

Course Description

This course introduces medical imaging methods to senior undergraduate and graduate students. It covers the following topics: radiation, radiography, computer tomography, radioisotope imaging, diagnostic ultrasound imaging, magnetic resonance imaging, and applications of different imaging modalities. This course requires basic knowledge of linear algebra, calculus, and geometry. Familiarity with a programming language such as MATLAB is needed.

Prerequisite(s): ELEC 2100 AND MATH 2011 AND MATH 2111

List of Topics

1. Introduction
2. X-ray CT
3. MRI
4. Ultrasound
5. Terahertz imaging
6. Nuclear Medicine, PET, SPECTT

Statement of Objectives/Outcomes:

Upon successful completion of this course, students will be able to:

CO1 - Understand the basis of mathematical models used in medical imaging.

CO2 - Have a knowledge of medical imaging techniques and their applications.

CO3 - Understand the pros and cons of different imaging techniques in terms of capabilities and safety.

CO4 - Give a PowerPoint presentation to introduce logically and coherently a topic within the syllabus

Textbook(s) and References:

J. Prince and J. Links, *Medical Imaging: Signals and Systems*

J. Bushberg, J. Seibert, E. Leidholdt, and J. Boone, *The Essential physics of Medical Imaging*

Steve Webb (ed.), *The physics of Medical Imaging*, 1988

Joseph P. Hornak, *The Basics of MRI*

Thomas L. Szabo, *Diagnostic Ultrasound Imaging: Inside Out*, Elsevier Science, 2004

Relationship of Course to Program Outcomes:

Please refer to the Report Section 4.3.2 (iii).

Grading Scheme:

Homework assignments	10%
Project	25% (of which 5% related to class discussion)
Midterm Examination	15%
Final Examination	50%