MAE 215: Introduction to Programming in MATLAB

Course Description

Introduces basic topics and concepts of computer programming in MATLAB. Required for aerospace engineering and mechanical engineering.

General Course Information

Instructor	Dr. Joshua Wilbur, ERC 459, Joshua.Wilbur@asu.edu
Office Hours	TBD, in-person (ERC 459) or via Zoom
Lecture	M: 12:00pm–12:50pm, SCOB 152
Primary Text	Moore, Holly. *MATLAB for Engineers, 4th Edition.* Prentice-Hall, 2011. ISBN: 978-0-13- 348597. **(Not Required)**
Other Useful Texts	Hahn, B. and Valentine, D. *Essential MATLAB for Engineers and Scientists, 7th Edition.* Elsevier, 2019. ISBN: 978-0-08-102997-8. (Free digital access through ASU library.) Gilat, Amos. *MATLAB: An Introduction with Applications, 5th Edition.* John Wiley & Sons, 2015. ISBN: 978-1-118-62986-4 (paper). (Free digital access through ASU library.)
Prerequisites	MAT 265: Calculus for Engineers I
Recommended Co-/Prerequisites	MAT 242: Elementary Linear Algebra

Course Topics and Outcomes

The purpose of this course is to familiarize you with the MATLAB® interface and the basic skills necessary for general scientific programming. Primary skills include:

- Navigating the MATLAB® interface
- Declaring variables
- Plotting
- Working with vectors (arrays) and matrices
- Looping structures
- Conditional structures
- Implementing user-defined functions
- Symbolic math
- Importing/exporting data

Course Outcomes

The course outcomes define the tangible skills that students must be able to demonstrate upon successful completion of the course. Demonstration of these skills is a necessary–but not sufficient–condition for passing the course.

Course Outcome	ABET(1-4)	Level of Mastery
Students will demonstrate proficiency in the use of common MATLAB functions.	1	Comprehension
Students will create MATLAB scripts and user-defined functions.	2	Comprehension
Students will utilize proper coding and documentation practices.	3	Comprehension
Students will demonstrate an understanding of programming control structures.	4	Comprehension

Student Expectations

In general, you are expected to take this (and all of your other courses) seriously, and make your best attempt to learn the material. It is also expected that you will not distract your classmates or detract from their ability to learn the course content–at a minimum. Ideally, you will have the pleasure of helping a classmate learn, or benefit from being able to learn from a classmate yourself.

Participation is not an official part of your grade, but I highly encourage you to ask questions when you don't understand something as well as you would like. You can ask these questions in lecture or on Ed Discussion on Canvas. If you don't quite understand something, odds are I did a poor job of explaining it, not that you "just don't get it". It is never the case that you or anybody in the class is "not smart enough" to understand a concept.

Grading Policies and Assignments

Course Grade

Students must complete all course assignments or the instructor may assign the grade of E. Your final letter grade will be determined as:

Grade	Plus	Nominal	Minus
A	$\geq$ 97.0 %	96.9 % to 94.0 %	93.9 % to 90.0 %
B	89.9 % to 87.0 %	86.9 % to 84.0 %	93.9 % to 80.0 %
C	79.9 % to 77.0 %	76.9 % to 70.0 %	–
D	–	69.9 % to 60.0 %	–
E	–	59.9 % to 0.0 %	–

Your overall percentage in the course will be determined as:

Assignment Category	**Weight**
Homework	50%
Quizzes	25%
Final Project	25%
Total	100%

Incomplete

An "incomplete" may be awarded only in cases when a student, who is otherwise performing satisfactorily, cannot complete final course requirements, such as the final exam or final assignment, due to circumstances beyond the student's control (such as illness or family emergency). Such circumstances must be documented. Incompletes will be approved only within the last one or two weeks of the semester. Incompletes cannot be requested after the time of the scheduled final exam for the course. To request a grade of incomplete, the student must formally apply to the instructor using the university's "Incomplete Grade Request" form. Requests must be submitted to the student's advisor prior to the final grade due date and are subject to final approval by the program.

Homework

My intention is to have HW due just before the start of class each week (i.e., **at 11:59am each week**). It is my intention to have a homework assignment due each week, to ensure you are practicing and developing your coding skills regularly. Since this is a programming course, the primary homework deliverable will be your written code and the corresponding results your code produces; however, **simply submitting lines of code will not earn you full marks on a homework assignment.** Problems–even homework problems–only make sense in context. As such, each homework problem (or script) should include:

1. A statement describing the objective of the homework problem and/or the overall functionality of your submission. You must **use your own words** when preparing these descriptions. This can often be accomplished by including a description of the primary purpose(s) of your code at the beginning of any script and/or function you write.

2. Sufficient description of your code via comments. The description of your scripts/functions should describe the overall functionality of your code, but comments are necessary to further describe the specific purpose of each line or block of code.

I will do my best to emulate this style when I upload examples, homework solutions, etc., to Canvas.

Quizzes

Quizzes will be administered near the end of most modules. Because it is frankly way too easy to share code (i.e. cheat) during an online quiz about programming, the quizzes will take place **in class**. The admissible resources will likely vary between quizzes, and I will announce which resources you will be allowed to use a couple days before each quiz.

Final Project

The last assignment of the course will be a final project that incorporates all the skills you've learned throughout the semester. This project will be an individual assignment, but you are welcome to seek support/guidance from outside resources. Late submissions for the final project will not be accepted.

Late Work

Late homework assignments will be accepted up to 24 hours after the due date. Grades (percentage) for late assignments will be determined as

$$\text{assignment grade} = (\text{grade as though turned in on time}) * 0.9e^{-t/204}$$

$$t = \begin{cases} 1, & t_{\text{submission}} < 1 \text{ hour late} \\ 2, & 1 \text{ hour late} \leq t_{\text{submission}} < 2 \text{ hours late} \\ 3, & 2 \text{ hours late} \leq t_{\text{submission}} < 3 \text{ hours late} \\ & \dots \\ 24, & 23 \text{ hours late} \leq t_{\text{submission}} \leq 24 \text{ hours late} \end{cases}$$

where $t_{\text{submission}}$ is the submission time, with $t_{\text{submission}} = 0$ representing the official due date. Note that there is no difference between the maximum possible score for an assignment that is 1 hour late and an assignment that is 1 hour and 59 minutes late.

Attendance

Outside of mandatory in-class activities (quizzes, exams, etc.), I will not take attendance in lecture. I will do my best to make lecture useful and engaging, but you are ultimately responsible for assessing whether or not attending lecture is a necessary component of your learning for this course. **I strongly encourage you to bring your laptop to class; the best way to learn how to code is to write code.** If you would like to attend lectures, but find them generally unhelpful, I am more than happy to hear that feedback from you. I cannot guarantee I will be able to make an adjustment to my content delivery method mid-semester, but I am certainly open to trying. At worst, your feedback could improve the course for future students.

Absences and Make-up Policies

Absences generally fall into two categories: excused and unexcused. In short, anything that does not fall under the category of excused absences is inherently an unexcused absence. The following is an exhaustive list of university-approved excused absences:

- Absences related to religious observances/practices–see ACD 304-04, "Accommodation for Religious Practices". For a list of official university-recognized religious holidays, click here.
- Absences related to university-sanctioned events and activities, such as participating in officially recognized sporting events, representing ASU at student conferences, etc–see ACD 304-02, "Missed Classes Due to University-Sanctioned-Activities."
- Excused absences related to missed class due to military line-of-duty activities that are in accord with ACD 304–11, "Missed Class Due to Military Line-of-Duty Activities," and SSM 201–18, "Accommodating Active Duty Military".

- Illness, quarantine or self-isolation related to illness as documented by a health professional.
- Medical emergencies requiring immediate attention.

Simply having an excused absence is not sufficient criteria for receiving appropriate accommodation. To receive appropriate accommodation, you must notify the instructor **at least 48 hours in advance of planned absences, and as soon as possible for unplanned/unforeseen illness or emergencies.** In cases of documented illness or family emergency, accommodation may be made for a missed quiz. Such situations must be documented, and you must notify the instructor of the emergency immediately–in most cases, before the start time of the exam, and in any case no later than on the day of the exam. In cases of missed quizzes due to emergency, the missed quiz will not be rescheduled, but the average of the not-missed quiz scores will be counted as the score for the missed exam.

COVID-19

We will follow the current recommendations and guidelines set forth by ASU regarding COVID-19. The most recent guidelines can be found here. Please inform me of any COVID-related accommodations ASAP.

Academic Integrity

Students in this class must adhere to ASU's academic integrity policy. Students must review this policy and familiarize themselves with the various actions that can be interpreted as academic integrity violations. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office. The Academic Integrity Office (AIO) maintains a record of all violations and has access to academic integrity violations committed in all other ASU college/schools. Course content, including lectures, are copyrighted materials. In addition to ASU's academic integrity policy, students may not share outside the class, upload, sell, or distribute course content or notes taken during the course of the semester (see ACD 304–06, "Commercial Note Taking Services" for more information). Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the student first complies with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Typical recommended sanctions for academic integrity violations in this class may include:

- Zero on the assignment or test
- Zero on the assignment or test and course grade lowered by one letter grade
- Receiving an "E" in the course
- Receiving an "XE" in the course

Note that in cases of copying, both the copyist and the person whom allowed their work to be copied are considered guilty. Consequently, engaging in this type of activity places both you and your friend/colleague at risk. Unless otherwise specified in writing, collaboration on homework, projects or take-home exams are NOT allowed; you are expected to turn in your own work. Keep

in mind that even if collaboration is allowed, the resulting work products would never be identical or nearly so.

Use of solution manuals for solution to homework or take-home or online exam questions is not allowed and will be considered plagiarism. Similarly, access to services that provide free or paid consultation or solutions to problems is not allowed (i.e., chegg.com, coursehero.com, or similar). Likewise, use of homework or project materials from prior semesters is prohibited.

Collaboration and Seeking Help/Guidance

You are allowed to collaborate with your classmates on homework assignments, come to office hours to discuss confusing concepts or specific issues you're encountering in your code, or otherwise seek help/guidance during the duration of the semester. However, there is an important difference between seeking help/guidance and asking–explicitly or not–someone else to do your work for you. This difference can be difficult to discern at times, but the list below should help you stay on the "correct" side of this blurry line.

- Figure out exactly where you're having trouble before seeking help. Are you unsure about the overall framework of the problem (i.e. the concepts), or are you getting hung up on a specific step in the solution process (i.e. the mechanics)? Do you not remember how to perform a specific mathematical technique, or have you tried to employ it but recognize that your current answer seems incorrect? Through this process, you might be able to work the issue out on your own, and you'll be much more effective in your communication if you do seek help from others.
- Frame your questions using specific and direct language. "I don't know how to do this" is not specific enough to generate any useful dialogue, and it also undersells your understanding, since it is highly unlikely that you don't know how make any progress on a given problem. Instead, try something like, "I factored the polynomial, but I am unsure how to find the roots from here". This shows the person you're consulting that you've made some progress, and generally know the framework of the solution process, but are simply getting hung up on some of the mechanics.
- Don't be afraid to interrupt someone if you feel they are giving you too much help (i.e. they start to do your work for you). Many folks enjoy helping others. This is generally a good thing, but it can sometimes cause people to provide too much guidance or assistance. Let people know when you'd like them to stop providing assistance so you can continue to work and learn on your own. The above bullets should be helpful in establishing these boundaries from the onset of your interactions.
- Lastly, **if it feels like cheating, it probably is.**

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU Student Accessibility and Inclusive Learning Services (SAILS), and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged. See ACD 304-08, "Classroom and Testing Accommodations for Students with Disabilities".

Sexual Discrimination

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services is available if you wish to discuss any concerns confidentially and privately.

Tentative Course Schedule/Outline[1]

Week	Date	Topic
1	01/09	Intro and Basic MATLAB
2	01/16	MLK Holiday (No Class)
3	01/23	Intro to vectors and plotting
4	01/30	Matrices for data handling
5	02/06	User-defined functions
6	02/13	Quiz 1
7	02/20	Conditional statements
8	02/27	For loops
9	03/06	Spring Break (No Class)
10	03/13	While loops
11	03/20	Import/export data
12	03/27	Quiz 2
13	04/03	Symbolic math
14	04/10	Solving systems of equations
15	04/17	
16	04/24	

[1]Subject to change as semester progresses.