Computer Applications for BME

BME 3053C Section 2278
Class Periods: M,W,F, period 6, 12:50 pm – 1:40 pm
Location: COMM G-11
Academic Term: Spring 2024

Instructor:
Xiao Fan
xiaofan@ufl.edu
352 273 9938
Office Hours: Friday, 12:00 – 12:50 pm, DS 3116

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please contact through the Canvas website

- Nick Lucarelli, Nicholas.Lucarelli@medicine.ufl.edu, in-person meeting by appointment

Course Description
Computer application and programming knowledge and lab to utilize MATLAB to analyze biomedical measurements.

Course Pre-Requisites / Co-Requisites
COP 2271 and COP 2271L or equivalent and MAC 2312, with minimum grades of C.

Course Objectives

- Appreciate the importance and value of computer applications for BME
- Develop an understanding of biomedical engineering problems that require quantitative analysis and visualization.
- Develop a proficiency in the use of computer programming (specifically, MATLAB) to analyze biomedical measurements.
- Solve real-life BME problems using MATLAB through collaborative teamwork

Materials and Supply Fees
N/A

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Medium
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	

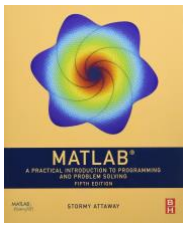
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

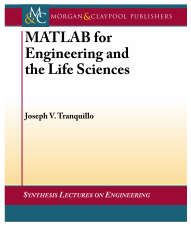
Required Textbooks and Software

- No required textbook
- Lecture slides will be provided
- Software: MATLAB (info.apps.ufl.edu, in CSE Active Learning Lab, or buy student license)
- A laptop is required for in-person midterm exam

Recommended Materials
(not required to purchase)



a. MATLAB, A Practical Introduction to Programming and Problem Solving
Author: Stormy Attaway
Publication date and edition: 2018, 5th edition
ISBN number: 9780128154793



b. MATLAB Programming for Biomedical Engineers and Scientists 1st Edition
Author: Andrew King, Paul Aljabar
Publication date and edition: 2017, 1st edition
ISBN Number: 978-0128122037

Course Schedule

Week	Module	Topic	HW	Quiz	Project
		Part 1: Fundamentals			
1	M1	Welcome & Course Logistics	HW 1	Quiz 1	Mingle & Team Up
2	M2	MATLAB Basics	HW 2	Quiz 2	
3	M3	Vectors and Matrices	HW 3	Quiz 3	
4	M4	Array Operations	HW 4	Quiz 4	
5	M5	Matrix Vector Computation	HW 5	Quiz 5	
6	M6	Function	HW 6	Quiz 6	
7		Midterm Review			Brainstorm
8		Midterm Exam (2/26 and 2/28)		Exam	
		Part 2: Applications			
9	M7	Machine Learning	HW 7	Quiz 7	Proposal
10	M8	Image Display	HW 8	Quiz 8	
11	M9	Image Filtering	HW 9	Quiz 9	Introduction
12	M10	Edge Detection	HW10	Quiz 10	
13	M11	Fourier Transform	HW11	Quiz 11	Methodology
14	M12	Signal Processing	HW12	Quiz 12	
15		Project Presentation			Report due

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance Policy:

- Required
- Attend office hours if having questions
- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Class Expectations:

- Complete the course activities (quiz, homework and projects) on time.
- Every week's module will be available on every Sunday before class via Canvas.
- Turn in homework on time (Quiz/Survey/Assignments due every Monday 11:59 PM)
- Write your own code. Do not copy code from others (Code plagiarism will be checked)
- Better late than never
- Ask for help if you need it (instructor and STS hold office hours every week)

Make-up Policy:

- One free late submission of assignments (homework, quiz, project)
- From the second late submission, a deduction of 0.1% per minute will be applied. For example, for a 20-point homework, being 100 min late will result in a 2 (100*0.1%*20) points deduction. The maximum points achievable after deduction are 18, given there are no other mistakes.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework (12)	100 each	40%
Quizzes (12)	100 each	15%
Midterm Exam	100	20%
Final Project	100	20%
MATLAB onramp	100	5%
		100%

Grading Policy

Percent	Grade	Grade Points
94.0 - 100	A	4.00
91.0 - 93.9	A-	3.67
88.0 - 90.9	B+	3.33
85.0 - 87.9	B	3.00
82.0 - 84.9	B-	2.67
78.0 - 81.9	C+	2.33
74.0 - 77.9	C	2.00
70.0 - 73.9	C-	1.67
66.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is

important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
• Your academic advisor or Graduate Program Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*:* https://distance.ufl.edu/getting-help/; *https://distance.ufl.edu/state-authorization-status/#student-complaint*.