Add 4000/6000 Course

Course Attributes

Subject Abbreviation:	ME-Mechanical Engineering	**Catalog Title:**	Cardiovascular Biomechanics ☐ **Additional Fee?**
Course Number:	4340 / 6340	**Transcript Title:**	Cardiovascular BiomechanicsJustification
Effective Term:	Fall 2018	**Cross-reference(s):**	BIOE 4340/6340
College:	Engr, Comp, and Appl Sci	**Grade Mode:**	Standard Letter
Department:	Mechanical Engineering		

Form

User ID: ekung **Name:** Ethan Kung
Date: 03/21/2018 **Number:** 38462

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 20
Year 2: 25
Year 3: 30
Year 4: 30

Evaluation

4000				6000			
A	85	-	100	**A**	85	-	100
B	70	-	85	**B**	70	-	85
C	55	-	70	**C**	55	-	70
D	50	-	55	**F**	<		55
F	<		50				

Weekly Assignments	15%	Weekly Assignments	10%
Creative Video Project	30%	Midterm Exam	20%
Midterm Exam	20%	Final Exam	30%
Final Exam	30%	Term Project	30%
Class Participation	5%	Presentation	10%

Catalog Description

This course provides the critical background knowledge for an engineer to thoroughly consider important aspects of the human cardiovascular system relevant to investigations of cardiovascular computational modeling, medical device design, and surgical treatment planning.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**

"C" or better in one of the following: ME 3050, ECE 3300, BIOE 3700, BIOE 3200. Or instructor consent.

Statement of need and justification based on assessment of student learning outcomes

Given the growing importance of biomedical technology and inter-disciplinary education, we would like to provide opportunities for our students to obtain training relating to the biological, physiological, and clinical aspects of biomechanical engineering. This course will equip students with the critical background knowledge to thoroughly consider important aspects of the human cardiovascular system relevant to computational modeling, medical device design, and surgical treatment planning. Additionally, the skills students obtain in utilizing medical data in engineering research and effectively conversing with clinicians will encourage interdisciplinary collaborations and expand the impact areas of the ME department.
If approved, this course will be cross-listed also in BIOE and accept those students. This will offer students from both departments an ideal environment for directinterdisciplinary interactions and experiences. The BIOE department has long been interested in establishing with us a cross-departmental minor in biomechanical
engineering. This course will serve as one of the cornerstones for the development of this program, as well as facilitate interdisciplinary collaboration and research.

Textbook(s)

Textbook (free on Canvas): "Cardiovascular Biomechanical Models", Ethan Kung, 2017

Supplemental Texts:
"Cardiovascular Physiology Concepts", Richard Klabunde, 2012
"Computational Bioengineering", Guigen Zhang et al., 2015

Learning Objectives

After completing the course, students will be able to--
1) demonstrate an overall understanding of biological and physiological interactions in the cardiovascular system, and predict system behaviours in response to hypothetical scenarios
2) identify relevant cardiovascular anatomy in medical imaging data (ie. magnetic resonance imaging, computed tomography, etc)
3) modify, design, and evaluate computational circuit models which mimic cardiovascular physiology
4) apply appropriate considerations of cardiovascular biology/physiology in medical device design
5) comprehend and synthesize primary literature in biomedical engineering and medicine

Topical Outline

1) Cardiovascular Anatomy Review (2)
2) Cardiac Physiology and Biomechanics Modeling (4)
3) Vascular Structure and Biomechanics (4)
4) Lumped-parameter Cardiovascular Models (6)
5) 1D Theory of Blood Flow (2)
6) Multi-scale Computational Modeling (3)
7) Blood Properties, Functions, and Behaviours (1)
8) Cardiac Electrophysiology (3)
9) Biomechanics in Cardiovascular Diseases (4)
10) Auto-Regulation and Exercise Conditions (3)
11) In-vitro Experimental Techniques (3)
12) Medical Imaging (3)
13) Presentations & Tests (7)

Duplication (if applicable)

None

Add course requirements for honors courses (if applicable)

NA

Add course requirements for 6000-level courses

Term Research Paper & Presentation: Each student will write a review paper on the current cutting-edge progress regarding a topic of your choice relating to the cardiovascular system. This project will involve graduate-level research, meaning that in order to be successful you must conduct an in-depth literature survey and develop good understanding of the current state-of-the-art. Each student will also deliver a 10-min presentation during the last week of classes to present their research as if giving a conference talk.

Syllabus

Upload File: SyllabusPDF-20180309101548.pdf

Chair, Department Curriculum Committee — Date: 3/14/18

Department Chair — Date: 3/19/18

Chair, College Curriculum Committee — Date: 3/15/18

College Dean — Date: 3/15/18

Director, Calhoun Honors College — Date: 5/19/18

Chair, Undergraduate Curriculum Committee — Date: 4/6/2018

Chair, Graduate Curriculum Committee — Date:

Provost — Date:

President — Date:

000034

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	2200
Effective Term:	Fall 2018
Title:	Evaluating Innovations
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201708

Brief Statement of Change Based on Assessment Results:
Students with ENGL 1030 are much more prepared to engage in the research and critical thinking assignments, and are therefore more successful in the class.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☑ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Prerequisite(s) / Corequisite(s)

From	None
To	Preq: ENGL 1030

Form

User ID:	jminor	**Name:**	John Minor
Date:	02/26/2018	**Number:**	38049

000035

Chair, Department Curriculum Committee — Date: 2/26/2018

Department Chair — Date: 3/5/18

Chair, College Curriculum Committee — Date: 3/16/18

College Dean — Date: 3/17/18

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

000036

Delete Major

Major Name: Serv, Sci, Mgt and Engr

Degree: Certificate **Effective Catalog Year:** 2018-2019

Additional Information:

Description:

Summary/Explanation

The Services, Science, Management and Engineering certificate has never had a student enrolled. It is unclear to the current department members what it required.

Form

User ID: ~~wbearde~~ mkurz **Name:** ~~William Bearden~~ Mary E. Kurz

Date: 12/15/2017 **Number:** 36615

Major - Curriculum & Course Change System https://uccban.app.clemson.edu/major.php?form=36615&action=dele...

2-22-18
Date
Chair, Department Curriculum Committee

2-26-18
Date
Department Chair

3/16/18
Date
Chair, College Curriculum Committee

3/17/18
Date
College Dean

Date
Director, Calhoun Honors College

4/6/2018
Date
Chair, Undergraduate Curriculum Committee

Date
Chair, Graduate Curriculum Committee

Date
Provost

Date
President

Add 4000/6000 Course

000037

Course Attributes

Subject Abbreviation:	IE-Industrial Engineering	**Catalog Title:**	Investigating Human Error in Complex Systems	☐ **Additional Fee?**
Course Number:	4510 / 6510	**Transcript Title:**	Investigating Human Error	Justification
Effective Term:	Fall 2018	**Cross-reference(s):**		
College:	Engr, Comp, and Appl Sci	**Grade Mode:**	Standard Letter	
Department:	Industrial Engineering			

Form

User ID: sriggs **Name:** Sara Riggs
Date: 03/15/2018 **Number:** 38236

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☑ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ○ Lab With Fee
- ◉ Lecture
- ○ Other
- ○ Seminar
- ○ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 40
Year 2: 40
Year 3: 40
Year 4: 40

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework and in-class activities (10%); Midterm (40%); Case study progress report (5%); Case study presentation (10%); Final exam case study report (35%; note: the final exam case study report is used in lieu of a final exam and would be due during final exam week. The case studies will be assigned to the undergraduate students whereas the research project topics will be determined by the graduate students with the guidance of the instructor)

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Homework and in-class activities (10%); Midterm (40%); Research project progress report (5%); Research project presentation (10%); Final exam research project report (35%; note: the final exam research project report is used in lieu of a final exam and would be due during final exam week). The research project would involve identifying a topic, completing a literature review, analyzing the data using meta-analytic techniques, and preparing a Human Factors journal style report

Catalog Description

Operator error is often the fall back explanation as to why failures occur, but in reality failures occur due to a combination of cognitive, technological, and organizational factors. This course will introduce students to look at complex system failures from a systems point of view.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**

Undergraduates: IE 2100 or IE 4880 or PSYC 4350 (C or better)
Graduates: IE 8000 or PSYC 8350

Statement of need and justification based on assessment of student learning outcomes

Industrial Engineering students will benefit from the proposed course in their available technical electives. IE students are required to have 3 technical electives in IE. This course expands the set of courses available to students with interest in human factors and emphasize looking at work domains from a systems point of view. This course has already been offered as a special topics course three times (Fall 2014; Spring 2016; Fall 2016).

Textbook(s)

None

Learning Objectives

Undergraduate

- Describe human error and human processing limitations and how they can explain erroneous actions involved in accidents
- Analyze interactions between operators, technologies, and organizations in the evolution of accidents
- Identify shortcomings of traditional accident analyses and compare them to contemporary approaches
- Develop recommendations for improvements of organization safety culture

Graduate

- Describe human error and human processing limitations and how they can explain erroneous actions involved in accidents
- Analyze interactions between operators, technologies, and organizations in the evolution of accidents
- Identify shortcomings of traditional accident analyses and compare them to contemporary approaches
- Develop recommendations for improvements of organization safety culture
- Comprehend, assess, and present research papers in human factors.
- Write up findings in a Human Factors journal styled report.

Topical Outline

Topic 1: Human perceptual and cognitive abilities and limitations
Course overview (2.5 hours)
Human cognition and perception (2.5 hours)
Decision making (2.5 hours)
The role of culture in complex systems (2.5 hours)
Human error classification (2.5 hours)

Topic 2: How design can induce human error
Automation (3.75 hours)

Topic 3: Accident models
Linear and latent failure models (2.5 hours)
Extensions needed to traditional models (2.5 hours)

Topic 4: Developing a proactive safety culture
Normal Accident Theory (2.5 hours)
High Reliability Theory (2.5 hours)
Resilience Engineering (2.5 hours)

Topic 5: Case studies (16.25 hours)
Columbia Space Shuttle
Deepwater Horizon
Three Mile Island
Therac 25
Air France
Exxon Valdez
Challenger

Duplication (if applicable)

We were unable to identify any courses at Clemson that is significant overlap with this course.

Add course requirements for 6000-level courses

The students will have to complete a research project on a selected topic related to the course material rather than focus on one accident to analyze at the 4000-level. The case studies will be assigned to the undergraduate students whereas the research project topics are to be determined by the graduate students with the guidance of the instructor. The research project will require students to complete a thorough literature review, identify a research gap, complete a meta-analysis on the selected literature, and write up the findings in a Human Factors journal styled report that will be graded like a paper that is submitted to the journal. The students as part of the 6000-level section will also have assigned times to meet one-on-one with the instructor outside of class to get further guidance and direction on the research project.

Syllabus

Upload File: IE 4510-6510 ABET Syllabus_rev 3-13-20180313160048.pdf

Description: IE 4510-6510 ABET Syllabus

Chair, Department Curriculum Committee — Date 3/15/18

Department Chair — Date 3/15/18

Christopher Kitchens 3/16/18

Chair, College Curriculum Committee — Date

College Dean — Date 3/17/18

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 4/6/2018

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

Add Undergraduate Course

Course Attributes

Subject Abbreviation:	IE-Industrial Engineering	**Catalog Title:**	Network Flows for IE Applications ☐	**Additional Fee?**
Course Number:	4530	**Transcript Title:**	Network Flows	Justification
Effective Term:	Fall 2018	**Cross-reference(s):**		
College:	Engr, Comp, and Appl Sci	**Grade Mode:**	Standard Letter	
Department:	Industrial Engineering			

Form

User ID: burak **Name:** Burak Eksioglu
Date: 03/13/2018 **Number:** 38244

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☑ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ○ Lab With Fee
- ◉ Lecture
- ○ Other
- ○ Seminar
- ○ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 15
Year 2: 20
Year 3: 20
Year 4: 20

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

There will be three projects, one mid-term exam and one final exam.

Projects – 60% (20% each)
Mid-term – 20%
Final – 20%

Catalog Description

Many of the logistics and supply chain optimization problems have a natural network structure. In this course, the following problems will be discussed: shortest path, maximum flow, minimum cost flow, and minimum spanning trees. These problems appear as sub-problems in many real world applications.

☑ Prerequisite(s) ☐ Corequisite(s)

(IE 2800 or MATH 4400) and (IE 4400 or MATH 3600 or MATH 3650 or CPSC 1110)

Statement of need and justification based on assessment of student learning outcomes

This course has already been offered twice as a special topics course (IE 4910). Given that IE students need to complete 9 hours of technical electives, addition of this course will provide more options for them to satisfy this requirement.

Textbook(s)

"Network Flows: Theory, Algorithms, and Applications," by R. Ahuja, T. Magnanti, and J. Orlin, Prentice Hall, 1993.

Learning Objectives

Students who are successful in this course will demonstrate:
1. the ability to apply appropriate network flow algorithms to solve tactical and operational problems related to distribution systems
2. the ability to identify shortest path, maximum flow, minimum cost flow, and minimum spanning tree problems as part of larger supply chain problems

Topical Outline

Introduction, Network Notation, Data Structures (3)
Algorithm Design and Analysis (3)
Shortest Paths (9)
Maximum Flows (9)

Minimum Cost Flows (9)
Minimum Spanning Trees (9)
Testing (3)
Total = (45 lecture hours)

Syllabus

Upload File: IE 4530 ABET Syllabus 2017-20180307131659.docx

Chair, Department Curriculum Committee — 3/13/18 Date

Department Chair — 3/13/18 Date

Chair, College Curriculum Committee — 3/16/18 Date

College Dean — 3/17/18 Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date