

Biomaterials for Regenerative Medicine

BME 4931

Class Periods: MWF, Period 5, 11:45-12:35 PM

Location: Larsen Hall 330

Academic Term: Fall 2017

Instructor:

Greg Hudalla

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352-273-9326

Office Hours: By appointment

Teaching Assistants:

- None

Course Description

This course introduces the students to biomaterials used in regenerative medicine and tissue engineering. This course will highlight chemical and physical properties of various natural and synthetic biomaterials, and how these features relate to choosing a material for a regenerative medicine application. This course will also provide tissue-specific examples of successful tissue regeneration.

Course Pre-Requisites / Co-Requisites

EMA3010 and EMA3066

Course Objectives

1. to become familiar with different types of biomaterials used for regenerative medicine
2. to apply engineering principles to select materials for specific tissue regeneration applications
3. to understand methods to assess the clinical effectiveness of biomaterials in tissue regeneration

Materials and Supply Fees

N/A

Professional Component (ABET):

N/A

Relation to Program Outcomes (ABET):

Outcome	Coverage*
a. Apply knowledge	
b1. Conduct experiments	
b2. Statistical design of experiments	
c. Design	
d. Function on teams	
e. Solve problems	
f. Professional and ethical responsibility	
g. Communicate	
h1. Economic impact	
h2. Global, societal, and environmental impact	
i. Lifelong learning	
j. Contemporary issues	
k. Techniques, skills, and tools for degree program	

Required Textbooks and Software

Course notes are developed by the instructor and published on the course website at <http://www.elearning.ufl.edu>

Recommended Materials

- a. Title – Biomaterials Science: An Introduction to Materials in Medicine
- b. Authors – Ratner, B.D., et al
- c. ISBN: 9780125824637

- a. Title – Tissue Engineering
- b. Authors – Bernhard O. Palsson and Sangeeta N. Bhatia
- c. ISBN number: 0-13-041696-7

- a. Title – Molecular Biology of the Cell
- b. Authors – Bruce Alberts
- c. ISBN number: 0-8153-3218-1

Course Schedule (tentative)

Introduction

Week 1 (Aug 21): Overview of Tissue Engineering

Why, what, how, where, and when of tissue engineering

Week 2 (Aug 28): What is a tissue? A review of extracellular matrix, cell, stem cells

Homework #1 due Friday Sept 1

Module 1 – Host-material interactions

Week 3 (Sept 4): Protein adsorption and cell adhesion (NOTE: No class on Sept 4 – Labor Day)

Quiz #1 Friday Sept 8 in class

Week 4 (Sept 11): Host response to materials, part I

Homework #2 due Friday Sept 15

Week 5 (Sept 18): Host response to materials, part II

Homework #3 due Friday Sept 22

Module 2 – Classes of Materials for TE/RM

Week 6 (Sept 25): Ceramics

Exam #1 Friday Sept 29 in class

Week 7 (Oct 2): Metals (NOTE: No class on Friday Oct 2 – Homecoming)

Week 8 (Oct 9): Synthetic polymers (NOTE: No class on Oct 13 – BMES National meeting)

Homework #4 due Friday Oct 13

Week 9 (Oct 16): Natural biomaterials

Module 3 – Applications of Materials: From Replacement to Regeneration

Week 10 (Oct 23): Cardiovascular

Quiz #2 Friday Oct 27 in class

Week 11 (Oct 30): Orthopedic

Homework #5 due Friday Nov 3

Week 12 (Nov 6): Epithelial (Note: No class on Nov 10 – Veteran's day)

Week 13 (Nov 13): Neural

Exam #2 Friday Nov 17 in class

Week 14 (Nov 20): Return exam 2 (Note: No class on Nov 22 or Nov 24 – Thanksgiving)

Week 15 (Nov 27): Regulatory considerations (M/W); In-class Design Project (F)

Week 16 (Dec 4): In-class Design Projects (M), Review Session (W), Reading Day (F)

Week 17 (Dec 11): Final Exam – 14A – Thursday Dec 14, 7:30-9:30 AM

Attendance Policy, Class Expectations, and Make-Up Policy

-Lecture attendance is not required, but is strongly recommended.

-You must let me know AS SOON AS POSSIBLE if you will be ABSENT on the SCHEDULED DATE of ANY Quiz or Exam. If you know that you'll be absent for an EXAM or QUIZ, a make-up MUST be taken **PRIOR TO** the date listed above.

-No make-up problem sets, quizzes, or exams will be given for unexcused absences.

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.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (5)	2 points each	10%
Quizzes (2)	10 points each	20%
Exams (2)	20 points each	40%
Final Exam (1)	30 points	30%
		100%

Extra credit opportunities: *Regenerative Medicine in the News*, 2 points awarded for presenting 1 article in class

Grading Policy

Percent	Grade	Grade Points
93 - 100	A	4.00
90.0 - 92.9	A-	3.67
87- 89.9	B+	3.33
83 - 86.9	B	3.00
80.0 - 82.9	B-	2.67
77 - 79.9	C+	2.33
73 - 76.9	C	2.00
70.0 - 72.9	C-	1.67
67 - 69.9	D+	1.33
63 - 66.9	D	1.00
60.0 - 63	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 requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. 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/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 Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.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: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

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.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.