

**Science of Biomaterials**  
**EMA 6580 Class Number 20891/20893/20894**

**Class Periods:** Tuesday (8:30am-10:25am) and Thursday (9:35am-10:25am)

**Location:** NEB 0201 & Online EDGE

**Academic Term:** Fall 2023

**I. Instructor:**

Josephine Allen  
[jallen@mse.ufl.edu](mailto:jallen@mse.ufl.edu)  
(352) 846-3328  
Office Hours: TBD

**II. Teaching Assistants:**

- TDB

**III. Course Description**

(3 credit hours) – Introduction to variables that control compatibility and performance of biomaterials, including physical and chemical properties, corrosion, fatigue, and interfacial histochemical changes

**IV. Course Pre-Requisites / Co-Requisites**

(CHM2045 or CHM2095) or an equivalent general chemistry class

**V. Course Objectives**

Students who complete Biomaterials will understand the following principles:

- Understand the fundamental principles in biomedical materials, material science and chemistry, and how they contribute to biomaterial development and performance
- Biomaterial degradation in the biological environment
- Wound healing and tissue remodeling in the absence and presence of implants
- Molecular and cellular interactions with biomaterials
- Comparative analysis of permanent, biodegradable and bioactive implants
- The fundamentals of tissue engineering and scaffold design

**VI. Materials and Supply Fees:**

None

**VII. Required Textbooks and Software**

Recommended but NOT Required:

Biomaterials Science: An Introduction to Materials in Medicine  
Wagner, Sakiyama-Elbert, Zhang, Yaszemski  
2020, (4<sup>th</sup> Edition)  
Academic Press ISBN: 9780128161371

OR

Biomaterials Science: An Introduction to Materials in Medicine  
Buddy D. Ratner et al.  
2013, (3<sup>rd</sup> Edition) ISBN: 978-0123746269

Other reference material will be provided throughout the class.

## **VIII. Course Schedule (tentative and subject to change)**

Week 1:	Introduction, History of Biomaterials,
Week 2:	MSE Review fundamental concepts
Week 3:	Characterization of Biomaterials
Week 4:	Proteins and Biomaterials
Week 5:	Proteins and Biomaterials
Week 6:	Metals in Medicine
Week 7:	Ceramics in Medicine
Week 8:	Polymers in Medicine
Week 9:	Cell-Biomaterial Interactions
Week 10:	Tissue, Extracellular Matrix
Week 11:	Inflammation, foreign body response
Week 12:	Tumorigenesis and Blood-Materials Interactions
Week 13-16:	Student Presentations

## **IX. Class Policies (Attendance Policy, Class Expectations, and Make-Up Policy)**

- A. Attendance Policy- Lecture attendance is highly recommended. EDGE students should follow along with the recorded lectures as close to real time as possible. Experience has shown that those who attend lectures (and keep up with recorded content) earn higher grades in the course. Arrival on time is expected. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.
- B. Class Expectations- Please turn off all cell phones upon entering class. Working on assignments for this or other classes, or other activities that are not part of the class are not allowed during lecture. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom.
- C. Exams- There will be no exams for this course.
- D. Make-up Policy – No late work will be accepted. You will have your due dates well in advance. Please plan accordingly, submit early, and do not miss any deadlines. In an emergency situation, the instructor will follow UF guidelines on missed work.

## **X. Evaluation of Grades**

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Specific Aims Draft	10%
Significance/Innovation Draft	10%
Approach Draft	10%
Final Grant	20%
Journal Article Discussion Board	25%
Participation (Peer Review)	10%
Quizzes/Homework	15%
<b>Total</b>	<b>100%</b>

### **a. Grant submission**

You will be required to write a grant proposal. Detailed instructions will be provided separately and a lecture will be dedicated to going over how to write a grant. Throughout the semester, components of the proposal will be due and will be graded, along with the final proposal. The proposal and its elements will comprise 50% of your grade.

### **b. Canvas Quizzes & Discussion Prompts:**

Lectures will periodically have an associated quiz, question, or discussion prompt, which must be completed prior to the deadline. Quizzes must be completed individually with no collaboration and

should ideally be completed shortly or immediately after the lecture so the professor can assess what concepts or content should be revisited. These will collectively be worth 15% of your grade.

**c. Journal Article Discussion Board**

Throughout the semester journal articles will be posted on the discussion board and you will be required to post comments related to the article as well as comments on your classmates comments. Detailed instructions will be provided. These discussion board posts will constitute 25% of your grade.

**d. Participation**

Part of your course participation will be your completion of peer reviews for the submitted proposals. Detailed instructions will be provided on how to conduct a proposal review, review guidelines, rubric, scoring etc. Participation will comprise 15% of your grade.

***You have one week after any assignment is returned to resolve any questions about scores and grades. No changes to your assessment grades will be made after that time.***

**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:

[UF Graduate Catalog](#)  
[Grades and Grading Policies](#)

**XI. 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.

**XII. 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.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

**XIII. 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.

#### ***XIV. 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.

#### ***XV. Commitment to a Safe and Inclusive 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, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
- HWCoe Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@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)

#### ***XVI. 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.

#### ***XVII. 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>

## **XVIII. 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>.

XIX.