

Quantitative Physiology

BME 4409 Section 24902

Class Periods: MWF, period 3, 9:35am – 10:25am

Location: FAB 0103

Academic Term: Spring 2022

Instructor:

Meghan Ferrall-Fairbanks, Ph.D. (she/her)

Email: mferrall.fairbanks@bme.ufl.edu

Office Phone Number: (352) 846-2762

Office Hours: Wednesday 11am-12pm and Thursday 10am-11am or by appointment. Virtual location will be provided on Canvas.

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

- N/A

Course Communication

Communication with the instructor is welcome via email or through Canvas. We will also use a course Slack portal that will enable instructor, direct-student, and intra-group communication. Finally, Discussion boards will be used throughout the course for posting thoughts related to course content. The instructor will strive to provide responses to communication within 1 business day of the initial communication. Grades will be posted promptly following their completion, typically within 1 week of the assessment deadline.

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
2. An ability to apply engineering design to produce solutions that meet specified needs with	Medium	Reinforced

Outcome	Coverage*	
consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors		
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

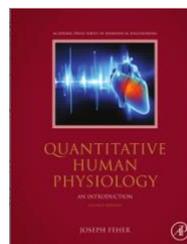
- N/A

Recommended Materials

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

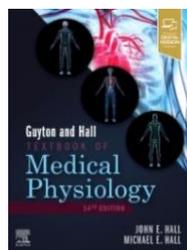
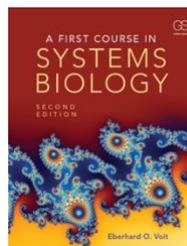
Main Book:

- 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



Supporting Books:

- 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



Attendance Policy, Class Expectations, and Make-Up Policy

Class participation is required and part of the final grade. Exceptions are made conforming to university policies, but the instructor must be notified in advance. Lectures and class discussions will be held synchronously during the pre-determined course meeting time.

Participation: Students are expected to attend scheduled class sessions. Attending class is critical for understanding the course material. The highest total grades are regularly earned by students who come to class having reviewed all assigned materials and are prepared to actively participate in activities and discussions.

Reading: Reading is an opportunity for students to learn and review course material. Reading also provides a perspective on the course material that is different than that provided by the instructor. Most readings are real-world applications of Quantitative Physiology concepts and show how researchers and scientists apply fundamental concepts in BME to a variety of biomedical problems.

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). Quizzes will be released after completion of a module and are due at the start of the next scheduled class time.

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. Assignments turned in late will not be graded, except under extreme circumstances at the discretion of the instructor. 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 20% of the final grade.
- 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 account for 20% of the final grade.
- Three Exams will be administered throughout the semester and will each account for 10% of the final grade (30% total for all exams).
- Participation will account for 10% of the final grade.

Assignment	Percentage of Final Grade
Assignments	20%
Module Quizzes	15%
Exams (3 at 10% each)	30%
Semester Project	25%
Participation	10%
	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.ua.ufl.edu/public-results/>.

Course Recording

Our class sessions may be audio visually recorded for students in the class to refer to 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 online and 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 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 if you are online or abstain from participating if you are in-person. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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/>.

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) 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>.