

# BME322 Biomedical Engineering Design VI

## Catalog Description:

### **BME322 Biomedical Engineering Design VI**

Introduction to the principles of wireless transmission, signal processing for biomedical applications, and the design of biomedical devices and instrumentation with wireless and signal processing capabilities.(e.g. pacemakers, defibrilators. EKG). Electrical safety (isolation, shielding), and equipment validation standards for FDA compliance are introduced. Use of LabView to provide virtual bioinstrumentation. The course culminates in group projects to design a biomedical device that runs on wireless and/or signal processing technology.

## Text Book:

None

## Instructor:

Bruce McNair, Distinguished Service Professor of ECE.

## Goals:

The goal of this course is to give students an understanding of the issues involved in designing biomedical systems with wireless and signal processing components and introduction to the tools and techniques used to address these issues.

## Prerequisites by Topic:

- Linear Systems
- Probability and Random Variables
- Circuits and Systems

## Grading Policy:

Participation	10%
Midterm readout	25%
Final Project	50%
Final presentation	15%

All assignments provide opportunities for extra credit work. Work that goes significantly beyond what is asked will be graded accordingly.

Although nearly all the graded work in the course is group based, the Stevens Honor System still applies. In particular, plagiarism or failure to fully cite all sources will not be tolerated.

## Course Components:

- Engineering - 100%

### **Course Web Site:**

<http://koala.stevens-tech.edu/~bmcnair/BME322-XXX> where XXX is the current semester, e.g., F08

### **Schedule of Topics**

- Electronics review
  - Electromagnetic properties
  - Electromagnetic fields
  - Electromagnetic effects
  - Analog and digital signals
  - A/D conversion
  - D/A conversion
  - Filtering
  - Frequency vs. time domain
- Modulation and demodulation
  - Analog and digital
- Wireless systems
  - Bandwidth
  - Multiplexing
  - Spectrum
- Noise and grounding
- Media, Antennas and propagation
- Interaction between electronic systems and biological systems
- Signal processing
  - Averaging, filtering
  - Measuring periodicity (correlation)
  - Spectral analysis
  - Detection of signals in noise

Last revised: May 31, 2009