Office of the Registrar
FORM 40 REV. 11/09

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

Print Form

EFD #20-10

DEPARTMENT Biomedical Engineering

EFFECTIVE SESSION ~~Spring~~ Summer 2011

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [X] 1. New course with supporting documents
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes (department head signature only)
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered (department head signature only)
- [ ] 12. Transfer from one department to another

PROPOSED:		EXISTING:	
Subject Abbreviation	BME	Subject Abbreviation	
Course Number	25600	Course Number	
Long Title	Physiological Modeling in Human Health		
Short Title	Physiological Modeling		

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [ ] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs ____ (Check One) To [ ] Or [ ] Maximum Cr. Hrs. ____
3. Equivalent Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ] Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6. Registration Approval Type: Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

ScheduleType	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	3	16	
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

2011 APR -4 AM 10:21
OFFICE OF THE REGISTRAR RECEIVED

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Major Restriction: BME Only. Prerequisites: BIOL 23000 and CS 15900 and (PHYS 24100 or PHYS 27200). Concurrent Prerequisites: MA 26200 or MA 26600. Introduction to the physiology and medicine underlying practical problems in biomedical engineering, especially with respect to medical device development. Engineering skills taught and practiced within the context of human disease, injury, and illness on extended problem sets which include mathematical modeling and problem solving with appropriate documentation. Main physiological systems of focus are cardiovascular, pulmonary, and renal, and common afflictions thereof.

*COURSE LEARNING OUTCOMES:
1. Students will understand the physiology and medicine underlying practical problems in biomedical engineering, especially with respect to medical device development.
2. Students will understand the process of mathematical modeling of human anatomy and physiology, including technical description of objectives, methods, results, and conclusions from modeling exercises.

Calumet Department Head	Date	Calumet School Dean	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date
North Central Department Head	Date	North Central Chancellor	Date
George R. Wodicka 2/9/11		Jen Reed - PhD 3-31-11	
West Lafayette Department Head	Date	West Lafayette College/School Dean	Date

Sandra Rodgers 4/8/11
West Lafayette Registrar Date

OFFICE OF THE REGISTRAR

4/8/11

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North Central Department Head	Date	North Central Chancellor	Date
George R. Wodicka	2/9/11	Jeri Reed-Pfahler	3-31-11
West Lafayette Department Head	Date	West Lafayette College/School Dean	Date

West Lafayette Registrar Date

OFFICE OF THE REGISTRAR

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Engineering Faculty Document No. 20-10

January 26, 2011

TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Biomedical Engineering

RE: New Undergraduate Course, BME 25600, Physiological Modeling in Human Health

The Faculty of the School of Biomedical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

BME 25600 Physiological Modeling in Human Health
Term offered: Spring, Lecture 3, Cr. 3
Restriction: Must be enrolled in the School of Biomedical Engineering (BME)
Prerequisites: BIOL 23000 and CS 15900 and (PHYS 24100 or PHYS 27200)
Concurrent Prerequisites: MA 26200 or MA 26600

Description: Introduction to the physiology and medicine underlying practical problems in biomedical engineering, especially with respect to medical device development. Engineering skills taught and practiced within the context of human disease, injury, and illness on extended problem sets which include mathematical modeling and problem solving with appropriate documentation. Main physiological systems of focus are cardiovascular, pulmonary, and renal, and common afflictions thereof.

Reason: This course teaches physiology and introduces modeling as a problem solving tool within the context of current medical device and treatment challenges. This course will become a required course for the undergraduate curriculum in the Weldon School of Biomedical Engineering (BME) beginning Fall 2011 (see EFD 28-11). We feel it addresses a current weakness within the currently approved BME curriculum. This course will serve as a cornerstone on physiology supporting our overall biomedical engineering curriculum. Other organ systems, especially neuro-musculo-skeletal systems are dealt with elsewhere in the BME curriculum, including BME 204, Biomechanics of Hard and Soft Tissues, and BME 301, Bioelectricity. Currently there are no existing competing courses at Purdue that address this topic.

The course has been taught 3 times previously as an experimental course and has been a recommended part of the curriculum for all BME sophomores. The course evaluations for this course have been overwhelmingly positive.

George R. Wodicka

George R. Wodicka, Professor and Head
Weldon School of Biomedical Engineering

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #13

Date 3/9/2011

Chairman ECC R. Cipra

BME 25600 Physiological Modeling in Human Health
(Offered as temporary course BME 29500 Human Physiology for Biomedical Engineers)

Instructors: Charles F. Babbs, MD, PhD and Willis A. Tacker, MD, PhD

Level: Undergraduate - Second semester sophomore

Credit: 3

Class: Typically meets 3 times per week for 16 weeks for 50 minutes.

Course Objectives:
(1) Students will understand the physiology and medicine underlying practical problems in biomedical engineering, especially with respect to medical device development
(2) Students will understand the process of mathematical modeling of human anatomy and physiology, including technical description of objectives, methods, results, and conclusions from modeling exercises
(3) To put more biology and medicine into the biomedical engineering curriculum.

Course climate:
"Show up on time. Do your best." – Gene Keady
(If you prefer to sleep or read newspapers, do not come to class.)
Respectful feedback is welcomed.

Course requirements and assignments:
- Lectures and whole class discussion
- Reading and Web study
- Problem sets (due 1 week prior to exams, grade penalty for lateness or sloppiness)
- Exams (3 unit examinations plus one final)

Textbooks: Boron WF and Boulpaep EL, Medical Physiology, Elsevier Sanders, 2005.
National Library of Medicine medical encyclopedia and dictionary online:
www.nlm.nih.gov/medlineplus/encyclopedia
www.nlm.nih.gov/medlineplus/mplusdictionary

Reading assignments: Distributed in class.

Problem set work groups:
- Modified random assignment of group members (see handouts)
- Practice "teaming"
- Solutions, not answers required (see style guide)
- All group members must sign off on solutions
- Single group grade for all members on problem sets
- Group studying for exams is encouraged

Group dynamics: try hard to contribute equally and to resolve differences. Talk with staff if major problems arise. Encourage more quiet or shy members to contribute.

Happiness is keeping up and not procrastinating or cramming.

Grade composition (subject to change with notice):

- 3 closed-book exams, 50%
- Problem sets, 30%
- Comprehensive final closed-book exam 20%

Calendar for Spring 2009

Date	Instructor	Topic
Mon Jan 12	Babbs & Staff	Course introduction and overview of body systems
Wed Jan 14	Tacker	Vascular anatomy and composition **7:00 – 8:00 p.m. Advance help session (optional)**
Fri Jan 16	Tacker	Vascular anatomy and composition
Mon Jan 19		MLK
Wed Jan 21	Babbs	Atherosclerosis
Fri Jan 23	Babbs	Atherosclerosis and stents
Mon Jan 26	Babbs	Hemostasis and anticoagulants **Problem set #1 due, in which students develop geometric and algebraic models to characterize properties of the vascular system, oxygen delivery during CPR, shock strength for heart defibrillation, or finger pulse amplitude.**
Wed Jan 28	Babbs	Hemostasis and anticoagulants
Fri Jan 30	Babbs	Renovascular disease and stents
Mon Feb 2	Babbs	Renovascular disease
Wed Feb 4	Babbs	Restenosis after angioplasty
Fri Feb 6	Babbs	Restenosis after angioplasty
Mon Feb 9	Staff	Exam 1
Wed Feb 11	Tacker	Aneurysms
Fri Feb 13	Tacker	Aneurysms and endovascular devices
Mon Feb 16	Babbs	The heart as a pump
Wed Feb 18	Babbs	The heart as a pump
Fri Feb 20	Babbs	Congestive heart failure
Mon Feb 23	Tacker	Myocardial ischemia and infarction **Problem set #2 due, in which students solve a second order ordinary differential equations describe the resonant frequency of the second heart sound as a function of aortic pressure, oscillations of blood columns in the aorta, or novel resuscitation techniques.**

Calendar for Spring 2009 (cont.)

Wed Feb 25	Tacker	Myocardial ischemia and infarction
Fri Feb 27	Tacker	Peripheral vascular disease
Mon Mar 2	Tacker	Peripheral vascular disease and devices
Wed Mar 4	Babbs	Adult onset diabetes pathophysiology
Fri Mar 6	Babbs	Adult onset diabetes treatment options
Mon Mar 9	Staff	Exam 2
Wed Mar 11	Babbs	Stroke I
Fri Mar 13	Babbs	Stroke interventions
Mon Mar 16		*Spring break*
Wed Mar 18		*Spring break*
Fri Mar 20		*Spring break*
Mon Mar 23	Babbs	Carotid artery disease and distal protection devices
Wed Mar 25	Tacker	Aortic dissections
Fri Mar 27	Tacker	Skin, burns, barriers, and grafts
Mon Mar 30	Babbs	Shock I **Problem set #3 due, in which students develop systems of partial linear differential equations to create a multi-compartment models of the circulatory system in to test the effectiveness of a new forms of CPR, represent glucose and insulin kinetics, or describe the performance of a novel left ventricular assist device or an exercise responsive pacemaker.**
Wed Apr 1	Babbs	Shock II
Fri Apr 3	Babbs	Ventricular assist devices
Mon Apr 6	Babbs	Ventricular assist devices
Wed Apr 8	Staff	Exam 3
Fri April 10	Hiles	Tissue engineering
Mon April 13	Babbs	Pulmonary physiology Part I
Wed Apr 15	Babbs	Pulmonary physiology Part II
Fri Apr 17	Babbs	Kidney and urinary tract Part I
Mon Apr 20	Babbs	Kidney and urinary tract Part II
Wed Apr 22	Babbs	Kidney and urinary tract pathology Part III
Fri Apr 24	Babbs	Renal failure and dialysis
Mon Apr 27	Tacker	Benign prostatic hyperplasia: diagnosis and imaging
Wed Apr 29	Tacker	Benign prostatic hyperplasia: therapeutic systems
Fri May 1	Tacker	Dental and GI **Problem set #4 due, in which students create finite element models of the arm to optimize design of a blood pressure cuff for accurate readings or of the brain to optimize performance of electrodes for deep brain stimulation and solve the models using simulated annealing.**
Final Exam	Staff	**TBA**