BME 405. BIOMEDICAL TRANSDUCERS AND INSTRUMENTATION
SPRING 2007

Instructor:
Prof. Marom Bikson, T-403B
bikson@ccny.cuny.edu
Class hours: Monday, Wensday 10:30-11:45
Office hours: Open / By appointment.
Students are required to check the class web-site at least weekly:
bme.engr.ccny.cuny.edu/faculty/mbikson/Courses/BMEInstrumentation/index.html

Textbook:
There is no required text-book for the course. Additional course material will be made available through class hand-outs and the class web-site. The course is based largely on class lectures/notes. Attendance of all classes is required and students are responsible for all material lectured on.

Text-books may be made available for short-term loan through the Department of Biomedical Engineering.

Students interested in purchasing a supplementary text-book may consider: “Medical Instrumentation, Application and Design”. John G. Webster, Editor. Wiley Text Books; 3rd edition

Schedule: (relevant Experimental Modules listed)

Jan 29, Jan 31: Introduction, Resistive Sensors
Introduction to course and instrumentation. Resistive sensors including thermistors Basic circuits for measuring resistance: Voltage dividers, Wheatstone bridge.

Feb 1: Intro to Experimental Methods. Circuit boards and components.
Feb 2/Feb 5 Experimental Module 1: Basic resistive sensor and circuits

Feb 5, Feb 7: Introduction to analog/digital signals and data-acquisition, analog gain

Feb 8: Intro to Lab-View
Feb 9/Feb 15: Experimental Module 2a: Basic Data Acquisition I
Feb 16/Feb 21 Experimental Module 2b: Data Acquisition II

Feb 14: Guest Lecture

Feb 21, Feb 26: Resistive Strain Gauges. Combined Temperature and Strain sensitivity.

Feb 22, March 1: Lecture Experimental Methods
Feb 23/Feb 26: Experimental Methods Module 3a: Strain-gauge I
Mar 2/Mar 5: Experimental Methods Module 3b: Stain-gauge II

Feb 28, March 5, March 7: Analog Signal Processing

March 8: Lecture Experimental Methods 4: Filter Design
March 9, 12: Experimental Methods Module 4: Filter Design

March 12, 14, 19, 21: Quantitative Sensing, Capacitive and Inductive Sensors

March 15: Lecture Experimental Methods: ECG
March 16, 19: Experimental Methods Module 5: ECG

March 26, 28, April 11, April 16: Electrodes / Chemical Sensors
Detection of bio-potentials, metal-solution interface, ion-selective (pH) electrodes. Glucose sensors. EEG Demo

(Spring Recess: April 2-April 10)

April 23, 25, 30, May 2: Non-invasive Sensors: Optical techniques, ultrasound

May 7: Digital Signal Processing: ‘in context’

May 9, 14, 16: Student Presentations / Demos Experimental Methods Module: EEG
Grading: Quizzes 10%
Homework / Projects 80%
Attendance / Participation 10%

Homework: Unless otherwise stated, homework is due at the beginning of the next class. No extensions will be given. Homework will not be accepted after the lecture begins. If you are tardy for class your homework will not be accepted. Homework may be handed in by another student or in Prof. Bikson’s mailbox before the start of class.

Collaboration with other students on homework is allowed. If you work with another student directly on a homework problem and receive or provide information directly related to a homework problem you must list the names of any collaborators on your homework. Failure to do so will be considered cheating. Students may be asked questions about handed in home-work during or after class.

Collaboration can include exchanging ideas on how to approach solving a problem or how to solve a specific step in a given problem. Collaboration does not allow direct copying of (even a portion) of another student’s work. You must derive all equations and run all numerical calculations yourself.

The penalty for a single cheating offense (on HW, quiz, or project) can be up to dismissal from the course. If you have any questions about allowed collaborations, ask.

Each homework will be given a ‘point’ value. Unless otherwise stated, a single homework is worth one point. In calculating your homework grade, each assignment will be weighted by its point value (i.e. a 3-point assignment counts as much as three 1-point assignments). The final homework/project will involve individual presentations to the class.

Quizzes: There may be a (surprise) quiz at the beginning of a class. A quiz will be based on material directly covered in previous lectures, homework (including a homework due the same day), or any assigned reading material. If you are late or absent you will receive a 0 on that quiz.

Projects: There will be both in-class group projects, which are limited to one class, and out-of-class projects which will be assigned 1 or more weeks in advance. In-class projects will count as 1 HW and you will receive a 0 if you are absent from that class. Our-of-class projects may be worth one or more homeworks.

Attendance: Because the course material is largely lecture (rather than text-book) based, students are discouraged from missing any classes. If a student cannot attend a lecture they are responsible for obtaining the lecture notes/homework assignments from another student. Homework may be handed in by another student or dropped at my office or mail-box before it is due. Students who are habitually disruptive (late arrival, leaving the class, talking, sleeping) will receive a 0 for Attendance/Participation in addition to any Quiz/HW 0’s.
You may use a computer to take notes. You may not use the internet for any purpose (including checking e-mail) during class – unless specifically given instructions by the professor.

Cell phones: If your phone rings during class you final grade may be reduced by as much as 5% each incident. If it is absolutely necessary to answer a call during class (e.g. an emergency), do so at a distance down the hallway. Do not send/check text messages.