New Jersey Institute of Technology
Department of Biomedical Engineering

BME 301 – Section H01 – Course Syllabus

Electrical Fundamentals of Biomedical Engineering - Fall 2007

Instructor:

Mesut SAHIN, PhD
Assistant Professor, Biomedical Engineering Department, NJIT
Fenster Hall, Room 617
Office Hours: The two hours that follow regular class time
(973) 596-5573 (office)
(862) 368-1450 (Cell)
E-Mail: sahin@njit.edu

Textbook:
Milton Gussow, Schaum's Outline of Theory and Problems of Basic Electricity, McGraw-Hill, ISBN: 0-07-025240-8.
Other References:

John G. Webster (Editor), Medical Instrumentation, Third Edition. John Wiley & Sons, Inc. New York, 1998. ISBN: 0-471-15368-0

Course Description:

Course lectures and laboratories will address important issues for biomedical engineers at the introductory level; covering the origins of bio-electric signals and the instrumentation involved in collection of biopotentials from the electrodes to processing of the signals on the computer. Some other topics included are the transducers/sensors and modern engineering software used in bio-instrumentation. Laboratory work will provide hands-on experience in all of these topics. The course will also address practical issues in design of medical devices such as noise, resolution, linearity, and saturation. This course is offered in Studio format that involves the integration of lectures and labs into one highly participatory structure.

Studio format involves the integration of lectures and labs into one highly participatory structure. All of our classes will be held in this Studio. Unlike traditional courses, there will be a lecture by the instructor followed by small-group activities that will be highly interactive and open-ended. You and your group members will be free to explore the concept that was introduced and go beyond what would normally be a standard laboratory experience. The session will close with a group discussion of the explorations. It is essential that you participate in the Studio sessions since the exams will draw heavily from the studio sessions as well.

Homework and **Studio Reports** must be returned on the date that is due. There will be a penalty for a late submissions. Handwritten homework is acceptable, however, should be written legibly!!!

Studio Reports should be **typed** and submitted **individually**. Studio sessions will be conducted in 2 or 3 person groups. A template will be provided for the studio reports.

Final exam is comprehensive. There will be two more exams during the semester.

Attendance: You need to come to each class to keep up with the material since this is a studio style class. ***There will be no make up sessions for the missed studios.***

Academic Dishonesty: In accordance with the Academic Honor Code, an evidence of cheating may result in an "F" grade in this course.

Honor Code Violations/Disruptive Behavior: NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. ***No eating or drinking is allowed in class. Cellular phones must be turned off during the class hours.***

Finally, the best way to reach the instructor for any reason outside the office hours is via e-mail. Also, check your email every day for messages, homework assignments, etc. from the instructor as a part of this class.

Class Grading:

Exam #1:	10%
Exam #2:	15%
Final:	25%
Lab Reports:	25%
Homeworks:	25%

Course Objectives:

In general terms this course is designed to accomplish the following:

1. Understand basic electric circuits and their usage for amplification and filtering of biological signals
2. Learn the principles of interfacing with the living systems for collection of biological signals
3. Learn the origins of biopotentials and their characteristics in time and frequency domain
4. Apply modern engineering tools to collect, analyze and interpret biological signals
5. Work in groups and develop written communication skills

Learning Outcomes:

By the end of the semester you will have acquired the following knowledge and skill set:

1. Developed a firm understanding of passive circuits with resistors and capacitors; became familiar with standard laboratory equipment such as the oscilloscope, amplifier, signal generator, multimeter, etc.
2. Learned the principles of operation for the electrodes and various kinds of sensors to acquire biopotentials and other biomedical signals.
3. Learned the origin of biopotentials and their characteristics in time and frequency domain.
4. Developed introductory level knowledge of processing biopotentials both in the analog and digital domain; attained basic skills to collect biomedical signals into a computer using LabView and analyzed them in Matlab and other software.