

**Quantitative Physiology**  
BME 4409 Section 21646  
**Class Periods:** M W F, Period 3, 9:35am – 10:25am  
**Location:** LAR 0330  
**Academic Term:** Spring 2025

**Instructor:**

Dr. Markia Bowe (she/her)

Email: [mbowe@bme.ufl.edu](mailto:mbowe@bme.ufl.edu)

Virtual Office Hours: Thursdays 10am-11am

**Course Communication**

- Class announcements will be posted to Canvas.
- Dr. Bowe prefers that you use Canvas when sending messages for automatic association with the class.
- If communicating through email, include BME 4409 in the subject line.
- Although we are usually faster, please allow up to 48 hours for a response from teaching team, longer if at night or on the weekend / holidays / breaks.

**Learning Assistant (LA):**

LAs are fellow undergraduates who have passed this course with strong academic performance and are trained in collaborative learning strategies. Your LA will help you navigate and digest course material. Your LA does not participate in direct instruction or grading.

- LA Office Hours: see Canvas calendar for scheduled times

**Course Description**

Quantitative modeling of organ system physiology of the nervous system, the cardiovascular system, the renal system, and others will be discussed, and students will work on quantitative problems.

**Course Pre-Requisites / Co-Requisites**

Pre-requisites with minimum grades of C:

- PCB 3713C - Cell and system physiology or similar course (with instructor approval)
- BME 3053C – Computer Applications for BME
- BME 3060 – Biomedical Engineering Fundamentals
- BME 3508 – Biosignals and Systems

**Course Objectives**

- To be able to describe a physiologic system in a quantitative way
- To be able to analyze physiologic measurements and use them for parameter estimation

**Materials and Supply Fees**

None

**Professional Component (ABET):**

This course incorporates mathematics and basic sciences appropriate to Biomedical Engineering. Basic sciences are defined as biological, chemical, and physical sciences. It also incorporates engineering topics, consisting of engineering sciences, and engineering design appropriate to Biomedical Engineering.

**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 Emphasized

Outcome	Coverage*	
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	Reinforced
3. An ability to communicate effectively with a range of audiences		
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		
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium	Reinforced
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium	Reinforced

\*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

- N/A

### Recommended Materials

This course pulls material from a variety of different areas and the following texts cover material that the course will draw on.

#### Supporting Books:

Title: Human Physiology: An Integrated Approach

- Author: Dee Unglaub Silverthorn; Publisher: Pearson
- Publication Edition: Eighth
- ISBN number: 9781323905852

Title: Quantitative Human Physiology

- Author: Joseph Feher
- Publication date and edition: Second Edition (2012)
- Publisher: Academic Press/Elsevier
- ISBN number: 978-0-12-800883-6

Title: A First Course in Systems Biology

- Author: Eberhard O. Voit
- Publication date and edition: Second Edition (2017)
- Publisher: Garland Science, Taylor & Francis Group
- ISBN number: 978-0815345688

Title: Guyton & Hall Textbook of Medical Physiology

- Author: John E. Hall & Michael E. Hall

- Publication date and edition: 14th Edition (2020)
- Publisher: Elsevier
- ISBN number: 978-0-323-59712-8

#### Other Recommended materials:

MATLAB student edition (from the bookstore), OR access to a computer with MATLAB, OR use online at <http://info.apps.ufl.edu>. Full help including FAQ and a Help Request can be found here: <https://info.apps.ufl.edu/>.

#### **Course Recording**

Our class sessions **will not** be audio recorded. While attendance is not required it is strongly recommended. There will be various in class assignments and opportunities for extra credit that will not be announced in advance. To gain the most from this course, come prepared to engage with the material and interact with your classmates.

#### **Attendance Policy, Class Expectations, and Make-Up Policy**

Attendance is not required and is not part of the final grade, but *strongly* recommended. Lectures and class discussions **will not be held synchronously**. 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/>

Quizzes: Quizzes allow the students and the instructor to assess understanding of current course material. They also act as a mechanism to widen the course's grading scheme (i.e., lower the stakes of each exam and the project and include individual, instead of team-based, grades). There will be various quizzes throughout the semester.

Coursework: In-class and homework assignments provide students with an opportunity to apply concepts and affirm their understanding of the course material. All assignments should be turned in electronically via the course website. Students are encouraged to work cooperatively on assignments. However, each student must individually submit assignments consisting of his or her own work. This means that students are encouraged to discuss the solution process for problems. However, copying another student's work (or allowing a student to copy your work) will be considered a violation of the University honor code.

Course Project: The design project is an opportunity to learn, practice, and apply quantitative modeling techniques to biomedical applications. There will be three project milestone assignments and a final in-class presentation and 5-page report detailing the results of model. Groups of 3-4 students will be randomly assigned by the instructor. All project milestones will involve written deliverables and/or in-class presentations. Further project details will be discussed in class and distributed on the course website.

Absences: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Accommodations for missing an in-class presentation or other assignments will only be made for student who provide appropriate documentation of an excused absence. Excused absences must be consistent with University policies in the undergraduate catalog:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

#### **Evaluation of Grades**

Student performance will be assessed by:

- Assignments will be made periodically throughout the semester and will account for 25% of the final grade. These assignments will include in class and homework assignments.
- The semester project and its accompanying reports and presentations will account for 25% of the final grade. The end goal of the project is to work in small groups to develop a simple model of a physiological phenomenon and evaluate the model for a specific system. The projects will be evaluated based on an in-class presentation and a 5-page report detailing the results and there are 3 milestone reports throughout the semester prior to the final presentation and report.

- Module quizzes will be given and must be completed online. These quizzes will account for 20% of the final grade.
- Two Exams will be administered throughout the semester and will each account for 15% of the final grade (30% total for all exams).

Assignment	Percentage of Final Grade
Assignments	25%
Quizzes	20%
Exams (2 at 15% each)	30%
Semester Project	25%
	100%

### Grading Policy

The following grading standards will be used in this class:

Percent	Grade	Grade Points
100 % to 92.0 %	A	4.00
< 92.0 % to 90.0 %	A-	3.67
< 90.0 % to 87.0 %	B+	3.33
< 87.0 % to 83.0 %	B	3.00
< 83.0 % to 77.0 %	B-	2.67
< 77.0 % to 76.0 %	C+	2.33
< 76.0 % to 74.0 %	C	2.00
< 74.0 % to 70.0%	C-	1.67
< 70.0 % to 67.0 %	D+	1.33
< 67.0 % to 64.0 %	D	1.00
< 64.0 % to 61.0 %	D-	0.67
< 61.0 % to 0.0 %	F	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.ua.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 Conduct 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. 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 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:

- Kelly Stalter, Undergraduate Academic Advisor, 352-273-8096, [undergrad@bme.ufl.edu](mailto:undergrad@bme.ufl.edu)
- 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)

### **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.

### **AI Policy**

Generative AI is a powerful new tool that can help learners to engage with a topic of interest. Please be aware of the limitations of generative AI including the tendency to hallucinate (invent) incorrect responses. Many students believe AI tools are more trustworthy than they actually are.

#### **Feel free to use AI tools/software:**

- As part of your study regimen to help you better understand course material (keeping in mind AI can and does give incorrect responses)

#### **Do not:**

- Substitute AI for primary sources of information (textbooks, lecture materials, scientific literature).
- Use AI to do the writing of any substantive portion of an assignment for you. I will treat this as plagiarism and an honor code violation, the same as hiring any other external person, entity, or service to complete your assignments for you.

### **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>

### **Inclusion Statement:**

In this course, we hold a deep respect for differences and seek to acknowledge the many factors that make us diverse, empathetic, and creative learners. As your instructor, I am committed to fostering an environment where persons of every race, age, culture, ethnicity, religion, gender, sexual orientation and neurotype are celebrated! In doing so, I hope to create a quality learning environment where students feel safe and can freely share their unique perspectives and ideas. Creativity is the foundation of science and discovery. As future world-changers, I hope that we can tap into the perspectives that will shape future knowledge and bring out the best in humanity. To promote and support our quality learning environment, we will remain dedicated to addressing any concerns, issues, or events that contradict our commitment to inclusive excellence. If you have any questions or suggestions, I am always happy to engage in active dialogue.

### **Lived Name / Pronoun Statement:**

I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

### **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:** <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](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/>.

**COVID-19**

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- 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.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- 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.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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://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**: <http://www.distance.ufl.edu/student-complaint-process>.