BME-650: Biomedical Measurement and Instrumentation Spring 2006

Instructor
Ellis Meng
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DRB 159
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Office Hours
by appointment

TA
Rachel Bitton
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Lectures
W 8-10:50am
OHE-136

TA Office Hours
2-4p, DRB 131

Course Website
See blackboard

Course Description from Catalog
Design of measurement systems and biomedical instrumentation; architecture of electronic instruments used to measure physiological parameters, analysis of major process functions integrated in these instruments. Open to M.S., Medical Device and Diagnostic Engineering and biomedical engineering Ph.D. students only.

Course Prerequisites
BME 513 or instructor approval.

Prerequisite knowledge and/or Skills
Basic knowledge of electronics, physics, and chemistry.

Textbook

Course Reserves
(Available for 2 hr check-out in Leavey Library)

Course Objectives
This course introduces students to the design of measurement systems and biomedical instrumentation. The course provides an overview of the architecture of electronic instruments used to measure physiological parameters and an in-depth analysis of the major functions integrated in these instruments.

After completing this course, students should be able to:
- Describe the critical measures needed to evaluate biological systems
- Describe the architecture of biomedical instruments and the principle of operation of sensors commonly used for measuring physiological variables
- Analyze biomedical measurement applications in selected organ systems (neuromuscular, cardiovascular, and pulmonary) and analytical laboratory devices (blood lab. machines)

Class Format and Grading Policy
There will be one lecture per week on Wednesday from 8-10:50am in OHE-136.
The final grade will be based on the following:
(1) Homework (40 %)
(2) Midterm (30 %)
(3) Final (30 %)
**Homework Policy**

Students are expected to do their own homework assignments and should completely understand everything that they submit as their own. It is anticipated and expected that students consult one another for clarification of concepts, advice, to compare homework solutions, etc. You may also use whatever materials you find on the web, in other texts, or other sources to assist in preparing your homework. You may not consult homework from previous offerings of BME 650 (in any form). Also, copying homework prepared by another student and plagiarizing are strictly prohibited. Violations of this policy will result in a score of 0 on the homework in question and possibly other sanctions as well. No late homework will be accepted (only exception is a valid family or medical excuse).

**Course Outline and Schedule**

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<th>Topics Covered</th>
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<th>HW Out</th>
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<td>Course Introduction</td>
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<td>Operational Amplifiers Instrumentation Amplifiers</td>
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<td>Origin of Biopotentials Human Biopotentials</td>
<td>Ch. 4 &amp; 5</td>
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<td>Signals and Noise Biopotential Electrodes</td>
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<td>Other Electrodes</td>
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<td>Light and Spectrophotometry</td>
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<td>Measurement of Liquid and Gas Flows</td>
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<td>Ch. 13</td>
<td>HW 10</td>
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<td>Review of Digital Electronic Devices Interfacing to Computers Digital Signal Processing</td>
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<td>HW 10</td>
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<td>Safety in Bioinstrumentation Final Review</td>
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<td>Final Exam 11a-1p</td>
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**Recommended Classes for Further Study in Medical Instrumentation**

- BME 302L Medical Electronics
- BME 425 Basics of Biomedical Imaging
- BME 523 Measurement and Processing of Biological Systems
- BME 525 Advanced Biomedical Imaging
- BME 620L Applied Electrophysiology
- AME 305 Mechanical Design
- AME 503 Advanced Mechanical Design

**Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to the TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. – 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.