**Biomaterials Lab**  
EMA 4061L  Section 13452  

**Class Periods:** Tuesday, Period 7-9 (1:55pm-4:55pm)  
**Location:** Rhines Hall Undergraduate Laboratory B06, and lecture space to be announced  
**Academic Term:** Fall 2021

**Instructor:**  
Josephine Allen, Ph.D.  
jallen@mse.ufl.edu  
Office Hours: Office hours via zoom, Monday & Wednesday 10:00-11:00am. Zoom link provided in CANVAS announcement.

**Teaching Assistant/Peer Mentor/Supervised Teaching Student:**  
Justin Silberman, jsilberman@ufl.edu, office hours in-person or via zoom, before class, Tuesday 1:00-1:55pm. If requesting zoom, please contact TA for zoom link.

**Course Description**  
Hands-on laboratory experience in the processing and characterization of biomaterials for use in medical applications. (1 credit hours)

**Course Pre-Requisites / Co-Requisites**  
Co-requisite EMA4061

**Course Objectives**  
The objective of this course is for students to become familiar with biomedical engineering experimental techniques and methods used to evaluate biomaterials for medical applications. Students will gain knowledge and learn advanced principles that are involved at the interface between a biomaterial and the living system. Student will review and design experiments as well as analyze and interpret data.

**Materials and Supply Fees:** $80/student

**Professional Component (ABET):**  
1 credit of Engineering Topics

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

The table below is an example. Please consult with your department’s ABET coordinator when filling this out.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Coverage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</td>
<td>Medium</td>
</tr>
<tr>
<td>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</td>
<td>Medium</td>
</tr>
<tr>
<td>3. An ability to communicate effectively with a range of audiences</td>
<td>Medium</td>
</tr>
<tr>
<td>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</td>
<td>Low</td>
</tr>
<tr>
<td>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</td>
<td>Low</td>
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<tr>
<td>6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions</td>
<td>High</td>
</tr>
<tr>
<td>7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies</td>
<td>Medium</td>
</tr>
</tbody>
</table>

*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**
No required textbook. Course material will be provided by the instructor.

**Recommended Materials**
Other reference material (i.e. literature manuscripts, video lab demonstrations etc.) will be used throughout the class. These will be indicated by the instructor and provided as used or needed.

**Course Schedule (Tentative)**

- **Week 1:** Module 1: Introduction to the lab
- **Week 2:** Module 2: Laboratory Safety
- **Week 3:** Module 3: Basic Laboratory Skills
- **Week 4-6:** Module 4: Cell Culture
- **Week 7:** Open Lab
- **Week 8-9:** Module 5: Cell-Material Interactions
- **Week 10:** Open Lab
- **Week 11-13:** Module 6: Biocompatibility
- **Week 14:** Thanksgiving Holiday (No Lab)
- **Week 15:** Lab shut down
- **Week 16:** Lab Wrap Up and Reflection

**Descriptions of the Course Modules**

- **Module I. Introduction to the Lab**
  We will go over the course objectives, syllabus, expectations, grading etc. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 1 week.

- **Module II. Laboratory Safety**
  We will discuss safety aspects specific to the cell culture lab. Students will be instructed how to access the required online safety training, General Biosafety/Blood Borne Pathogen (BBP)/Biomedical Waste (BMW) Training. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 1 week.

- **Module III: Basic Laboratory Skills**
  Students will get familiar with the equipment and instruments that will be used in the lab. Skills include the use of pipettes, solution making, serial dilutions, and a microplate protein assay. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 1 week.

- **Module IV: Cell Culture**
  Students will learn the basics of culturing cells. Specifically aseptic technique, making media, thawing cells, caring for cells and maintaining cultures, passaging cells, counting cells, assessing live/dead cells, seeding cells and imaging of cells will be learned. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 3 weeks.

- **Module V: Cell-Material Interactions**
  This module will involve assessing cell adhesion, morphology, and proliferation on protein and polymer modified surfaces. Cell adhesion and morphology will be assessed via microscopy and image analysis via image J software. Proliferation will be assessed via microplate assay. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 2 weeks.

- **Module VII: Biocompatibility Evaluation**
  Assorted materials are tested for their cytotoxicity using in vitro cell culture methods, which include the direct contact method and the extraction method. You will have a lab report, quiz, and discussion prompt for this module. This module will be open for 3 weeks.
Attendance Policy, Class Expectations, and Make-Up Policy
This lab is a hands-on lab experience, therefore attendance in Lab is required. However, you are expected to attend class so long as you are cleared. If a student who is withheld from campus attends class, the student will be asked to leave the classroom and be reported to the Dean of Students Office. 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/

We will make every attempt to provide an opportunity to make up a missed lab, however, this may not always be possible when working with live cells. Missed or late lab assignments as a result of an excused absences (including being withheld from campus) may be made up provided that appropriate documentation is submitted. Contact instructor to arrange the make-up. Missed or late assignments under any other circumstances will not be accepted.

Lectures, online demos, videos etc. will be posted online through Canvas prior to the lab. You are expected to view the lectures and lab materials for each module and complete any pre-lab assignments prior to coming into the laboratory. Our schedule is pretty tight, so there won’t be time in lab for you to read the lab for the first time and figure out what you are doing for the day. You are expected to come to lab prepared to start the lab right away. Your lab assignments will be submitted through Canvas.

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) 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.

Evaluation of Grades

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Final Grade</th>
</tr>
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<tbody>
<tr>
<td>Canvas Discussion Board</td>
<td>10%</td>
</tr>
<tr>
<td>Lab Group Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Pre-Lab Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Lab notebook</td>
<td>20%</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>50%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Discussion Board:
Throughout the course, questions related to experimental research will be posted on the Canvas Discussion Board. Your participation is required on these discussion posts. You are required to 1) post a new comment; and 2) post a comment in response to a classmate’s comment. The discussion thread will stay open as long as the module is open. There will be 6 discussion threads. The participation in the discussion threads will comprise 10% of your grade.

Lab Group Participation:
Students will work in groups or 3 or 4 throughout the semester, and these groups will remain the same throughout the semester. I expect equal effort and distribution of the groups work among all members. Group engagement will be assessed via peer feedback as well as TA and instructor evaluations. The assessment of your participation will comprise 5% of your grade.

Quizzes:
You will be given pre-lab quizzes to complete prior to attending lab. The pre-lab quizzes are timed and based upon your understanding on the upcoming lab exercise. They may also be related to the demo/videos related to the lab exercise that may be posted through Canvas. The quizzes will be administered via Canvas and will be due the Monday prior to the start of the lab module. There will be 6 pre-lab quizzes. The quiz assessment will comprise 15% of your grade.
Lab Notebooks:
Students will be expected to keep a lab notebook all semester. One will be provided to you. The lab notebook will document your work in the lab. Your lab notebooks will be checked periodically throughout the semester and will be graded on completeness, accuracy, inclusion of data/notes, and references. The assessment of your lab notebook will comprise 20% of your grade.

Lab Reports:
Following each lab exercise you will be expected to complete a lab report. While you work in groups in the laboratory and share the data collected within your group, the writing of the report is a solitary activity. No joint reports will be accepted. Additional details on Lab report format, grading, and expectations will be provided. Each module or lab will have a lab report; therefore you will have 6 lab reports. Lab reports will be due 1 week after the module or lab ends. The assessment of your lab notebook will comprise 50% of your grade.

Grading Policy

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
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</thead>
<tbody>
<tr>
<td>93.4 - 100</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>90.0 - 93.3</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>86.7 - 89.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>83.4 - 86.6</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>80.0 - 83.3</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>76.7 - 79.9</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>73.4 - 76.6</td>
<td>C</td>
<td>2.00</td>
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<tr>
<td>70.0 - 73.3</td>
<td>C-</td>
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<td>63.4 - 66.6</td>
<td>D</td>
<td>1.00</td>
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<tr>
<td>60.0 - 63.3</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>0 - 59.9</td>
<td>E</td>
<td>0.00</td>
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</table>

More information on UF grading policy may be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

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.
**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.

**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.bluer.com/ufl/](). Summaries of course evaluation results are available to students at [https://gatorevals.ua.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 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:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jennnappo@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](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](https://care.dso.ufl.edu), 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/](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](https://care.dso.ufl.edu) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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**Academic Resources**

- **E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. [https://iss ata.ufl.edu/help.shtml](https://iss ata.ufl.edu/help.shtml)
- **Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling; [https://career.ufl.edu](https://career.ufl.edu).
- **Library Support**, [http://cms.uflib.ufl.edu/ask](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/](https://teachingcenter.ufl.edu/).
- **Writing Studio**, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. [https://writing.ufl.edu/writing-studio/](https://writing.ufl.edu/writing-studio/)
- **Student Complaints Campus**: [https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/](https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/)