EE 5340/EE7340
Biomedical Instrumentation
Fall 2004

Course Description: Application of engineering principles to solving problems encountered in medicine and biomedical research. Topics include transducer principles, electrophysiology, and cardiopulmonary measurement systems. EE 7340 students are required to expand on the lab project.

Time and Place: MW 1:00-1:50, Junkins 112 (Lecture)
F 1:00-2:20, Junkins 215 (Lab)

Instructor: Carlos E. Davila, Junkins 341

Text: J.G. Webster, *Medical Instrumentation: Application and Design*, Houghton Mifflin, 1992

Topics:

I. Introduction: A. History of Biomedical Engineering B. Definition of Biomedical Engineering C. General Instrumentation System D. Generalized Static and Dynamic Characteristics

II. Basic Transducer Principles: A. Displacement Measurements B. Resistive Transducers C. Bridge Circuits D. Inductive Transducers E. Capacitive Transducers F. Piezoelectric Transducers G. Temperature Measurement

III. Electrophysiology: A. Electrical Activity of Excitable Cells B. Volume Conduction C. The Nervous System D. The Electroneurogram E. The Electromyogram F. The Electrocardiogram G. The Electroretinogram H. The Electroencephalogram

IV. Biopotential Electrodes: A. The Electrode-Electrolyte Interface B. Polarization C. Polarizable and Nonpolarizable Electrodes D. Motion Artifact E. Types of Recording Electrodes

V. Electrophysiology Instrumentation: A. Basic Op Amp amplifier types B. Instrumentation Amplifiers C. Filters D. Electrical Safety Issues

VI. Cardiopulmonary Support: A. Cardiac Pacing B. Cardiac Defibrillators C. Respirators D. Anesthesia Machines E. Heart-lung Machines

VII. Blood Pressure and Sound Measurement: A. Direct BP Measurements B. Recording System Characteristics C. Heart Sounds and Phonocardiography D. Cardiac Catheterization E. Indirect BP Measurements

VIII. Blood Flow and Volume Measurement: A. Indicator Dilution Methods B. Electromagnetic Flowmeters C. Ultrasonic Flowmeters

IX. Respiratory System Measurements (Spirometry): A. Volumes B. Pressure C. Flow

X. Medical Imaging Systems: A. Radiography B. Tomography C. Ultrasound Imaging

Grading:	Midterm Exam	30%
	Final Exam	30%
	Laboratory Modules	35%
	Attendance	5%

Some course rules and expectations:

- Attendance will be taken. More than five unexcused absences will result in a 5% reduction in the score used to determine the final grade.
- Adherence to the SMU Honor Code will be strictly enforced.
- Students enrolled in EE 7340 will be required to complete one additional lab module compared to students enrolled in EE 5340.
- Students in EE 5340 can complete an additional lab module as an extra credit project.

The following items have to do with common courtesy and respect for your classmates and professor:

- Please arrive/exit class on time, late arrivals and early exits can be a distraction to others.
- Please do not use cell phones or other communications devices while in class.
- Please minimize talking during lecture as this can be very disruptive to those around you who are trying to listen to the lecture.
- One page note sheets will be allowed on each exam. Your work area should otherwise be completely cleared of books and additional notes during a test.

Electrical Engineering Program Objectives

SMU Incomplete Grades Policy

An Incomplete (I) may be given if the majority of the course requirements have been completed with passing grades but for some justifiable reason, acceptable to the instructor, the student has been unable to complete the full requirements of the course. Before an (I) is given, the instructor should stipulate, in writing, to the student the requirements and completion date that are to be met and the grade that will be given if the requirements are not met by the completion date. The maximum period of time allowed to clear the Incomplete grade is 12 months (except for graduate thesis and dissertation courses). If the Incomplete grade is not cleared by the date set by the instructor or by the end of the 12-month deadline, the (I) may be changed to an F or to another grade specified by the instructor. The grade of (I) is not given in lieu of an F, WP, or other grade, each of which is prescribed for other specific circumstances. If the student's work is incomplete and the quality has not been passing, an F will be given. The grade of (I) does not authorize the student to attend the course during a later semester. Graduation candidates must clear all Incompletes prior to the deadline in the official University Calendar, which may allow less time than 12 months. Failure to do so can result in removal from the degree candidacy list and/or conversion of the (I) to the grade indicated by the instructor at the time the (I) was given.

Statement Regarding Disability

Disability Accommodations: If you need academic accommodations for a disability, you must first contact Ms. Rebecca Marin, Coordinator, Services for Students with Disabilities (214-768-4563), to verify the disability and to establish eligibility for accommodations. Then you should schedule an appointment with the professor to make appropriate arrangements.