

Cover Sheet: Request 11304

BME3XXX Biomedical Materials

Info

Process	Course New Ugrad/Pro
Status	Pending
Submitter	Theus, Kristin undergrad@bme.ufl.edu
Created	11/16/2016 4:08:41 PM
Updated	2/10/2017 11:14:25 AM
Description of request	Restoration of physiological function by engineering biomaterials for biological environment, covering principles underlying use and design of medical implants and matrices/scaffolds. Strong emphasis on transition from engineering material to biological tissue, including molecular and cellular interactions with biomaterials, tissue and organ regeneration, and design of intact, biodegradable, and bioreplaceable materials.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Biomedical Engineering 021934001	Rinaldi, Carlos		11/16/2016
No document changes					
College	Approved	ENG - College of Engineering	Caple, Elizabeth		1/20/2017
Replaced BME4XXX Biomaterials 11.3.16.docx					
University Curriculum Committee	Comment	PV - University Curriculum Committee (UCC)	Case, Brandon	Added to the February agenda.	1/24/2017
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			1/24/2017
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 11304

Info

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Submitter: Theus, Kristin undergrad@bme.ufl.edu

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Form version: 1

Responses

Recommended PrefixBME

Course Level 3

Number XXX

Category of Instruction Intermediate

Lab Code None

Course TitleBiomaterials

Transcript TitleBiomaterials

Degree TypeBaccalaureate

Delivery Method(s)On-Campus

Co-ListingNo

Effective Term Spring

Effective Year2017

Rotating Topic?No

Repeatable Credit?No

Amount of Credit3

S/U Only?No

Contact Type Regularly Scheduled

Weekly Contact Hours 3

Course Description Restoration of physiological function by engineering biomaterials for biological environment, covering principles underlying use and design of medical implants and matrices/scaffolds. Strong emphasis on transition from engineering material to biological tissue, including molecular and cellular interactions with biomaterials, tissue and organ regeneration, and design of intact, biodegradable, and bioreplaceable materials.

Prerequisites BME3060(C) & CHM3217 or equivalent

Co-requisites None

Rationale and Placement in Curriculum This course will provide BME students with an understanding of the functions of biomaterials. A course of this nature does not exist in the BME curriculum. This course will be regularly offered each year to BME students and will count as a specialization track course for students in the Biomaterials track or as a technical elective.

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 and biodegradable implants
- The fundamentals of tissue engineering and scaffold design

Course Textbook(s) and/or Other Assigned Reading Title: Biomaterials: The Intersection of Biology and Materials Science

Authors: Temenoff and Mikos

Publication date and edition: 2008, first edition

ISBN number: 978-0130097101

Title: Biomaterial Science

Author: Buddy D. Ratner

Publication date and edition: 2004, second edition

ISBN number: 978-0080470368

Weekly Schedule of Topics Material Structure, Compositions, and Function

Week 1: Introduction to Biomaterials – Basic Concepts

Week 2: Structure and Composition: Metals

Week 3: Structure and Composition: Ceramics

Week 4: Structure and Composition: Polymers / Quiz 1.1

Week 5: Physical and Mechanical Properties of Biomaterials

Week 6: Chemical Composition and Process Effects: Metals and Ceramics

Week 7: Chemical Composition, Process Effects, and Degradation: Polymers
Quiz 1.2

Week 8: Surface Properties / Exam 1

Biological Implication of Biomaterials

Week 9: Biocompatibility Testing

Week 10: Protein and Cell Interactions with Biomaterials

Week 11: Principles of Tissue Engineering and Scaffold Design / Quiz 2.1

Week 12: Wound Healing and the Role of Biomaterials in Modulating Wound Healing
Responses

Week 13: Thrombosis and the Role of Biomaterials in the Vasculature

Week 14: Acute and Chronic Inflammation and the Role of Biomaterials in Modulating
the Immune Responses / Quiz 2.2

Week 15: Regulatory Considerations and Testing / Exam 2

Links and Policies

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

<https://www.dso.ufl.edu/drc>

<https://evaluations.ufl.edu/evals>

<https://evaluations.ufl.edu/results/>

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

<http://www.counseling.ufl.edu/cwc>

<http://www.police.ufl.edu/>

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

<https://www.crc.ufl.edu/>

<http://cms.uflib.ufl.edu/ask>

<https://teachingcenter.ufl.edu/>

<https://writing.ufl.edu/writing-studio/>.

https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

<http://www.distance.ufl.edu/student-complaint-process>

Grading Scheme Exam 1 - 25% of grade

Exam 2 - 25% of grade

Final Exam - 30% of grade

Quizzes - 10% of grade

Homework - 10% of grade

A: 90-100

A-: 87-89

B+: 84-86

B: 81-83

B-: 78-80

C+: 75-77

C: 72-74

C-: 69-71

D: 63-65

D+: 66-68

D-: 60-62

Fail: <60

Instructor(s) To be determined

Biomedical Materials
BME 3XXX Section XXXX
Class Periods: TBA
Location: TBA
Academic Term: Spring 20XX

Instructor:

TBD
TBD
TBD@bme.ufl.edu
Office Hours: TBD

Teaching Assistants:

Please contact through the Canvas website

- TBD

Course Description

This course focuses on the restoration of physiological function by engineering biomaterials for the biological environment, covering the principles underlying the use and design of medical implants and matrices/scaffolds. A strong emphasis will be placed on the transition from the engineering material to the biological tissue, including molecular and cellular interactions with biomaterials, tissue and organ regeneration, and the design of intact, biodegradable, and bioreplaceable materials.

Course Pre-Requisites / Co-Requisites

Pre-Requisites:

BME3060: BME Fundamentals with a minimum grade of C

CHM3217: Organic Chemistry (or equivalent of CHM3217 according to the BME Curriculum Map)

Co-Requisites: None

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 and biodegradable implants
- The fundamentals of tissue engineering and scaffold design

Professional Component (ABET):

A, E, H

Relation to Program Outcomes (ABET):

Outcome	Coverage*
a. Apply knowledge	High
b1. Conduct experiments	
b2. Statistical design of experiments	
c. Design	
d. Function on teams	
e. Solve problems	High
f. Professional and ethical responsibility	Low
g. Communicate	High

h1. Economic impact	Low
h2. Global, societal, and environmental impact	Low
i. Lifelong learning	
j. Contemporary issues	Low
k. Techniques, skills, and tools for degree program	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

Required Textbooks and Software

- Title: Biomaterials: The Intersection of Biology and Materials Science
Authors: Temenoff and Mikos
Publication date and edition: 2008, first edition
ISBN number: 978-0130097101

Recommended Materials

- Title: Biomaterial Science
Author: Buddy D. Ratner
Publication date and edition: 2012, third edition
ISBN number: 978-0123746269

Course Schedule

Material Structure, Compositions, and Function

- Week 1: Introduction to Biomaterials – Basic Concepts
(Read Chapter 1)
- Week 2: Structure and Composition: Common Metals used in Medical Applications
(Read Chapter 2-3)
- Week 3: Structure and Composition: Common Ceramics used in Medical Applications
(No reading, continuation of Chapter 2-3)
- Week 4: Structure and Composition: Common Polymers used in Medical Applications
(No reading, continuation of Chapter 2-3)
Quiz 1.1
- Week 5: Structure-Function Relationships of Common Biomaterials
(Read Chapter 4)
- Week 6: Chemical Composition and Process Effects: Common Metals and Ceramics used in Medical Applications
(Read Chapter 5-6)
- Week 7: Chemical Composition, Process Effects, and Degradation: Common Polymers used in Medical Applications
(No reading, continuation of Chapter 5-6)
Quiz 1.2
- Week 8: Surface Properties
(Read Chapter 7)
Exam 1

Biological Implication of Biomaterials

- Week 9: Biocompatibility Testing
(Read Chapter 8-9)
- Week 10: Protein and Cell Interactions with Biomaterials
(No reading, continuation of Chapter 8-9)
- Week 11: Principles of Tissue Engineering and Scaffold Design
(Read Chapter 10)
Quiz 2.1
- Week 12: Wound Healing and the Role of Biomaterials in Modulating Wound Healing Responses
(Read Chapter 11)

- Week 13: Thrombosis and the Role of Biomaterials in the Vasculature
(Read Chapter 13)
- Week 14: Acute and Chronic Inflammation and the Role of Biomaterials in Modulating the Immune Responses
(Read Chapter 12)
Quiz 2.2
- Week 15: Regulatory Considerations and Testing
(No Reading)
Exam 2

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is not required. However, class notes will not be provided to absent students, unless they have excused absences. 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.

This course is a traditional lecture based course, and use of computers, tablets, and cell phones is distracting to your fellow classmates. Computers, tablets, and cell phones are not appropriate for use during this class and must be put away during class.

Unless prior arrangements or an excused absence has been granted by the instructor, students will be deducted 2 letter grades for late coursework (grading will start at 75% [C]). The deduction occurs at the time the work is due. Once the assignment has been handed back and the key discussed, a zero will be assigned late assignments that are not excused. Students with an excused absence shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.

Evaluation of Grades

Assignment	Percentage of Final Grade
Exam #1	25%
Exam #2	25%
Final	30%
Quizzes	10%
Homework	10%
	100%

Grading Policy

A: 90-100 B+: 84-86 C+: 75-77 D+: 66-68 Fail: <60
 A-: 87-89 B: 81-83 C: 72-74 D: 63-65
 B-: 78-80 C-: 69-71 D-: 60-62

For information on current UF grading policies for assigning grade points, please visit:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: A C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. 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:

At UF Every Gator Counts. U Matter, We Care serves as UF's umbrella program for UF's caring culture and provides students in distress with support and coordination of the wide variety of appropriate resources. Families, faculty and students can contact umatter@ufl.edu seven days a week for assistance for students in distress. If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: The counseling and wellness center provides resources for students in distress, including but not limited to suicide prevent, crisis management, advice on parenting a college student, and advice on adjusting to college life. <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): Sexual assault recovery services are available in the Student Health Care Center, contact at 392-1161.

University Police Department provides security and police services to the University of Florida. Contact at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support: Technical support for the Universities e-learning websites is available. Contact at 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center: Whether it's connecting dots to figure out your interests or finding ways to connect with opportunities, the University of Florida Career Resource Center (CRC) is here to help you figure it out. The CRC focuses on your interests and experiences – not just your major. They can help you make sense of where you've been and show you where you can go. Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support: Librarians are available to help you identify resources related to this course material. Contact at <http://cms.uflib.ufl.edu/ask> for various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: The mission of the Teaching Center at the University of Florida is to empower students to become successful lifelong learners. Through a variety of services and instructional approaches, the Teaching Center seeks to help students master effective ways of learning for different disciplines, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. The writing studio provides help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy. *Information available at* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf and <http://www.distance.ufl.edu/student-complaint-process>.