Florida Institute of Technology

ADDING A NEW COURSE TO THE CURRICULUM

This is a request for evaluation of a course in the system. □ Yes □ No

New courses are available beginning with the fall term in which they appear in the University Catalog.

SUBJECT B M E COURSE NO. 4100 CREDIT HOURS 3 ACADEMIC YEAR TO BE ADDED TO THE FILE Fall 2016
(e.g., CSE) (e.g., 1301)

CLASS HOURS 45 LECTURE HOURS 45 LAB HOURS CONTACT HOURS (CEU ONLY)

DEPARTMENT Biomedical Engineering SCHEDULE TYPE Lecture
(e.g., Computer Science) (e.g., Lecture, Lab or Special Topics/Project)

□ COLLEGE OF AERONAUTICS – 23 □ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS – 25
□ NATHAN M. BISK COLLEGE OF BUSINESS – 24 □ COLLEGE OF SCIENCE – 26
□ COLLEGE OF ENGINEERING – 1 □ EXTENDED STUDIES / NATHAN M. BISK COLLEGE OF BUSINESS – 90

COMPUTER TITLE Restricted to 25 characters, including spaces Tissue Mechanics
Tissue Mechanics

CATALOG TITLE Restricted to 150 characters, including spaces

Studies basic mechanics concepts applied to human biological systems. Includes aspects of statics and mechanics of materials. Discusses tissue mechanics and cellular biomechanics.

This description has been approved by the catalog office 1/30/2015

Catalog & Curriculum Manager Date

In addition, please attach a course syllabus and/or a more detailed description.

GRADES TO BE ISSUED
□ A, B, C, D, F □ A, B, C, D, F, CEU/Audit
□ CEU □ S, U □ P, F □ Other

ADDITIONAL RESTRICTION
(e.g., Major/Class Level, Department Head Approval)

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

SUBJECT Alpha Prefix (e.g., CSE) COURSE NO. (e.g., 1301) TERM TO IMMEDIATE

□ Yes □ No Will this course be used to measure program level student learning outcomes? If yes, write signature required.

□ Yes □ No Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

□ Yes □ No Will this course impact any existing program? If yes, attach "Changing Graduation Requirements" form for each program that is impacted.

APPROVALS: On completion of description and course number verification, affix appropriate signatures as indicated, and submit completed form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval.

Original
Date 7/31/15

Department Head/Program Chair
Date 8/3/15

Dean or Associate Dean
Date 8-24-15

Chair, Graduate Council Date

Chair, Undergraduate Curriculum Committee Date

**Vice President for Institutional Effectiveness**

Date

CATALOG & CURRICULUM MANAGER

REGISTRAR’S USE ONLY

SCBASE SCADEN SCAPREQ SCABASE

SCBRES OperatIon Date

Florida Institute of Technology • Office of the Registrar
150 West University Boulevard, Melbourne, FL 32901-6975 • (321) 674-8114 • Fax (321) 674-7827
BME 4100 TISSUE MECHANICS
Fall 2016

2016-17 Catalog Data: Studies basic mechanics concepts applied to human biological systems. Includes aspects of statics and mechanics of materials. Discusses tissue mechanics and cellular biomechanics.

Credits & Contact Hours: 3 Credits, 28 lectures, 1.5 class hours / lecture (for 45 hours).

Required or Elective or Selected Elective: Elective.

Prerequisites by Topic: Physics, Statics, Mathematics, Physiology, Material Science, Basic introductory computer skills.

Co-requisites by Topic: None

Grading Policy:

  * Homework and Quizzes (10%)
  * Midterm Exams (50%)
  * Project (20%)
  * Final Exam (20%)

Textbooks:

Course Outcomes: Students completing the course should be able to:
1. Develop a basic understanding of the structure and physiology of biological tissues, and the relationship of these properties to the mechanics of the native tissue and the requirements for prosthesis design.
2. Understand basic principles related to mechanics of materials applied to biomechanics, and perform simple calculations of stress, strain and deformations due to uniaxial, bending and combined loading.
3. Apply stress transformations, principal coordinate systems, Mohr’s circle, and failure criteria
4. Understand current challenges in biomechanical engineering. An understanding of a particular challenge will be communicated through writing.

Topics Covered and Associated Time:
1. Introduction to specific biological tissues (1 lecture)
2. Statics review and statics applied to biological tissue (2 lecture)
3. Basic loading analysis including Stress, Strain, Deformation (1 lecture)
4. Tissue Mechanics for bone (2 lecture)
5. Tissue Mechanics for ligaments, cartilage, muscle (3 lecture)
6. Tissue Mechanics for skin and vascular tissue (2 lecture)
7. Viscoelasticity (2 lecture)
8. Introduction to prostheses and grafts (1 lecture)
9. Bone bending (Normal/ Shearing Stresses, Deformation Calculations) (2 lectures)
10. Stress Transformations (1 lecture)
11. Principal Coordinate Systems, Mohr’s Circle (2 lecture)
12. Failure Criteria (2 lecture)
13. Introduction to finite element analysis (2 lecture)
14. Introduction to Cellular Biomechanics (2 lecture)
15. Presentations and mid-terms (3 lecture)

Class Schedule: Tuesday & Thursday: 9:30 AM – 10:45 AM

Contribution of Course to Meeting the Requirements of Curriculum: This course meets requirements for a one and one-half year curriculum of engineering science topics.

Relationship of Course to Program Outcomes: See assessment matrix.

Prepared By: Chris Bashur, Ph.D., Assistant Professor of Biomedical Engineering
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**Key**

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◊ = The course outcome *lightly* addresses the Student Outcome  
♦ = The course outcome *strongly* addresses the Student Outcome

Course outcomes assessment matrix completed by: Chris Bashur, Ph.D., Biomedical Engineering  
Date: 12/9/2013