

## Cellular Engineering Laboratory

BME 3323L

*Academic Term:* Spring 2024

*Location:* BMS JG05 *Class Number:* 21628

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

*Location:* BMS JG05 *Class Number:* 11297

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

### ***Instructor:***

Sarah Furtney, PhD

[furtney@bme.ufl.edu](mailto:furtney@bme.ufl.edu)

(352) 273-9333

Office Hours: TBD, and by appointment - schedule via [Calendly.com/furtney](https://calendly.com/furtney)

### ***Teaching Assistant/Peer Mentor/Supervised Teaching Student:***

Please contain 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.

- Ashleigh Abbott, Esteban Bermudez-Berrios, Heather Blackwell, Mariah Turner

### ***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***

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

### ***Materials and Supply Fees***

Course Fee: \$187.50

### ***Relation to Program Outcomes (ABET):***

- The student will learn about professional and ethical responsibility
- The student will learn to communicate effectively
- The student will learn about contemporary BME research
- 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

### **Required Textbooks and Software**

Culture of Animal Cells

Freshney

Wiley, 7<sup>th</sup> 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. Delivery of content, ie in-person vs online (synchronous vs. asynchronous) is subject to change and will be impacted by county, state, and federal COVID guidelines. Management of in-person sessions is subject to change and can be impacted by teaching team insights and UF EH&S guidance.

Safety: General laboratory safety & COVID-specific laboratory guidance

Biological safety cabinet operation

Aseptic technique

Pipetting (serological and micro-)

Plasticware handling

Aspirating techniques

Basic laboratory equipment: use and maintenance

Cell culture theory

Cell culture techniques: passaging, maintenance, counting, seeding, microscopy

Cell culture supplies; inventory procurement and management

Microscopy: brightfield and fluorescence

Spectrophotometer operation

Histology

Cell culture analysis methods

Bioethics

Science Policy & Science Communication

Statistics fundamentals

Overview of biomaterials / tissue engineering / regenerative medicine

Experiment planning and execution

Experiment visualization and data visualization

Laboratory notebook documentation

Communication skills: presentation and poster formats

Relevant regulations

### ***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. 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:
  - a. <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>
  - b. Excused absences should be communicated with the teaching team BEFORE the absence occurs, in order to be eligible for make-up credit
  - c. The missed laboratory will be a "0" in the gradebook until the make-up work is submitted. If make-up work is never submitted, the grade will remain "0".
  - d. 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.
  - e. Strategy for make-up work should be discussed with Dr. Furtney
4. From the registrar's office - Final exams are determined by course meeting times, except for certain large courses. No student is required to take more than three final exams in one day. If two exams are scheduled at the same time, assembly exams take priority over time-of-class exams. When two assembly exams or two time of class exams conflict, the course with the higher number will take priority. Instructors giving make-up exams will make the necessary adjustments.
5. 20% will be deducted for quizzes, assignments, and other class materials submitted late. 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***

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Attendance & Participation	5%
Quizzes	15%
Assignments	30%
Lab documentation	30%
Project(s)	20%

## 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

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.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 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
- 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.

### ***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](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/>.

### 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 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>.