Cover Sheet: Request 11305

BME3XXX Mechanical Behavior of Biological Tissues and Systems

Info

Process	Course|New|Ugrad/Pro
Status	Pending
Submitter	Theus, Kristin undergrad@bme.ufl.edu
Created	11/16/2016 4:17:54 PM
Updated	2/10/2017 11:21:30 AM
Description of request	This course will focus on understanding the mechanical behavior of biological tissues and systems. The course will begin by evaluating structure-function relationships, stress-strain relationships, and the mechanical complexity of biological systems. In addition, the basics of viscoelastic behavior will be introduced as it applies to biological tissues.?

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 Mechanical Behavior of Biological Tissues and Systems 11.3.16.docx Deleted BME3XXX Mechanical Behavior of Biological Tissues and Systems 11.3.16.docx					12/13/2016 12/13/2016
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					

Step	Status	Group	User	Comment	Updated
No document changes					

Course|New for request 11305

Info

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Submitter: Theus, Kristin undergrad@bme.ufl.edu
Created: 2/10/2017 11:19:45 AM
Form version: 2

Responses

Recommended PrefixBME
Course Level 3
Number XXX
Category of Instruction Intermediate
Lab Code None
Course Title Mechanical Behavior of Biological Tissues and Systems
Transcript Title Biological Tiss & Sys
Degree Type Baccalaureate

Delivery Method(s) On-Campus
Co-Listing No

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 This course will focus on understanding the mechanical behavior of biological tissues and systems. The course will begin by evaluating structure-function relationships, stress-strain relationships, and the mechanical complexity of biological systems. In addition, the basics of viscoelastic behavior will be introduced as it applies to biological tissues.?
Prerequisites BME3060(C) & EGM2511
Co-requisites None
Rationale and Placement in Curriculum This class is currently being taught as a rotating topics course for BME students as a specialization track course. This course will be regularly offered each year to students needs an official course number assigned.
Course Objectives Students who complete this course will understand the following principles:

- Stress-strain relationships and energy storage in elastic solids
- Common mechanical properties and the mechanical characterization of elastic solids (metals, ceramics, and some polymers)
- Stress-strain relationships and energy dissipation in viscoelastic solids
- Mechanical properties and the mechanical characterization of viscoelastic solids (polymers and tissues)
- Structure-function relationships in engineering materials and tissues

- Modeling mechanical behavior in biological systems

Course Textbook(s) and/or Other Assigned Reading Title: Introduction to Biomechanics: Solids and Fluids, Analysis and Design
Authors: Jay D. Humphrey and Sherry L. O'Rourke
Publication date and edition: 2015, second edition
ISBN number: 978-1493926237

Weekly Schedule of Topics Fundamentals of Solid Mechanics
Week 1: Stress, Strain, and Constitutive Relations
Week 2: Bending and Torsion / Quiz 1.1
Week 3: 1-Dimensional Hooke's Law and Poisson's Relationship
Week 4: The Stress-Strain Curve /Quiz 1.2
Week 5: Stress, Motion, and Constitutive Relations / Exam 1

Fundamentals of Elasticity
Week 6: 2-Dimensional Hooke's Law
Week 7: 3-Dimensional Hooke's Law / Quiz 2.1
Week 8: Anisotropy, Transversely Isotropic, and Orthotropic Material and Tissue Properties
Week 9: Pressure Vessels – Lungs, Heart, and Blood Vessels / Quiz 2.2
Week 10: Elastic Tissues – Bone and Enamel / Exam 2

Fundamentals of Viscoelasticity
Week 11: The Interface of Solids and Fluids
Week 12: Maxwell Fluid and Kelvin-Voight Solids / Quiz 3.1
Week 13: Standard Linear Solid under Stress Relaxation and Creep
Week 14: Shock/Impact Absorption: Cartilage vs. Fibrocartilage / Quiz 3.2
Week 15: Stretch and Contraction: Muscle and Tendon / Exam 3

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
Exam 3 - 25% of grade
Homework - 15% of grade
Quizzes - 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+: 66-68
D: 63-65
D-: 60-62
Fail: <60

Instructor(s) To be determined

Mechanical Behavior of Biological Tissues and Systems
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 will focus on understanding the mechanical behavior of biological tissues and systems. The course will begin by evaluating structure-function relationships, stress-strain relationships, and the mechanical complexity of biological systems. In addition, the basics of viscoelastic behavior will be introduced as it applies to biological tissues.

Course Pre-Requisites / Co-Requisites
BME3060: BME Fundamentals with a minimum grade of C
EGM2511: Engineering Statics

Course Objectives
Students who complete this course will understand the following principles:
- Stress-strain relationships and energy storage in elastic solids
- Common mechanical properties and the mechanical characterization of elastic solids (metals, ceramics, and some polymers)
- Stress-strain relationships and energy dissipation in viscoelastic solids
- Mechanical properties and the mechanical characterization of viscoelastic solids (polymers and tissues)
- Structure-function relationships in engineering materials and tissues
- Modeling mechanical behavior in biological systems

Professional Component (ABET):
E, G, K

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	
g. Communicate	High
h1. Economic impact	Low
h2. Global, societal, and environmental impact	Low
i. Lifelong learning	

j. Contemporary issues	
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.

Recommended Textbooks and Software

- Title: Introduction to Biomechanics: Solids and Fluids, Analysis and Design
  Authors: Jay D. Humphrey and Sherry L. O'Rourke
  Publication date and edition: 2015, second edition
  ISBN number: 978-1493926237

Course Schedule

Fundamentals of Solid Mechanics
Week 1: Stress, Strain, and Constitutive Relations
Week 2: Bending and Torsion
Quiz 1.1
Week 3: 1-Dimensional Hooke's Law and Poisson's Relationship
Week 4: The Stress-Strain Curve
Quiz 1.2
Week 5: Stress, Motion, and Constitutive Relations
Exam 1

Fundamentals of Elasticity
Week 6: 2-Dimensional Hooke's Law
Week 7: 3-Dimensional Hooke's Law
Quiz 2.1
Week 8: Anisotropy, Transversely Isotropic, and Orthotropic Material and Tissue Properties
Week 9: Pressure Vessels – Lungs, Heart, and Blood Vessels
Quiz 2.2
Week 10: Elastic Tissues – Bone and Enamel
Exam 2

Fundamentals of Viscoelasticity
Week 11: The Interface of Solids and Fluids
Week 12: Maxwell Fluid and Kelvin-Voight Solids
Quiz 3.1
Week 13: Standard Linear Solid under Stress Relaxation and Creep
Week 14: Shock/Impact Absorption: Cartilage vs. Fibrocartilage
Quiz 3.2
Week 15: Stretch and Contraction: Muscle and Tendon
Exam 3

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.

Evaluation of Grades

Assignment	Percentage of Final Grade
Exam #1	25%
Exam #2	25%
Exam #3	25%
Homework	15%
Quizzes	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.

Policy on grade corrections

Your TA and I are not perfect and will make errors, but the responsibility is on you to bring errors to my attention within a reasonable time frame. After you've reviewed your grade, you may request a re-grade. To do so, attach a 1-page description of what problems you want re-graded and place this in the re-grade folder for me to review. Students will have 3 classes after receiving a grade to challenge errors or a grading mistake. After 3 class periods, the grade will become final and will not be changed.

Please note:

1) I will not re-grade on the spot. So, do not form a line at the end of class to beg for points back on an exam or homework. In my experience, these lines are highly biased by order... and the students at the beginning of the line don't get the same treatment as those at the end (or those unwilling to wait). It's not a fair system. I'm happy to talk about problems and provide advice, but I do not instantly have answers for all problems and I will not re-grade anything until I have the time and environment to consider the case fairly. This helps me be consistent across the class. So, if you do not submit the written 1-page description to me, I will not re-grade it.
2) I will not consider any corrections at the end of the semester that are for assignments/tests assigned in the first part of the course. THIS POLICY IS STRICTLY ENFORCED. The end of the semester stinks for everyone, not just students. All those reports you have due, all the finals you have to take – your instructor and TA have to grade them. Reconsidering grades in the first part of the course because you are on the bubble is not fair to students that follow this policy. You will have a window to request a correction on every single assignment in this class, but it is not an infinite window. This policy provides some leniency to the students, but protects my and the TA's schedule, time, and sanity to some degree.

Policy on late coursework

Unless prior arrangements have been made with me, 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, you will receive a zero on the homework. THIS POLICY IS STRICTLY ENFORCED. In this course, I grade very quickly, and usually9 return grades at the next class period so that you have all material back in your hands to study for the test. So, if you choose to be late, the grade will go from 75% to 0% in about 48 hours. So, don't be late.

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.