BME-650: Biomedical Measurement and Instrumentation Spring 2008

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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)
King, P., R. C. Fries. Design of Biomedical Devices and Systems, Marcel Dekker, 2003.
Normann, R.A. Principles of Bioinstrumentation, John Wiley & Sons, 1988.
Pallás-Areny, R., J. G. Webster. Sensors and Signal Conditioning, Wiley, 2000.
Togawa, T., T. Tamura, P.A. Oberg. Biomedical Transducers and Instruments, CRC Press, 1997.
Webster, J.G. Bioinstrumentation, Wiley, 2004.
Webster, J.G. Medical Instrumentation: Application and Design, 3rd ed., John Wiley & Sons, 1998.

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

	Topics Covered	HW Out	HW Due
Week 1 1/14,16/08	No class Take-home quiz assigned	Quiz	
Week 2 1/23/08	Course Introduction Characteristics of Measurement Systems		Quiz
Week 3 1/28,30/08	Operational Amplifiers Instrumentation Amplifiers	HW 1	
Week 4 2/4,6/08	Signals and Noise Filters	HW 2	HW 1
Week 5 2/11,13/08	Lab – mandatory attendance (2/11) Origin of Biopotentials	HW 3	HW 2
Week 6 2/20/08	Human Biopotentials Biopotential Electrodes	HW 4	HW 3
Week 7 2/25,27/08	Lab – mandatory attendance (2/25) *-only if needed* Other Electrodes	HW 5	HW 4
Week 8 3/3,5/08	Mechanical Transducers Midterm Review		HW 5
Week 9 3/10,12/08	Exam 1, given in 2 parts		
3/18/08	Spring Break		
Week 10 3/24,26/08	Temperature Transducers	HW 6	
Week 11 3/31, 4/2/08	Light and Spectrophotometry	HW 7	HW 6
Week 12 4/7,9/08	Measurement of Liquid and Gas Flows	HW 8	HW 7
Week 13 4/14,16/08	Pressure, Motion, and Force Measurement Analog Linearization	HW 9	HW 8
Week 14 4/21,23/08	Review of Digital Electronic Devices Interfacing to Computers Digital Signal Processing	HW 10	HW 9
Week 15 4/28,30/08	Safety in Bioinstrumentation Final Review		HW 10
16, 5/12/08	Exam 2, 11a-1p		

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