

Syllabus: EMA 4061L
Biomaterials Lab

1. **Course Description**- (1 credit hours) – Hands-on laboratory experience in the processing and characterization of biomaterials for use in medical applications.
2. **Pre-requisites and Co-requisites**- EMA4061
3. **Course Objectives**- The objective of this course is for students to gain hands-on experience with biomedical engineering techniques and methods used to evaluate biomaterials for medical applications. Students will gain practical knowledge and learn advanced principles that are involved at the interface between a biomaterial and the living system. Students will develop skills to design and conduct experiments as well as analyze and interpret data.
4. **Instructor** – Dr. Josephine Allen
 - a. Office location: Rhines Hall, room 152
 - b. Telephone: 352-846-3328
 - c. E-mail address: jallen@mse.ufl.edu
 - d. Class Web site: The course website can be found on the canvas system.
<http://elearning.ufl.edu/> There you can find the course syllabus, lecture notes, lab handouts, grades, and announcements. Check it frequently.
5. **Teaching Assistant** –Ahmed Hemeid (Ahemeid@ufl.edu)
6. **Office hours**- By appointment
7. **Meeting Times**- TBD
8. **Meeting Location**- TBD
9. **Material and Supply Fees**: TBD
10. **Textbooks and Software Required**-

Helpful resource: Biomaterial Science: An Introduction to Materials in Medicine (3rd Edition)
B. Ratner, A. Hoffman, F. Schoen, and J. Lemons Academic Press ISBN: 978-0-12-374626-9

If you are majoring in biomaterials, this is an excellent reference book to have.
11. **Supplemental reference materials**: Other reference material will be used throughout the class. These will be indicated by the instructor and provided as used or needed.
12. **Attendance and Expectations**- Lab attendance is highly recommended. There will be no opportunity to make up a missed laboratory exercise. Arrival on time is expected. Please turn off all cell phones upon entering lab. Reading of newspapers, working on assignments for this or other classes, or other activities that are not part of the class are not allowed during lab. There is absolutely no eating or drinking during lab. Students who do not comply with these requirements as well as those outlined in the safety manual or who behave disorderly or disrespectfully may be asked to leave the classroom. Even though you will work in groups, every member of the group must participate in the experiment. You will detail your role in the experiment within your lab reports. Your active participation will be evaluated and comprise 20% of your grade.

13. Tentative Course Outline (Laboratory exercises may include the following):

- Unit 1: Basic Laboratory Skills: Cell Culture
 - Biohazard Safety
 - Aseptic technique
 - Cell handling (counting, passaging, feeding etc.)
- Unit 2: Biocompatibility Evaluation: Cytotoxicity and Adhesion
 - Cell adhesion
 - Cell proliferation
 - Cellular toxicity
 - Cell Viability
 - Inflammatory response
- Unit 3: Material Surface Modification: Effect on cellular response
 - Material (i.e. polymer) Synthesis
 - Materials surface treatment/modification
 - Surface characterization
 - Protein adsorption
- Unit 4: Drug Delivery: Controlled release of encapsulated protein from PLGA microspheres
 - Encapsulation of BSA in PLGA microspheres
 - Evaluation of encapsulation efficiency and amount of BSA loaded
 - Quantification of release kinetics
 - Bioactivity assessments

14. **Grading** – 50%: Post-lab Reports
20%: Pre-Lab Reports/quizzes
20%: Lab Notebook
10%: Attendance/Participation

15. 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

For more information on grades and grading policies, please visit:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

16. **Exams**- There will not be any exams in this course.
17. **Exam Conflicts with other course exams**- N/A
18. **Make-up exams**- N/A

19. **Pre-Lab reports/Quizzes:** At the beginning of each lab you will turn in your pre-lab report or you will be given a pre-lab quiz. The pre-lab report or quiz is designed to ensure you are prepared for the lab exercise and understand the experimental protocols, data collection method, data analysis, and safety issues relevant to the lab. This category is weighted equally and represents 20% of your grade.

20. **Lab Notebook:** Students will be expected to keep a lab notebook all semester. 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.

21. **Post-Lab Reports:** At the end of each lab unit, you will be responsible for submitting a lab report. The specific instructions for the preparation of lab reports will be provided separately. These will be typed written reports that summarize the lab and include relevant data and conclusions. Lab reports are weighted equally and will comprise 40% of your grade.

22. **Contribution of course to meeting the professional component-**

(ABET only – undergraduate courses)

This is a 1 credit course. It provides 1 credit towards engineering sciences.

This course addresses the following MSE Program outcomes (note: Numbers refer to the list of MSE Program outcomes):

1. Ability to apply knowledge of mathematics, science, and engineering to materials systems. (medium coverage)
2. Ability to conduct experiments, analyze and interpret data. (high coverage)
3. (skipped)
4. Ability to apply and integrate knowledge of structure, properties, processing, and performance to solve materials selection and design problems within realistic constraints. (medium coverage)
5. Ability to function on multi-disciplinary teams. (low coverage, but not assessed)
6. Ability to identify, formulate, and solve engineering problems. (medium coverage)
7. Understanding of professional and ethical responsibility. (medium coverage)
8. Ability to communicate effectively in both oral and written form. (medium coverage)
9. Understanding of the economic impact of engineering solutions. (some discussion, but not assessed)
10. Understanding of the global, societal, and environmental impact of engineering solutions. (some discussion, not assessed)
11. Ability to engage in lifelong learning. (medium coverage)
12. Knowledge of contemporary issues. (some discussion, not assessed)
13. Ability to use the techniques, skills, and tools needed for practice as a materials engineer. (high coverage)

23. **Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

See <http://www.dso.ufl.edu/sccr/procedures/honorcode.php>

24. **Accommodation for Students with Disabilities** – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.
25. **UF Counseling Services** –Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
 - Career Resource Center, Reitz Union, 392-1601, career and job search services.
26. **Software Use** – All faculty, staff and student 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.
27. Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu>.