BMEn 2401
Programming for Biomedical Engineers
Course Information - Fall 2018

Class meets TR 12:20-1:10 OR TR 1:25-2:15 in Rapson Hall 56

Instructor: Victor Barocas (baroc001@umn.edu)
                      (Please write "BMEn2401" at the beginning of the subject line)

TA: Ken Louie (louie013@umn.edu)
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Office Hours: Victor   F 10:00 – 11:00, room TBD
                      TA Office Hours will be discussed in class on 4-SEP.

ABET Student Learning Outcomes:
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science,
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Prerequisites: MATH 1272, PHYS 1302, and CSE undergraduate student or consent of instructor
Textbook: *Essential MATLAB for Engineers and Scientists* (Sixth Edition) by Hahn and Valentine. 2016, Academic Press. A copy of this book is available online through the UMN library.

Video: This class will use the so-called "flipped" model, in which the content will be delivered primarily via video lectures, and class time will be used for discussion and problem-solving. Thus, most classes will have a video for you to watch *before* the class session, and a video-based assignment to be turned in *at the start of class*.

Homeworks: In addition to the small video-based daily assignments, there will be weekly homework assignments that involve a deeper exploration of the topic and more thorough implementation of the concepts. These will be worked on in teams during class time and also outside of class.

Working together is an important part of the learning process, and I encourage you to work with your colleagues in class and outside of class. That said, plagiarism (representing someone else's work as your own) is not acceptable (see further discussion of academic dishonesty below), and for evaluation purposes, there must be a limit on the number of people working on a problem together. Thus, the following rules will be in effect:
- Video-Based Assignments should be done *alone*.
- Weekly Assignments may be discussed with other students in the class. Programs and program segments may be developed collaboratively by up to three students, each of whom should turn in his/her own copy and should acknowledge the collaborators as a comment in the first line or two of the code ("% I worked with Ima Student and Matt Labb on this piece of code"). Non-coding components of assignments (e.g., analysis and discussion) may be worked out together, but each student should turn in his/her final work independently.
- Exams must be done alone.
- The Final Project should be done in teams of three or four.

Homework assignments are ***due before the first lecture*** (12:20) on Tuesdays. The work will be submitted through Canvas. Late submissions will not be accepted.

Examinations: There will be two cumulative exams. Per UMN policy, make-up exams will only be given in the case of conflicts with UMN-sanctioned events.

Grading Policy: The course grade is based on the weighted scores of the various assignments as described below. All regrade requests must be submitted in writing within one week of the return of the assignment to be regraded, and the request must include a description of what error was made.

Grade Weights:
- 10% Daily (Video) Assignments
- 25% Weekly Assignments
- 25% Exam #1
- 25% Exam #2
- 20% Project

Computer Policy: All computers within the UMN science & engineering computer labs are equipped with the latest version of MATLAB 2017. You can download the software on your personal computer through the UMN CSE IT website. The instructor and TAs of this course are NOT responsible for solving issues with MATLAB on your personal computers. Please see university IT for assistance.

Academic Integrity: Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

> *Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.*

Policy on Scholastic Conduct: Scholastic Dishonesty in any portion of the academic work for the course is grounds for awarding a grade of F for the entire course, and the infraction reported to the university. The MINIMUM sanction in cases of Scholastic Dishonesty is that zero credit will be given for the work in question.

Policy Statements: A list of policy statements, including excused/unexcused absences, may be found at *http://policy.umn.edu/education/syllabusrequirements-appa*.

Students with Disabilities: The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations. If you are registered with DS and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

Mental Health: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via *www.mentalhealth.umn.edu*.

Course Schedule

Lecture Number	Date	Topic	Assignment
1	04-SEP	Introduction, Matlab Introduction	--
2	06-SEP	Using Matlab, Intro to variables Scripts	VL2, HV 1.1.1-1.1.4, 1.2.1-1.2.2, 1.3.2
3	11-SEP	Variables, Arrays, and Strings	VL3, HV 2.1, 2.3, HW 1
4	13-SEP	Matrices, Linear Algebra in Matlab	VL4, HV 6.1.1-6.1.7
5	18-SEP	Program Design and Algorithm Development	VL5, HV 3.1, HW 2
6	20-SEP	Input/Output and Other Handy Matlab Functions	VL6
7	25-SEP	Conditional Statements and Logical Operators	VL7, HV 2.8, HW 3
8	27-SEP	Repeated Statements / Iteration	VL8, HV 2.7
9	02-OCT	Matlab Function Files	VL9, HV 3.2, HW 4
10	04-OCT	Local vs. Global Variables Recursion	VL10, HV 7, esp. 7.2.1, 7.7
11	09-OCT	Random Number Generation	VL 11, HV 13.1, 13.1.1, HW 5
12	11-OCT	System States	VL 12, HV 6.5
13	16-OCT	Review / Discussion	HW 6
14	**18-OCT**	**EXAM 1 (Lectures 2-11)**	*VB Out of Town*
15	23-OCT	Shall We Play a Game?	HW 7, watch "Algorithms" video
16	25-OCT	Sorting	VL 16, HV 10.3
17	30-OCT	Gauss Elimination	VL 17, HW 8
18	01-NOV	Random Walks, Diffusion, and Mean Squared Displacement	VL 18 HV 13.5
19	06-NOV	Root-Finding	VL 19, HV 14.1, HW 9
20	08-NOV	Optimization, Part 1	VL 20
21	13-NOV	Optimization, Part 2	VL 21
22	15-NOV	Review	HW 10
23	**20-NOV**	**Exam 2 (Lectures 12, 15-21)**	
24	**22-NOV**	**NO CLASS (THANKSGIVING)**	
25	27-NOV	Numerical Integration (Trapezoid Rule)	VL 25, HV 14.2
26	29-NOV	PROJECT	
27	04-DEC	PROJECT	HW 11
28	06-DEC	PROJECT	
29	11-DEC	PROJECT	
*		**Project Report Due**	

VL = Video Lecture (video-based assignment due at start of class)
HV = Hahn and Valentine (reading assignment, not graded)
HW = Weekly homework assignment due