

# Computer Applications for BME

BME 3053C Section 24730

*Class Dates:* 1/5/2021-4/20/2021

*Class Periods:* Wednesday 1:55 PM-6:00 PM (Period 7-10)

*Location:* FLG 230

*Academic Term:* Spring 2022

1. **Instructor:** Benjamin Shickel, Ph.D.

- E-mail address: shickelb@ufl.edu
- Office location: MSB N4-15
- Telephone: 352-392-3677
- Website: Canvas Page
- Office hours: Wednesday 4-5 PM in person or Zoom (and any time by appointment)

2. **Teaching Assistants:**

- Supervised Teaching Student (STS): Jasmine Smith
- STS Virtual Office Hour: Tuesday 1:30 PM – 3:30 PM via Zoom (in-person office hour is welcome by appointment)

3. **Description:** (2 credit hours) – Computer application and programming knowledge and lab to utilize MATLAB to analyze biomedical measurements.

4. **Pre-requisites and Co-requisites:** COP 2271 and COP 2271L or equivalent and MAC 2312, with minimum grades of C.

5. **Course Objectives:**

- Develop a proficiency in the use of *computer programming* (specifically, MATLAB) to analyze biomedical measurements.
- Develop an understanding of *biomedical engineering problems* that require quantitative analysis and visualization.

6. **Contribution of course to meeting the professional component (ABET):** 2 credits of engineering topics (no design component)

7. **Relationship of course 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	

8. **Class/laboratory schedule:** Each week, you will have one ~50-minute recorded video lecture (recommend viewing at least twice) before the optional open discussion session on Wednesday.

9. **Material and Supply Fees:** N/A

10. **Textbooks and Software Required**

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

11. **Recommended Reading (not required to purchase):**

- MATLAB, A Practical Introduction to Programming and Problem Solving
  - Author: Stormy Attaway
  - Publication date and edition: 2018, 5<sup>th</sup> edition
  - ISBN number: 9780128154793
- MATLAB Programming for Biomedical Engineers and Scientists 1st Edition
  - Author: Andrew King, Paul Aljabar
  - Publication date and edition: 2017, 1<sup>st</sup> edition
  - ISBN Number: 978-0128122037
  - Link: <https://issuu.com/nadirchine/docs/matlab-programming-biomedical-engin>

12. **Course Outline:** tentative schedule, subject to change.

Week	Module	Topic	HW	Quiz	Project
<b>Part 1: Fundamentals</b>					
1	M1	Welcome & Course Logistics	HW 1	Quiz 1	
2	M2	MATLAB Basics	HW 2	Quiz 2	Mingle & Team Up
3	M3	Vectors and Matrices	HW 3	Quiz 3	
4	M4	Matrix Operations	HW 4	Quiz 4	Brainstorm
5	M5	Matrix Vector Computation	HW 5	Quiz 5	
6	M6	Function	HW 6	Quiz 6	Data
7		Midterm Review			
8		Midterm Exam (2/23)		Exam	
<b>Part 2: Applications</b>					

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 Teamwork			Code and Results
16		Project Presentation			Report (due 4/27)

### 13. Attendance and Expectations:

#### Attendance:

- View the recorded lecture videos (recommend twice).
- Attendance to hybrid sessions is optional.
- Attend office hours if having questions.
- If a student who is withheld from campus attends class, the student should be asked to leave the classroom and be reported to the Dean of Students Office. Students can make up class by viewing the recorded lecture videos and make an appointment with the instructor and the STS.

#### Expectations:

- Schedule "lecture time" for yourself.
- Complete the course activities (lecture videos, quiz, homework) on time.
- Every week's module will be available on **Wednesday at 4 PM of the week before** via Canvas.
- Turn in homework on time (**Quiz due every Wednesday 4 PM, Assignments due every Saturday 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 TA hold office hours every week)

#### Late Policy:

- To address the potential late submission of assignments (homework, quiz, project), we will give a free late submission for the first time. From the second time and on, (number of late minutes \* 0.1 points) will be deducted from the 20 points of your homework or 10 points of your quiz, e.g. 30 min late = 30 \* 0.1 = 3 points from 20 = 17 points if you did not make any mistakes.

### 14. Evaluation of Grades:

Assignments	Percentage of Final Grade
Homework (12)	40%
Onramp Course	10%
Quizzes (12)	10%
Midterm Exam	20%
Final Project	20%
Total	100%

## 15. Grading Scale:

Points	Grade	Grade Points
93.00 - 100.00	A	4.00
90.00 – 92.99	A-	3.67
87.00 – 89.99	B+	3.33
83.00 – 86.99	B	3.00
80.00 – 82.99	B-	2.67
77.00 – 79.99	C+	2.33
73.00 – 76.99	C	2.00
70.00 – 72.99	C-	1.67
67.00 – 69.99	D+	1.33
63.00 – 66.99	D	1.00
60.00 - 62.99	D-	0.67
0 - 59.99	F	0.00

A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C-average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

16. **Make-up Exam Policy** – Exams can be rescheduled for an individual due to sickness or religious holidays. The instructor *must* be notified in advance.

## 17. Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

## 18. 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/>.

## 19. Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

## **20. 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.

## **21. 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/policies/student-honor-code-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.

## 22. Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

## 23. Health and Wellness

You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

## 24. Plagiarism

Plagiarism is a common infraction to the UF Honor Code. If you are confused as to what constitutes plagiarism, see here: <https://guides.uflib.ufl.edu/copyright/plagiarism>. Plagiarism on any of your assignments **will be reported to the Dean of Students as a UF Student Honor Code violation**. Also, note that **copying solutions for any assignment, regardless of the source (e.g. other students, pirated website solutions), will be treated as plagiarism**. If you have any questions or concerns, please consult with the instructor in this class. Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

## 25. Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination.

It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

## 26. 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.

## 27. 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>

## 28. Online Course with Recorded Materials

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

## 29. 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](mailto: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:** <http://www.counseling.ufl.edu/cwc>, 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](mailto: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 support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.