday:

- Download all the textbooks
- Read Chapter 1: Introduction To Octave For Scientists and Engineers by Sandeep Nagar
- Watch lecture videos
- Complete Quiz 1