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

DEPARTMENT Biomedical Engineering
EFFECTIVE SESSION Fall 2011

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

- New course with supporting documents
- Existing course offered at another campus
- Expiration of a course
- Change in course number
- Change in course title
- Change in course credit/credit

PROPOSED:
Subject Abbreviation: BME
Course Number: 30500
Long Title: Bioinstrumentation Circuit and Measurement Principles
Short Title: Bioinstrumentation Lab

EXISTING:
Subject Abbreviation: BME
Course Number: 30500

TERMS OFFERED: Check All That Apply:
- Summer
- Fall
- Spring

CAMPUS(ES) INVOLVED:
- Calumet
- Cont Ed
- Ft. Wayne
- Tech Statewide
- Indianapolis
- W. Lafayette

Abbreviated title will be entered by the Office of the Registrar if omitted. (20 CHARACTERS ONLY)

<table>
<thead>
<tr>
<th>CREDIT TYPE</th>
<th>COURSE ATTRIBUTES: Check All That Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fixed Credit: Cr. Hrs.</td>
<td>1. Pass/Not Pass Only</td>
</tr>
<tr>
<td>2. Variable Credit Range:</td>
<td>2. Satisfactory/Unsatisfactory Only</td>
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<tr>
<td>Minimum Cr. Hrs.</td>
<td>3. Repeatable</td>
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<tr>
<td>(Check One) To</td>
<td>4. Credit by Examination</td>
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<tr>
<td>Maximum Cr. Hrs.</td>
<td>5. Special Fees</td>
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<tr>
<td>Equivalent Credit: Yes</td>
<td>6. Registration Approval Type</td>
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<tr>
<td>No</td>
<td>Instructor</td>
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<td>No</td>
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Schedule Type:
| Lecture | 75 | Minutes | Per Week |
| Presentation | 1 | Meetings | Per Week |
| Laboratory | 200 | 16 | Weeks |
| Lab Prep | | | |
| Studio | | | |
| Distance | | | |
| Clinic | | | |
| Experiential | | | |
| Research | | | |
| Ind. Study | | | |
| Pract/Obser | | | |

% of Credit Allocated: 50

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Major Restriction: BME Only. Prerequisites: (PHYS 24100 or PHYS 27200) and (MA 26600 or MA 26200) and BME 20600. Concurrent prerequisite: BME 30100. Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the 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 measurement.

*COURSE LEARNING OUTCOMES:
1. Employ circuit models and analysis techniques to understand, interpret, and predict bioelectric system behaviors.
2. Conduct, observe, and document laboratory experiments to test hypotheses and predictions.
3. Design bioinstrumentation systems with adequate bandwidth, amplitude linearity, and phase linearity to faithfully record a physiological event.
4. Recognize the economics, ethical considerations, and regulatory and societal environment integral to the design of biomedical bioinstrumentation.

Calumet Department Head: Date
Calumet School Dean: Date

Ft. Wayne Department Head: Date
Ft. Wayne School Dean: Date

Indianapolis Department Head: Date
Indianapolis School Dean: Date

North Central Department Head: Date
North Central Chancellor: Date

W. Lafayette Department Head: Date
W. Lafayette College/School Dean: Date
W. Lafayette Registrar: Date

OFFICE OF THE REGISTRAR
### Proposed:

**Subject Abbreviation:** BME  
**Course Number:** 30500  
**Long Title:** Bioinstrumentation Circuit and Measurement Principles  
**Short Title:** Bioinstrumentation Lab

### Existing:

**Subject Abbreviation:** BME  
**Course Number:** 30500  
**Long Title:** Bioinstrumentation Circuit and Measurement Principles  
**Short Title:** Bioinstrumentation Lab

### Credit Type

| 1. Fixed Credit: C. Hrs. | 3 |
| 2. Variable Credit Range: Minimum C. Hrs. | (Check One) | To | Or |
| 3. Equivalent Credit: Yes | No |

### Schedule Type

| Lecture | 75 | Meetings Per Week | 1 | Weeks Offered | 16 | % of Credit Allocated | 50 |
| Presentation | | | | | | | |
| Laboratory | 200 | 16 | | 50 |
| Lab Prep | | | | |
| Studio | | | | |
| Distance | | | | |
| Clinic | | | | |
| Experiential | | | | |
| Research | | | | |
| Ind. Study | | | | |
| Pract/Observ | | | | |

### Course Attributes

1. Pass/No Pass Only  
2. Satisfactory/Unsatisfactory Only  
3. Repeatable  
4. Credit by Examination  
5. Special Fees  
6. Registration Approval Type  
7. Variable Title  
8. Honors  
9. Full Time Privilege  
10. Off Campus Experience

### Course Description

**Major Restriction:** BME Only. Prerequisites: PHYS 24100 or PHYS 27200 and MA 26600 or MA 26200 and BME 20600. Concurrent prerequisite: BME 30100. Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the 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 acquiring physiological measurements.

**Course Learning Outcomes:**

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

### Signatures

- **Purdue University Office of the Registrar**
- **Effective Session:** Fall 2011
- **Department:** Biomedical Engineering
- **Course Number:** 30500
- **Long Title:** Bioinstrumentation Circuit and Measurement Principles
- **Short Title:** Bioinstrumentation Lab
- **Credit Type:** 3
- **Schedule Type:** Lecture 75, Laboratory 200
- **Meeting Per Week:** 1
- **Weeks Offered:** 16
- **% of Credit Allocated:** 50
- **Course Attributes:** Pass/No Pass Only, Credit by Examination, Special Fees
- **Major Restriction:** BME Only
- **Prerequisites:** PHYS 24100 or PHYS 27200, MA 26600 or MA 26200, BME 20600, Concurrent prerequisite: BME 30100
- **Course Description:** Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the 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 acquiring physiological measurements.
- **Course Learning Outcomes:** Employ circuit models and analysis techniques to understand, interpret, and predict bioelectric system behaviors. Conduct, observe, and document laboratory experiments to test hypotheses and predictions. Design bioinstrumentation systems with adequate bandwidth, amplitude linearity, and phase linearity to faithfully record a physiological event. Recognize the economics, the ethical considerations, and regulatory and societal environment integral to the design of biomedical bioinstrumentation.
- **Signatures:**
  - **Calumet Department Head:** Date
  - **Calumet School Dean:** Date
  - **Fort Wayne Department Head:** Date
  - **Fort Wayne School Dean:** Date
  - **Indianapolis Department Head:** Date
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  - **North Central Department Head:** Date
  - **North Central School Dean:** Date
  - **West Lafayette Department Head:** Date
  - **West Lafayette School Dean:** Date
  - **West Lafayette Registrar:** Date

**Office of the Registrar**

**Print Form**

**PREPARED FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE (10000-40000 LEVEL)**

**Effective Session:** Fall 2011

**Department:** Biomedical Engineering

**Course Number:** 30500

**Long Title:** Bioinstrumentation Circuit and Measurement Principles

**Short Title:** Bioinstrumentation Lab

**Credit Type:**

| 1. Fixed Credit: C. Hrs. | 3 |
| 2. Variable Credit Range: Minimum C. Hrs. | (Check One) | To | Or |
| 3. Equivalent Credit: Yes | No |

**Schedule Type:** Lecture 75, Laboratory 200

**Meeting Per Week:** 1

**Weeks Offered:** 16

**% of Credit Allocated:** 50

**Course Attributes:** Pass/No Pass Only, Credit by Examination, Special Fees

**Major Restriction:** BME Only

**Prerequisites:** PHYS 24100 or PHYS 27200, MA 26600 or MA 26200, BME 20600, Concurrent prerequisite: BME 30100

**Course Description:** Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the 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 acquiring physiological measurements.

**Course Learning Outcomes:**

1. Employ circuit models and analysis techniques to understand, interpret, and predict bioelectric system behaviors.  
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- **North Central Department Head:** Date
- **North Central School Dean:** Date
- **West Lafayette Department Head:** Date
- **West Lafayette School Dean:** Date
- **West Lafayette Registrar:** Date

**Office of the Registrar**
TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Biomedical Engineering

RE: Changes to existing Undergraduate Course, BME 30500 Bioinstrumentation Circuit and Measurement Principles, description, number of credits and requisites.

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

**From:** BME 30500 Bioinstrumentation Circuit and Measurement Principles
- Term offered: Fall, Lecture 1, Lab 3, Cr. 2
- Prerequisites: PHYS 24100, MA 26600, or equivalents
- Co-requisite: BME 30100

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.

**To:** BME 30500 Bioinstrumentation Circuit and Measurement Principles
- Term offered: Fall, Lecture 1, Lab 3, Cr. 3
- Restriction: Must be enrolled in the School of Biomedical Engineering (BME)
- Prerequisites: (PHYS 24100 or PHYS 27200) and (MA 26600 or MA 26200) and BME 20600
- Concurrent prerequisite: BME 30100

Description: Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the 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.
Reason: The course credit hours have been changed to reflect the actual workload; no change in content has been made (see EFD28-11 for balancing of credit load). The prerequisites have been revised to specify equivalencies. The preceding BME undergraduate lab has also been added as a prerequisite. A restriction has been employed since this is a limited space laboratory course. “Mammalian” was removed from the description so as not to limit ourselves to one living system.

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