BME322 – Design VI

Class 1

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Course Introduction

- Course logistics
- Reference material
- Course requirements & Grading policy
- Course topics

Course Logistics

- This will be a team-based course, preparing you for Senior Design
- You will be introduced to two important (EE) technologies for biomedical systems:
  - Wireless technology
  - Signal processing technology
- The course material will consist of lectures, lab experiments, and computer simulation tools (Matlab/Simulink)
- You will also be expected to use the Stevens library to research material for your project and general class discussions (generally the IEEE database, Iexplore)
- Your primary deliverable for the course will be a project report and presentation due at the end of the course
- We will meet every week

Reference Materials

- Relevant articles from IEEE Transactions on Biomedical Engineering and other relevant sources will be posted on the course web site (elearn.stevens.edu)

- Matlab/Simulink simulation tools will be posted on the course web site for you to experiment with

Course Requirements

- Each student will be expected to participate in class discussions on relevant topics to the lectures/experiments. Lack of attendance and/or lack of participation are likely to lead to formal assignments to present selected research papers
- Each student will join a design group consisting of approximately 4 members. Teams are to be formed by Class 2
- Groups members will jointly develop a proposal for a biomedical project, preferably utilizing the technologies discussed this semester (i.e., wireless and signal processing technologies). The initial project idea will be due by Class 4
- A brief (~7 page) midterm report, outlining the general topics to be researched will turned in by Class 7
- A complete project report will be turned in by Class 13
- A Powerpoint presentation on the project will be delivered to BME and other faculty during Class 14

Grading

- Participation 10%
- Midterm report 25%
- Final report 50%
- Final presentation 15%

- 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.

- All written reports and presentations must be submitted electronically to my email address (bmcnair@stevens.edu) of via the elearn email system.

- For me to keep submissions straight from this and other courses I am teaching, all email attachments must be labeled as:

  BME322 – Group – assignment_name

  e.g., “BME322 – Improved MRI – midterm report.doc”

Course Topics

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