CEE/MAE M20
Introduction to Computer Programming with MATLAB

Syllabus

Summer 2020

Instructor: Edward X. Gao, 408 Engineering VI, EdwardXiangGao@gmail.com

Course Description: This course introduces fundamentals of computer programming and uses MATLAB as the computing environment. The course focuses on development of algorithms and their implementation as computer programs using model problems selected from engineering, mathematics and physical sciences. No prior programming experience is needed; some background in calculus and linear algebra, and statistics is required.

CCLE: All handouts, homework, announcements, and other info will be distributed through CCLE. Homework submission and grading will also be handled with CCLE.

PIAZZA Forum: We will use Piazza forum to hold all of student questions and answers. Please use the following link and sign up for a PIAZZA account and address any questions there regarding the coursework or logistics.

Schedule: The primary way youll receive information in this course is through recorded video lectures and lab sessions posted to CCLE. The recording schedule is listed below. (These schedules are tentative and subject to change)

Lecture	Monday & Wednesday	10:00 AM - 12:00 PM	Live Zoom Session (Recorded)
Office Hour	Monday	12:00 PM - 02:00 PM	Live Zoom Session (Unrecorded)

You can choose to attend the recording sessions “live via the Zoom Meeting software (follow links posted on CCLE) or wait for the resulting video file to be uploaded to CCLE and watch at your own convenience. This gives you the option to virtually participate in lecture and lab sessions when your schedule allows while also allowing flexibility to students with busy Summer schedules. There is no requirement to attend these sessions during the listed recording hours, but you must stay up to date with the material to get the most out of the course.

TA’s: We have 3 TA’s and 2 Lab sections.

Section 1A	TBD		
Lab	Friday	10:00 AM - 12:00 PM	Live Zoom Session (Recorded)
OH	Thursday	10:00 AM - 12:00 PM	Live Zoom Session (Not Recorded)
Section 1B	TBD		
Lab	Friday	12:00 PM - 02:00 PM	Live Zoom Session (Recorded)
OH	Thursday	12:00 PM - 02:00 PM	Live Zoom Session (Not Recorded)
Section 1C	TBD		
Lab	Friday	02:00 PM - 04:00 PM	Live Zoom Session (Recorded)
OH	Thursday	02:00 PM - 04:00 PM	Live Zoom Session (Not Recorded)

Software: For access to MATLAB, you will have the choice of using your SEASNet account (either on campus or via the remote desktop connection) or purchasing a student version of MATLAB to run on your own computer (highly recommended). If you work locally on your own machine, we highly encourage backing up your files remotely either to the SEASnet servers or using a cloud service such as iCloud or Google Drive.

Reading: Textbook:

> C.F. Van Loan and K.-Y.D. Fan, *Insight Through Computing: A MATLAB Introduction to Computational Science and Engineering*, SIAM, 2010.

This book is great for many reasons, two of which are worth mentioning:

(1) It matches perfectly our philosophy in this course, developing programming skills and techniques in the context of interesting engineering-related problems; and

(2) *You can download it electronically for free* through a site license to the UCLA library. From any UCLA IP address (or using the UCLA VPN), go to
`http://dx.doi.org/10.1137/1.9780898717648`.

Corrections to the text and problems (Errata) and other resources are found at the book website:
`http://www.cs.cornell.edu/insight/`.

Two other free books that you may wish to use for examples and additional reading are these by Cleve Moler, the author of the first version of MATLAB,

> C. Moler, *Numerical Computing with MATLAB*, Mathworks. `http://www.mathworks.com/moler/index_ncm.html`
>
> C. Moler, *Experiment with MATLAB*, Mathworks. `http://www.mathworks.com/moler/exm/index.html`

For help with MATLAB, you are encouraged to consult MATLAB's own extensive documentation, obtained by typing `doc` from the command prompt.

Coursework and Grading:

- Weights: Homework 60%; Quiz 10%; Final project 30%.
- There will be no midterms or final exam.
- Homework will be assigned every week, and due on Friday the following week at 11:59 PM. You should expect fairly extensive reading assignments.
- For any homework, you will be expected to submit
  - Your (unique) source code.
  - A structured report on your work.
- Each homework will be assessed on a scale of 100 points. Out of this total score, the grade is divided into:
  - Report, 50%
  - Source code, 50%
- In the report, you are expected to carefully and neatly describe your problem-solving logic and the significance of your findings. If you hand in a sloppy (either in thinking or writing) homework, you will lose points.

- The score for source code is based on its ability to produce correct results when operated by us (i.e. the course instructors and graders), neatness of organization, use of commenting, and the explicit use of the programming tools learned in the class. There might be other criteria specified in each homework assignment.
- Policy on late homework (late means anytime after 11:59pm on the due date): Late homework will still be accepted, but you will lose 10 points for each day that it is past the deadline.

Regarding collaboration and academic integrity: While I encourage you to discuss the course material and homework with others, the code and reports you submit must be your own. Unauthorized collaboration, and copying or viewing another person's work, including the transfer and/or use of another person's computer files, are considered acts of academic dishonesty by the University Academic Integrity Policy and the UCLA Student Code of Conduct (www.deanofstudents.ucla.edu), to which I will hold you accountable.

Under no circumstances should you share (by electronic, printed, visual, or any other means) any of your work with another student. I am very serious about this point — If you ever find yourself tempted to cheat, please talk to me instead (without fear of punishment or judgment), or look to the Dean of Students Office (www.deanofstudents.ucla.edu) for other ways to get help. **We will be actively monitoring the source code and reports and comparing your submitted work with that of others. If we find that you've copied each other or passed another's work off as your own, we will have to take steps to report the breach of academic integrity.**

The bottom line here: A university education is about so much more than gaining knowledge and a good GPA. Most importantly it is about challenging and developing your *mind* and your *character*. Honesty in your academic work will develop into professional integrity.

Overview of Course Topics (not necessarily in order):

1. Logic and conditionals
2. String manipulation
3. Loops, recursion
4. Round-off error and precision
5. 1-D arrays
6. Plotting with MATLAB
7. Abstraction and functions
8. Randomness
9. Multidimensional arrays
10. Sorting, searching, root finding
11. Data abstraction, structures and user-defined types
12. Data I/O, file processing
13. Memory allocation
14. Vectorization
15. Debugging and profiling

Week	Lecture A	Lecture B	Assignment
01	Introduction to MATLAB Command Window and Output	Conditional	HW 1
02	Neighbor Identification Iterations and Recursions	Pocket Change Calculations Predatory and Prey Simulation	HW 2
03	Arrays in MATLAB Pendulum Physics	DNA Vector	HW 3
04	Abstraction (Functions) Runge-Kutta Methods	Split Average	HW 4
05	Randomness Matrices in MATLAB	Random Walk	HW 5
06	Sorting Algorithm Searching Algorithms	Game of Life	HW 6
07	Data Abstraction	Rank Choice Voting	Final Project
08	File Input and Output Video Generation	Newton's Method	