

### **ECE 333 Medical Electronics**

**Catalog description:** Bioelectric events and electrical methods and circuits used to study and influence them in medicine, electrically excitable membranes, action potentials, electrical activity of muscle, the heart and brain, bioamplifiers, pulse circuits and their application. Prerequisite: ECE 123 or consent of instructor MWF. **Credit hours:** 3, **Prerequisite:** ECE 123 or consent of instructor. Fall 2015, 11.10-12, MWF P.L. 322.

**Textbook/required materials:** K.H. Norian, Electrical Engineering Theory and Examples, 5th Edition, HRC Publishers (2013).978-0-9772484-4-5.

#### **Course objectives:**

The main objective of this course is to provide the students with the theory of bioelectric activity in the body and the electrical methods and circuits used in their study and control. Students who take this course will understand:

- a)The origins of bioelectricity through electrochemical models of electrically excitable membranes of nerve and muscle tissue.
- b)The mechanism of the generation and propagation of action potentials.
- c)The impulse forming and conducting system of the heart and basic neuroanatomy
- d)The electronics of bioamplifiers and measurement techniques of their use in electroneurography, electromyography, electroencephalography, electrocardiography.
- e)Theory and design of instrumentation for electrical stimulation of tissue for electrotherapy and the effect of electrical pulses on excitable tissue.

#### **Topics covered:**

Bioelectric events and electrical methods and circuits used to study and influence them in medicine, electrically excitable membranes, action potentials, electrical activity of muscle, the heart and brain, bioamplifiers, pulse circuits and their application, bioamplifier electronics and measurement techniques in electroneurography, electromyography, electroencephalography, electrocardiography. Building ECG circuit. Acquire and display electrocardiogram in lab. Theory and design of instrumentation for electrical stimulation of tissue for electrotherapy and the effect of electrical pulses on excitable tissue.

**Assessment:** Each student does a term paper on a project topic. Students are assessed on progress they make on the project during the semester, in their depth of understanding of the subject in a final oral presentation and on the written report on the project and on tests/assignments. Grade determination, written project=30%, oral presentation=20%, tests and assignments =50%. Project titles due Wednesday, Sept.14. Written project reports due Monday, Oct 31. Test dates to be announced. Assignment dates depend on course progress and cannot be predicted. Students should bring their textbook to class for use in tests and assignments. Each student works alone and is responsible for his/her own paper, test and assignments. Students should notify the instructor of any absences ahead of time; otherwise they will not be given credit for missed tests/assignments. Students who stay away from class for long periods without a good excuse will fail the course. Students with special needs need to let the instructor know of these during the first week of classes.

K.H. Norian Aug 23, 2016