# Computer Applications for BME

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BME 3053C   Section 25226
***Class Periods:***  M, W, F | Period 6 (12:50 PM - 01:40 PM)
***Location:***  AND 0134
***Academic Term:***  Spring 2025

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***Instructor:***
Scott Siegel, Ph.D.
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(786)-473-5083
Office Hours: By Appointment

***Teaching Assistant/Peer Mentor/Supervised Teaching Student:***
Kelsey Sinclair
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Office hours: Mondays 2-3 PM:  https://ufl.zoom.us/j/95417614082

***Course Description***
(2 credit hours) – Computer application and programming knowledge and lab to utilize Python 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 proficiency in *computer programming* (specifically, Python).
- Solve real-life BME problems using Python through collaborative teamwork.
- Use cutting-edge deep learning models to analyze and interpret biomedical datasets.

***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 | Medium |
| 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies | Medium |

- ***Required Textbooks and Software***
  - o No required textbook
  - o Lecture slides will be provided
  - o Software: Python
  - o A laptop is required

*Recommended Practice*
  a.  https://www.learnpython.org/
  b.  https://www.practicepython.org/
  c.  3Blue1Brown's Essence of linear algebra video series
    a.  https://www.3blue1brown.com/topics/linear-algebra

*Course Schedule:*

| Lesson # | Topic |
|---|---|
| **Module 1 – Programming Fundamentals** | |
| 1 | Welcome & Course Logistics |
| 2 | Python Basics – Part 1 |
| 3 | Python Basics – Matplotlib and Numpy |
| 4 | Python Basics – Pandas |
| 5 | Python Libraries |
| **Module 2 - Applications** | |
| 6 | Matrix Computations |
| 7 | Cursor Introduction |
| 8 | Machine Learning Basics |
| 9 | Supervised Learning |
| 10 | Unsupervised Learning |
| 11 | Convolutional Neural Networks |
| 12 | Final Projects |

*Attendance Policy, Class Expectations, and Make-Up Policy*
Attendance:
- 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/

Expectations:
- Complete the course activities (quiz, homework and projects) on time.

- 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

*Evaluation of Grades:*

| Assignments | Percentage of Final Grade |
|---|---|
| Homework (10) | 40% |
| Quizzes (5) | 10% |
| Module 1 Exam | 15% |
| Module 2 Exam | 15% |
| Final Project | 20% |
| Total | 100% |

*Extra Credit*

The lectures will incorporate in-class exercises that students can complete for a bonus **of 5% of** their grade. To take advantage of these bonus points, students must complete at least 90% of the exercises and push their changes to GitHub at the end of class.

*Grading Policy*

| Percent | Grade | Grade Points |
|---|---|---|
| 93.00-100.00 | A | 4.00 |
| 90.0 - 92.99 | A- | 3.67 |
| 87.00-89.99 | B+ | 3.33 |
| 83.00 - 86.99 | B | 3.00 |
| 80.0 - 82.99 | B- | 2.67 |
| 77.00 - 79.99 | C+ | 2.33 |
| 73.00 - 76.99 | C | 2.00 |
| 70.0 - 72.99 | C- | 1.67 |
| 67.00 - 69.99 | D+ | 1.33 |
| 63.0 - 66.99 | D | 1.00 |
| 60.00 - 62.99 | D- | 0.67 |
| 0 - 59.99 | F | 0.00 |

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

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/

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

### *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.

### *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

### 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.

### BME Course Instruction Expectations

The purpose of this statement is to share the general UF BME faculty consensus for Fall 2022 course instruction. All BME courses listed in the UF Schedule of Courses are categorized as in-person; this categorization was present when student signed up to enroll in their courses. The decisions of course format (i.e. whether to offer synchronous zoom participation or recorded Zoom lectures and the extent that an instructor accommodates students) should be made by the instructor. Instructors are not expected to offer "hybrid" format to accommodate a student's internship schedule, desire not to attend class, or preference. Students should notify an instructor of an upcoming absence, and the instructor is required to make accommodations only in the case of university-recognized reasons. Outside of university-recognized reasons, it is at the instructor's discretion whether to accommodate an absence. Course format and accommodations should be selected based on the instructor's aim to enhance individual student and class learning. Note that the college requests for faculty (not required) to post course materials on Canvas with the expectation that students will be getting ill and having to quarantine. Making course materials readily available on Canvas as much as possible will make it easier for students to stay informed and help prevent them from falling behind. The college request does NOT mean offering classes via Zoom.

### 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*.