**Florida Institute of Technology**

**ADDITION A NEW COURSE TO THE CURRICULUM**

This is a request for reactivation 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** M E  **COURSE NO.** 3 0 3 0  **ACADEMIC YEAR TO BE ADDED TO THE FILE** Fall 2016  (e.g. Fall 2016)

**CLASS HOURS** 45/semester  **LECTURE HOURS** 45/semester  **LAB HOURS** 0/semester  **CONTACT HOURS (CEU ONLY)** N/A

**DEPARTMENT** Biomedical Engineering  **SCHEDULE TYPE** Lecture (A)

□ 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  **CATALOG TITLE** Biomedical Engineering

**CATALOG DESCRIPTION OF COURSE** Restricted to 350 characters, including spaces

Introduces fluid hydrostatics and hydrodynamics; flow kinematics; equations of mass, momentum and energy conservation; dimensional analysis for experimental setups; and biological systems circulation and theology.

This description has been approved by the catalog office **9/1/2016**

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

**RESTRICTIONS** □ Prerequisite PHY 2002  □ Corequisite MTH 2201

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

□ and □ or

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

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

**SURJECT** M E  **COURSE NO.** 3 0 3 0  **TERM TO INACTIVATE**

□ Yes □ No  Will this course be used to measure program-level student learning outcomes? If yes, review and 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 programs? 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.

**CATALOG & CURRICULUM MANAGER**

These changes/additions have been made for the University Catalog and entered into the DANNER term named above.

**REGISTRAR'S USE ONLY**

SCARSE  SCACETL  SCAPREQ  SCABASE  SCAREDS  Operator Init.  Date

Florida Institute of Technology • Office of the Registrar

150 West University Boulevard, Melbourne, FL 32901-6975 • (321) 674-8114 • Fax (321) 674-7827
2016-17 Catalog Data: Introduces fluid hydrostatics and hydrodynamics; flow kinematics; equations of mass, momentum and energy conservation; dimensional analysis for experimental setups; biological systems circulation and rheology.

Credits & Contact Hours: 3 Credits, 45 Lectures (50 minutes/lecture)

Required or Selected Elective: Required

Prerequisite by Topic: Physics 2

Corequisite by Topic: Differential Equations

Grading Policy:
- Homework (10%)
- Exam 1 (25%)
- Exam 2 (25%)
- Final Exam (40%)

Textbooks:

Course Outcomes: Students completing the course should be able to:
1. Apply basic laws of physics to formulate, solve, and communicate biofluid mechanics load-deformation analysis problems.
2. Develop an understanding of structure and physiology of biological fluids and apply engineering principles to model the mechanical function of fluid systems.
3. Apply fluid mechanics principles to biofluids to perform stress and flow calculations caused by a variety of loading regimes.
4. Apply fundamental balance relationship to determine biofluid flow parameters.
5. Understand current challenges in biofluids engineering.

Topics Covered and Associated Time:
1. Introduction to Biofluid Mechanics (2 lectures)
2. Hydrostatics (4 lectures)
3. Stress, Motion and Constitutive Equations (7 lectures)
4. Fundamental Conservation Relations – Mass, Momentum, Angular Momentum and Energy (7 lectures)
5. Euler & Bernoulli Equations, Reynolds Transport Theorem (6 lectures)
6. Introduction to Navier-Stokes Equations (5 lectures)
7. Dimensional Analysis (4 lectures)
8. Examples of Exact Solutions (5 lectures)
9. Control Volume and Semi-empirical Methods (5 lectures)
Class Schedule: Monday, Wednesday, Friday: 9:00 – 9:50am

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

Relationship of Course to Program Outcomes: See assessment matrix.

Prepared by: Ted Conway, Ph.D., Professor and Head of Biomedical Engineering
# Outcomes Assessment Matrix for BME 3030

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## Key

- **a**: An ability to apply knowledge of mathematics, science, and engineering
- **b**: An ability to design and conduct experiments, as well as analyze and interpret data
- **c**: An ability to design a system, component, or process to meet a desired need
- **d**: An ability to function on multi-disciplinary teams
- **e**: An ability to identify, formulate, and solve engineering problems
- **f**: An understanding of professional and ethical responsibility
- **g**: An ability to communicate effectively
- **h**: Have a broad education necessary to understand the impact of engineering solutions in a global and societal context
- **i**: Recognition of the need for, and an ability to engage in, life-long learning
- **j**: Knowledge of contemporary issues
- **k**: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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

Course outcomes assessment matrix completed by: Ted Conway, Ph.D., Biomedical Engineering

Date: 8/24/2015
The Department of Biomedical Engineering requests the substitution of the newly created course, BME 3030: Biofluid Mechanics, for the current OCE 3030: Fluid Mechanics to be required in the Fall semester of the third year. The new course, BME 3030, develops equivalent fluid mechanics principles that are presented in the OCE 3030 course with applications in Biomedical Engineering.