

# Biomedical Engineering and Physiology

**Academic Term:** Fall 2022

**BME 5401** – Section 0064 - Class Number 11450

**Class Periods:** M, W, F | Period 3 (9:35 AM - 10:25 AM)

**Location:** Communicor 003

Link to this location: - [COM-003](#)

Final Exam: 12/15/2022 @ 7:30 AM - 9:30 AM

**IMPORTANT:** The current status of attendance is 'in person' I will upload PPT files of class notes as each section is completed (this may or may not coincide with each lecture. If there are changes due to the pandemic the modality may change, please keep up-to-date with CANVAS to be sure of the latest status.

**Instructor:**

Peter S. McFetridge  
Associate Professor  
[pmcfetridge@bme.ufl.edu](mailto:pmcfetridge@bme.ufl.edu)  
352-273-9325

Office Hours: details on first lecture posted (7-8:30AM Monday and Friday). But we can set a convenient time for a Zoom session if needed.

**Supervised Teaching Assistant:**

None

**Course Description**

Physiology of cells, bones, and the circulatory system from a biomaterials, biomechanics, cellular, and tissue engineering perspective. Introduces the fundamentals of molecular biology for biomedical engineers. Designed for a range of student backgrounds, typically majoring in biomedical engineering, to learn the nomenclature and current state of knowledge of the eukaryotic cell, its related structures and systems physiology. Topics include protein structure and function, enzymes, the structure and nature of DNA and the cellular structure and function of various cellular organelles. Learn about energy and the function of mitochondria and chloroplast, cellular communication and the function of the extracellular matrix. Intellectual property and technology transfer included (3 Credits).

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

Upper level biology and enrollment in BME graduate program or permission of the instructor.

## **Course Objectives**

Upon completion, a student should be able to:

1. Describe the scope of molecular biomedical engineering across a range of topic covered in class
2. Describe biomolecular principles of protein (primary focus), nucleic acids, lipids with the principles of biochemistry
3. Understand cellular and molecular interactions associated with physiological processes
4. Describe molecular biomedical engineering principles and approaches in (for example) biotechnology, regenerative medicine, molecular engineering as related to the molecular events described above.
5. To teach the student about physiological systems of the human body and their homeostatic control.
6. To teach the student to be able to discuss and answer questions about physiological systems of the human body.
7. To teach the student to apply knowledge learned about physiological systems of the human body to a biomedical engineering research body

**Materials and Supply Fees** - None

**Relation to Program Outcomes (ABET):** N/A

## **Required Textbooks**

Title: Vander's Human Physiology, 15th Edition (or 16<sup>th</sup> – earlier edition will be used)

Authors: Eric Widmaier, Hershel Raff and Kevin Strang

Published: 2019

## **Other Recommended Materials**

Title: **Essential Cell Biology** ISBN: 9780815344544

Author: Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter

Edition: 4<sup>th</sup> (or 5<sup>th</sup>)

Publisher: Garland science

Course notes are derived primarily from the textbook above, however some notes will be in addition to the textbook with other content discussed in class – you will need to attend to get these details. Where additional reading or study is required citations and references will be provided to students accordingly.

## Course Topics and Schedule\*

Various section from the Essential Cell Biology text book above

Homeostasis (Chapter 1)

Chemical Composition of the Body and Its Relation to Physiology (Chapter 2)

Cellular Structure, Proteins, and Metabolic Pathways (Chapter 3)

Movement of Solutes and Water Across Cell Membranes (Chapter 4)

Cell Signaling in Physiology (Chapter 5)

Neuronal Signaling and the Structure of the Nervous System (Chapter 6)

Sensory Physiology (Chapter 7)

Consciousness, the Brain, and Behavior (Chapter 8)

Muscle (Chapter 9)

Control of Body Movement (Chapter 10)

The Endocrine System (Chapter 11)

Cardiovascular Physiology (Chapter 12)

Respiratory Physiology (Chapter 13)

The Kidneys and Regulation of Water and Inorganic Ions (Chapter 14)

The Digestion and Absorption of Food (Chapter 15)

Regulation of Organic Metabolism and Energy Balance (Chapter 16)

\*The number of topics covered during the semester will be highly dependent on the progress of students, the spread and subsequent ramifications of the COVID-19 pandemic, and the discretion of the instructor.

## 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.

**\* Exams are based on both lecture content/discussion and the textbook. \***

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

Excused absences must be consistent with university policies in the graduate catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Students are expected to attend course lectures and participate in class discussions. It is expected that there will be no cell phone or electronic device distractions in class. If you are unable to attend class, will be coming late or leaving early, then you are expected to inform the instructor. Students are expected to be in class, or online as noted. Be prepared to learn, engaged, and overall contributors to the learning environment.

**Molecular Biomedical Engineering: BME 4311**

***Peter S. McFetridge Ph.D.***

Fall 2022

Given the unusual circumstances with the Covid-19 pandemic – there may be some variation in class delivery so please keep up to date in CANVAS for additional details. We are currently planning on all classes being traditional face-to-face sessions with the session on-line in some (real-time only). Please keep track on CANVAS as we proceed in the semester.

Exam content will cover in-class examples, these are generally not on the uploaded ppt/pdf slides. If you miss class it is important you discuss the class content with another class member to get these notes. You will not be able to answer all the exam questions if you don't attend class. This is your responsibility.

**Unless prior arrangements** have been made with the instructor, students will be deducted 15% per day for late coursework, with deductions occurring at the time associated with the due date. Unless prior arrangements have been made with instructor, missed exams will receive a grade of Opts.

**While students are encouraged to discuss course material and assignments together outside of class, it is expected that all coursework/assignments submitted is the students' own work**

**All class material will be posted to CANVAS on or near the day of each class, however some content may take several sessions to get through so these are usually later.**

**All exams or term tests will be during the allotted class hours (or the time set by UF for the final exam).**

*Please pay careful attention to CANVAS for class updates/lectures and general information*

### **Evaluation of Grades**

<b>Assignment</b>	<b>Number of</b>	<b>Percentage of Final Grade</b>
Homework ( <b>subject to change</b> )	2	8% (4% each)
Semester Exams/projects	5	75% (15% each) – one class period each
Final Exam	1	15% (15%)
Attendance	1	2%
Total		100%

**Final Exam:** 12/15/2022 @ 7:30 AM - 9:30 AM

### **Grading Policy**

The following is given as an example only.

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67

86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	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 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.

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/>.

### ***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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

### ***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.

### ***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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***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)

### ***Campus Resources:***

#### *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.

**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/>.

Other Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto: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://care.dso.ufl.edu>.

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

