EECE 602: Biomedical Engineering II

Catalog description:

Credit hours: 3 credits

Required or elective:
Elective, open to ECE, CCE, and students from outside the ECE Dept taking the Biomedical Engineering Minor.

Prerequisites:
By course: EECE 601
By topic: Basic electric circuits and electronics. Basic biomedical instrumentation. Human biology.

Textbook(s) and/or required materials
Extensive class notes are provided

References:
Encyclopedia of Medical devices and Instrumentation, Wiley 2008
Wiley Encyclopedia of Biomedical Engineering, 2008
(Both encyclopedias are available on-line)

Course Objectives
1. Measurements made on the respiratory system.
2. Measurements made on the nervous system.
3. GSR and audiometry.
4. Biotelemetry
5. Medical and clinical laboratory tests.
6. X-ray systems
7. Radioisotope systems
8. Special surgical techniques.

Course Topics
1. Respiratory System and Measurements: respiratory physiology, measurement of lung capacities and volumes, respiratory therapy equipment, measurements of gas exchange and concentrations.


4. Biotelemetry: biotelemetry systems, completely and partially implantable systems.

5. Instrumentation for the Clinical Laboratory: blood tests and equipment, automated clinical test equipment, electrophoresis, high-pressure liquid chromatography.


8. Magnetic resonance: general, physical principles, principles of MRI, MR equipment and performance, MRI techniques. fMRI


Course Learning Outcomes
1. Understanding of the basic physical processes involved in respiration and how it is controlled
2. Familiarity with the measurements commonly made on the respiratory system
3. Understanding of how EMG measurements are made and what they indicate
4. Understanding of how EEG measurements are made, how they are analyzed, and what they indicate
5. Familiarity with Galvanic Skin Reflex measurements and what they indicate
6. Familiarity with various telemetry systems for measuring physiological variables
7. Understanding of the basic principles underlying X-ray production and application for diagnostic purposes
8. Understanding of the basic principles underlying tomography and its applications
9. Understanding of the basic principles underlying radioisotope production and application for diagnostic purposes
10. Understanding of the basic principles underlying magnetic resonance and imaging
11. Familiarity with the basic components of a magnetic resonance imaging system
12. Familiarity with some special surgical techniques and their applications

Class/Laboratory schedule
Two 75-minute lectures per week

Resources of the course
Lecture notes, references, Moodle, and Web
**Computer Usage**
Moodle, Web searches

**Evaluation methods**
Term paper, topic of choice from approved list 20%
Midterm (short answer) 30%
Final Exam (short answer) 50%

**Professional component**
Engineering topics: 75%
Biological Topics: 25%
General education: 0%
Mathematics and basic sciences: 0%

**Person(s) who prepared this description and date of preparation**
Nassir Sabah, September 2005

**Date of last revision**
January 2013