Office of the Registrar
FORM 40 REV. 7/05

PURDUE UNIVERSITY
REQUEST FOR ADDITION, DELETION, OR REVISION OF A COURSE

Print Form

5-06

DEPARTMENT: Biomedical Engineering

EFFECTIVE SESSION: Fall 2007

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

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

PROPOSED:		EXISTING:	
Subject Abbreviation	BME	Subject Abbreviation	BME
Course Number	305	Course Number	305

Long Title: Bioinstrumentation Circuit and Measurement Principles

Short Title: Bioinstrumentation Lab

Abbreviated title will be entered by the Office of the Registrar if omitted. (22 CHARACTERS ONLY)

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

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

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 2
2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs
3. Equivalent Credit: Yes [ ] No [ ]
4. Thesis 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. Designator Required [ ]
6. Special Fees [ ]

7. Registration Approval Type
Department [ ] Instructor [ ]
8. Variable Title [ ]
9. Remedial [ ]
10. Honors [ ]
11. Full Time Privilege [ ]
12. Off Campus Experience [ ]

Instructional Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated	Delivery Method (Asyn. Or Syn)	Delivery Medium(Audio,Internet, Live,Text-Based, Video)
Lecture	50	1	16			
Recitation						
Presentation						
Laboratory	~~2 hr 50~~ 150 min	1	16	100	Syn	Live
Lab Prep						
Studio						
Distance						
Clinic						
Experiential						
Research						
Ind. Study						
Pract/Observ						

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES):

Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the mammalian nervous system and other excitable tissues are demonstrated. Fundamental circuit elements and concepts include resistance, capacitance, inductance, op-amps, impedance, voltage, current, power, and frequency. Fundamental analog measurement concepts include adequate bandwidth and amplitude and phase linearity. An integrative two-week design project addresses the practical aspects of quantitative physiological measurements. Prerequisites are Phys 241, MA 266, or equivalents. Co-requisite is BME 301.

Calumet Undergrad Curriculum Committee	Date	Calumet Department Head	Date	Calumet School Dean	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
				Michael J. Stuart	2/8/07
Indianapolis Department Head	Date	Indianapolis School Dean	Date	Undergrad Curriculum Committee	Date
North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
Gary R. Wodicka	2/7/07				
West Lafayette Department Head	Date	West Lafayette College/School Dean	Date	Graduate Council Secretary	Date
				Sandra K. Shaffer	2/20/07
Graduate Council Area Committee Chair	Date	Graduate Dean	Date	West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

2/23/07


RECEIVED
MAR 2 2007
ENGINEERING

Engineering Faculty Document No. 05-06
August 5, 2006

To: Faculty of the College of Engineering

From: Faculty of Weldon School of Biomedical Engineering

Subject: Change in Existing Course Title and Description - BME 305 Bioinstrumentation Laboratory

The Faculty of the Weldon School of Biomedical Engineering has approved the change in title and description of the course listed below. This action is now submitted to the Engineering Faculty with recommendation for approval.

From:

BME 305 Bioinstrumentation Laboratory Sem. 1. Class 1, Lab 3, cr.2.
Prerequisites: PHYS 241, MA 266, or equivalents
Co-requisites: BME 301

Course Description: Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the mammalian nervous system and other excitable tissues are demonstrated. Fundamental circuit elements and concepts include resistance, capacitance, inductance, op-amps, impedance, voltage, current, power, and frequency. Integrative design project addresses instrumentation amplifiers and filtering for obtaining an ECG, emphasizing the practical aspects of quantitative physiological measurements.

To:

BME 305 Bioinstrumentation Circuit and Measurement Principles Sem. 1. Class 1, Lab 3, cr.2.
Prerequisites: PHYS 241, MA 266, or equivalents
Co-requisites: BME 301

Course Description: Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the mammalian nervous system and other excitable tissues are demonstrated. Fundamental circuit elements and concepts include resistance, capacitance, inductance, op-amps, impedance, voltage, current, power, and frequency. Fundamental analog measurement concepts include adequate bandwidth and amplitude and phase linearity. An integrative two-week design project addresses the practical aspects of quantitative physiological measurements.

Reasons: The revised course title is more descriptive of the subject matter taught in the course. The course description was modified to more accurately describe the culminating two-week design project and specify the measurement principles taught in the course. Upon initial implementation of this course, the ECG design project became Lab 13 and the subject of the two-week design project in Labs 14 and 15 changes from semester to semester.

Requested by:_____ Date:_____
Title Head of Biomedical Engineering

BME 305 – Bioinstrumentation Circuit and Measurement Principles (2 credits)
Required Core Course

Catalog Description: Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the mammalian nervous system and other excitable tissues are demonstrated. Fundamental circuit elements and concepts include resistance, capacitance, inductance, op-amps, impedance, voltage, current, power, and frequency. Fundamental analog measurement concepts include adequate bandwidth and amplitude and phase linearity. Integrative design project addresses emphasizes the practical aspects of quantitative physiological measurements.

Pre-requisites: PHYS 241, MA 266

Co-requisites: BME 301

Course Schedule: Lecture meets once each week
Lab meets for 150 min each week

Textbook: William H. Hayt Jr., Jack E. Kemmerly, Steven M. Durbin
Engineering Circuit Analysis, 7th Edition
McGraw Hill

Lab Manual: Fundamental Techniques of Bioinstrumentation

Required Materials: Safety goggles
Laboratory Notebook with duplicate pages
Each group must purchase one each of:
- BB-1 Basic Breadboard kit
- CK-1 General Purpose Component Kit
- TK-1 Tool Kit
- Hook-up wire

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE COMMITTEE ON
FACULTY RELATIONS

CFR Minutes 5

Date 10-20-06

Chairman CFR

Topics Covered:

WEEK	LAB ACTIVITY*	SUPPORTING LECTURE TOPICS
1	Fundamentals of electrical measurements and properties	Basic Concepts and Ohm's Law
2	Resistive models of biological systems	KCL, KVL, Nodal Analysis
3	Generation and measurement of bioelectric signals	Linearity, Thevenin equivalent
4	Time varying bioelectric signals and response times of measurement devices	Capacitors, Inductors, step response for RC and RL circuits
5	Bioelectric Amplifiers	Operational Amplifiers
6	**LAB PRACTICAL**	Sinusoids and sinusoidal steady state response
7	Frequency response of RC models of biological systems	Phasors with circuit analysis
8	Frequency content of physiological signals and bandwidth of measurement devices	*October Break – No class*
9	The RLC Model of the Cochlea	**EXAM** RLC circuits
10	Recording and stimulating electrodes	Electrode RC models
11	Stimulation of nervous tissue	Transfer Functions and Convolution
12	Action potential propagation in nervous and muscle tissue	Laplace Transforms
13	Recording of physiological signals	Advanced Op-Amp Circuits
14	Design project	Circuit analysis in s-domain
15	Design project	Criteria for faithful reproduction of physiological signals
16		**FINAL EXAM**

Professional Component:
This course provides two credits towards engineering topics required of biomedical engineers for graduation.

Course Outcomes: (*Relevant program outcomes are indicated in parentheses*)

Upon completion of the course each student will be able to:

1. Employ circuit models and analysis techniques to understand, interpret, and predict bioelectric system behaviors. (BME1, BME2)
2. Conduct, observe, and document laboratory experiments to test hypotheses and predictions. (BME4, BME5)
3. Design bioinstrumentation systems with adequate bandwidth, amplitude linearity, and phase linearity to faithfully record a physiological event. (BME3)
4. Recognize the economics, the ethical considerations, and regulatory and societal environment integral to the design of biomedical bioinstrumentation. (BME8, BME9)