BME-650: Biomedical Measurement and Instrumentation Spring 2008

Instructor (1st half)  
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Instructor (2nd half)  
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Office Hours: TBA

TA  
Samer Awad  
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Office Hours: 9:30-11:30a, DRB 131

Lectures  
MW 8-9:20 am  
OHE 136

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 recommended.

Prerequisite knowledge and/or Skills  
Basic knowledge of electronics, physics, and chemistry. Fundamental knowledge of basic electronic circuits is strictly required.

Textbook:  None, lecture notes only.

Recommended References: (Available for 2 hr check-out in Science and Engineering Library)  

Class Format and Grading Policy:  There will be one lecture per week on M and W from 8-9:20am in OHE 136. In addition, there will be a minimum of 2 mandatory attendance laboratory sessions to be held only on M in class. The final grade will be based on the following:  
(1)  Homework (40 %)  
   a. Includes mandatory attendance during lab exercises and presentations  
   b. Quiz will be graded “pass” or “fail”  
(2)  Exam 1 (30 %)  
(3)  Exam 2 (30 %)

Homework/Academic Integrity 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 (or exam) in question and filing of an academic misconduct report to the Office of Student Conduct. All students are expected to be familiar with and adhere to the USC standards of Academic Integrity (http://www.usc.edu/student-affairs/SJACS/docs/AcademicIntegrityOverview.pdf and http://www.usc.edu/student-affairs/SJACS/docs/GradIntegrity.pdf). No late homework will be accepted (only exception is a valid family or medical excuse).

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.
## Course Outline and Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>HW Out</th>
<th>HW Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/14,16/08</td>
<td>No class</td>
<td>Take-home quiz assigned</td>
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<tr>
<td>2</td>
<td>1/23/08</td>
<td>Course Introduction</td>
<td>Characteristics of Measurement Systems</td>
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<tr>
<td>3</td>
<td>1/28,30/08</td>
<td>Operational Amplifiers</td>
<td>Instrumentation Amplifiers</td>
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<tr>
<td>4</td>
<td>2/4,6/08</td>
<td>Signals and Noise</td>
<td>Filters</td>
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<tr>
<td>5</td>
<td>2/11,13/08</td>
<td>Lab – mandatory attendance (2/11)</td>
<td>Origin of Biopotentials</td>
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<tr>
<td>6</td>
<td>2/20/08</td>
<td>Human Biopotentials</td>
<td>Biopotential Electrodes</td>
</tr>
<tr>
<td>7</td>
<td>2/25,27/08</td>
<td>Lab – mandatory attendance (2/25)</td>
<td>- only if needed</td>
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<tr>
<td>8</td>
<td>3/3,5/08</td>
<td>Mechanical Transducers</td>
<td>Midterm Review</td>
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<tr>
<td>9</td>
<td>3/10,12/08</td>
<td>Exam 1, given in 2 parts</td>
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<td>10</td>
<td>3/18/08</td>
<td>Spring Break</td>
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<tr>
<td>11</td>
<td>3/24,26/08</td>
<td>Temperature Transducers</td>
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<td>12</td>
<td>3/31, 4/2/08</td>
<td>Light and Spectrophotometry</td>
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<td>13</td>
<td>4/7,9/08</td>
<td>Measurement of Liquid and Gas Flows</td>
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<td>14</td>
<td>4/14,16/08</td>
<td>Pressure, Motion, and Force Measurement</td>
<td>Analog Linearization</td>
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<td>16</td>
<td>4/28,30/08</td>
<td>Safety in Bioinstrumentation</td>
<td>Final Review</td>
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<tr>
<td>16, 5/12/08</td>
<td>Exam 2, 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