Cellular Engineering Laboratory

BME 3323L

Academic Term: Fall 2025

Location: BMS JG05 ***Class Number:*** 10951
Class Periods: M | Period 2 (8:30am-9:20am), W/F | Period 2-4 (8:30am-11:30am)

Location: BMS JG05 ***Class Number:*** 10952
Class Periods: M | Period 4 (10:40am-11:30am), T/R | Period 2-4 (8:30am-11:30am)

Instructor:
Roza Vaez Ghaemi
r.vaezghaemi@bme.ufl.edu
352-846-2939
Office Hours: TBD, and by appointment – Email me to set up a meeting.

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please limit contact with supervised teaching students to in-person and Canvas discussion boards. Supervised Teaching Students should not be contacted directly for grading questions; all grading questions should be brought to the instructor.

- Pumin Sintara, Ryan Quinn, Kyle Phillips, Trey Dalton

Course Description
(3 credit hours) - The Cellular Engineering Laboratory will teach students the fundamentals of cell culture for use in Biomedical Engineering investigations. Students will acquire skills in cell culture, experiment design, quantitative analyses, documentation, report writing and oral presentation. This 3-credit course is part of the BME core curriculum.

Course Pre-Requisites / Co-Requisites
Prereq: PCB3713C or instructor permission; Coreq: BME4311 or instructor permission

Course Objectives

a) Introduce students to the concept of cell culture as a BME research tool
b) Introduce students to the concept of growing healthy cells in an in vitro environment that is critical to conducting successful in vitro research
c) Give students hands-on experience growing cells in an in vitro environment
d) Introduce students to the concept of designing an experiment and executing, analyzing, and summarizing data derived from an experiment
e) Give students hands-on experience deriving answers to questions asked by biomedical engineers using in vitro techniques

Materials and Supply Fees
Course Fee: $170.83

Relation to Program Outcomes (ABET):

a) The student will learn about professional and ethical responsibility
b) The student will learn to communicate effectively
c) The student will learn about contemporary BME research
d) The student will learn to use the techniques, skills, and modern biomedical engineering tools necessary for biomedical engineering practice

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Low / Reinforced
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	Medium / Reinforced **
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	Low / Introduced
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	High / Reinforced
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High / Reinforced
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Low / Reinforced

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.
**Data is collected to assess this student outcome

Recommended Textbooks

Culture of Animal Cells
Freshney
Wiley, 7th Edition
ISBN number: 9780470528129
Free Access via Libraries course guide https://guides.uflib.ufl.edu/BME3323L/books
[At the top of the webpage you will find a link to the "Culture of Animal Cells" by Freshney. Access to the ebook will require your UF gatorlink credentials.]

An outline of each lab will be given to the class via the CANVAS website and group demonstration. All class correspondence will be through the Canvas communication features.

Materials

This is a lab class so be sure to wear full length trousers, close toed shoes and if you have long hair it must be tied back. Full details of the safety requirements will be given in the first week of class. You must be aware that the materials and equipment you will be using are potentially hazardous. Appropriate training and a clear review of the safety requirements will be provided.

The following websites provide a nice overview of the BME field and current events:

1. http://bme.ufl.edu/ (Information on our faculty, research, and laboratories)
2. http://bme.ufl.edu/academics/undergraduate (Information on the undergraduate UF BME curriculum)
3. http://www.bmes.org/ (Check out the undergraduate research section for career connections, news and press, and other resources)
4. http://whitaker.org/ (Check out undergraduate research programs and summer programs)

5. https://www.nibib.nih.gov/ (Information on recent advances in Biomedical Engineering and government funding in BME).
6. https://www.embs.org/ (Information on the IEEE Engineering in Medicine and Biology Society)
7. https://www.crc.ufl.edu/students/events-and-programs/ (UF Career Resource Center events)

Required Laboratory Items

1. Fully charged devices (smartphone, tablet, laptop)
2. A USB drive to save your data
3. ~~A bound notebook~~ Digital notebook
4. Calculator
5. Pen with permanent ink to take notes on all procedures
6. Closed toed shoes and long pants
7. Hair ties if hair can be picked up on head

*** Non-compliant students will not be able to conduct laboratory work that day and will therefore be ineligible to receive credit for those activities ****

Course Schedule

The teaching team's goal is to cover the following topics.
Safety: General laboratory safety & laboratory guidance
Dry lab techniques, including:
Statistics fundamentals, Experiment planning and execution, Data visualization
Basic laboratory techniques, including but not limited to:
Aseptic technique, Pipetting (serological and micro-), Plasticware handling, Aspirating techniques
Basic laboratory equipment: use and maintenance, including but not limited to:
Biological safety cabinet, Incubator, Microscope (brightfield and fluorescence), Centrifuge, Shaker
Cell culture theory & techniques, including:
Passaging, Maintenance, Counting, Seeding, Microscopy
Cell culture analysis methods, including:
Histology, Fluorescence labelling, ELISA, Spectrophotometry, Flow cytometry and FACS
Overview of biomaterials / tissue engineering / regenerative medicine
Advanced Cell and Tissue Bioengineering methods:
CRISPR and gene editing, scRND sequencing, spatial transcriptomics

In Case of an Accident

First notify your Professor and Supervised Teaching Students
For Emergencies Call 911
For University Police Call 352-392-1111
Shands Emergency Room 352-733-0800

Attendance Policy, Class Expectations, and Make-Up Policy

1. Attendance is mandatory for all in-person laboratory sessions unless noted by a class announcement.
2. The STS's will be keeping a record of in-person attendance and tardiness. It is important that you are in class on time as you will be working in groups that need a team approach. There will be a peer evaluation that will form the basis of a grade component. If you are disruptive to the class, fall asleep, or not engaged, attendance credit will be deducted.
3. Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.
    a. Excused absences should be communicated with the teaching team BEFORE the absence occurs, in order to be eligible for make-up credit
    b. The missed laboratory will be a "0" in the gradebook until the make-up work is submitted via in-person or online efforts. If make-up work is never submitted, the grade will remain "0".

c. A future laboratory notebook can be submitted for a previous excused absence if it covers the same work – just make sure to address all rubric items. For example, if you miss the "cell counting" laboratory and you complete cell counting later in the semester, submit the later notebook for cell counting credit.
d. Strategy for make-up work should be discussed with Dr. Ghaemi

4. Even with a legit reason to be absent from the lab, if you are missing 3 or more labs, you can't practically achieve the learning outcomes of the lab, therefore missing 3 or more labs, will result in max grade of 50% for the course.
5. 20% will be deducted for late submissions. The instructor can waive this penalty for accommodations and extenuating circumstances. Please communicate with your instructor! Deadline extensions can also be granted for accommodations and extenuating circumstances.
6. Grade petitions will only be considered up to one week after the grade has been released. Use official form found in canvas site and follow all form directions

General Expectations:

1. You will take notes when conducting any lab work.
2. You will conduct your work safely.
3. You will have read the laboratory plan prior to conducting the laboratory lesson.
4. You will be a respectful, contributing team member.

Evaluation of Grades

Assignment	Due date	Percentage of Final Grade
Attendance & Participation* (Individual - peer reviewed)	Weekly lecture and labs	15%
Lab reports (Group)	At the end of each lab period	10%
Troubleshooting (Individual)	Week of Nov 17th	20%
Project		
• Proposal (Group)	Sep 15th	10%
• Introductory report (Group)	Oct 20th	10%
• Presentation (Individual)	Week of Nov 17th	15%
• Final paper (Group)	Dec 3rd	20%

* Missing 3 or more labs will result in the course grade to be capped at 50%.

Grading Policy

Percent	Grade	Grade Points
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

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive 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.

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 Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

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.