ECE567/BME532 MODERN BIOMEDICAL IMAGING

Syllabus

Instructor: Dr. Ying (Ada) Chen  E-mail: adachen@siu.edu
Office Hours: MW 1:30-4:30 pm      Engr Building E206

TA: Mr. Weihua Zhou  E-mail: wzhou@siu.edu
Office Hours: MWF 1-3 pm              Engr Building E208

Course Description

Biomedical imaging is essential in diagnosis and detection of various diseases in modern society. The rapid advances in medical imaging technology make it possible to create high-resolution, three-dimensional anatomical and physiological images to enable powerful advances in diagnosis and intervention. This course focuses on principles of modern biomedical imaging including X-ray, ultrasound, computed tomography, magnetic resonance imaging, optical imaging, and nuclear medicine. Topics on signal and noise characteristics, image quality and image reconstruction algorithms will also be covered.

Course Goals

1. To provide graduate students with the ability to understand the principles and applications of various modern biomedical imaging modalities.

2. Emphasis is placed on concept and application of image quality, image reconstruction, and image analysis in biomedical imaging fields.

Recommended Textbook and references


References: Please check SIUC blackboard to download and print out lecture handouts.


Prerequisites by topic

ECE 355 or consent of the Instructor. Signal and image processing, basic physics, basic statistics, basic programming.
Instructional Objectives

Students should be able to:
1. Understand the principles and applications of biomedical imaging modalities.
2. Understand the concepts of frequency analysis, image quality, signal and noise characteristics, and image reconstruction.
3. Use a programming language or MATLAB to perform image analysis, three-dimensional object simulation and image reconstruction.

Grading

Grades will be computed based on the following:
   Homework (10%)
   Exam #1 (30%)
   Exam #2 (30%)
   Projects (20%) (Medical image processing, 3D image simulation)
   1 final project (10%) (3D image reconstruction)

Please note:
1. No cheating allowed.
2. The exams will focus on the lecture notes to help students understand principles of biomedical imaging.
3. The grading scheme will be strictly followed. There will be NO exceptions.
4. All assignments should be turned in promptly. Late homework/report will be penalized 10% per day.