

**Instructor**  
Hossain Ahmed

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**Office Location**  
NFSC, 1009

**Student Hours**  
Monday: 10:30 -11:20 am  
Tuesday: 9:30 – 10:20 am  
Thursday: 9:30 – 10.20 am

**Class Time  
and Location**  
Tuesday: 12:30 - 1:20 pm  
Thursday: 11:30 am – 12:20  
pm  
Friday: 1:30 pm – 2:20 pm

Location: **SCHW 289**



**ST. FRANCIS XAVIER  
UNIVERSITY**

## **Subject Name: Phys 250, Fall 2024 Medical Imaging**

### **Course Overview**

Medical imaging of the human body is an indispensable part of modern science and technique. It provides inner and specific information about a body part that requires diagnosing or treating a medical condition. This course examines the fundamental principles of medical imaging, e.g. radiography, CT, ultrasound, MRI, emission tomography, etc. The basic physical concepts behind the interactions of light with matter, the production of X-rays and radioactivity will be introduced. Technical parameters important to all forms of diagnostic imaging, such as image quality and data processing, will be addressed. Three credits

### **Additional Course Information**

Class participation, textbook consultation, doing assignments, and participating in-class quizzes are the key to success in this course. Class attendance is strongly recommended, and students are responsible for collecting information from the classes.

### **Learning Objectives**

By the end of this course, students will be able to:

- Explain light, matter, their interaction, image quality, data, and their storage.
- Categorize different diagnostic radiology.
- Demonstrate how the radiation is detected and measured.
- Accurately describe the response of body parts exposed to radiation and their protections.

## Evaluations

Category	Weight
Class Activities	5%
Assignments (3)	15%
Quizzes (3)	15%
Midterm	20%
Final	45%
Total	100%

There are three assignments and three in-class quizzes throughout the semester. Solving assignment questions and participating in-class quizzes will significantly help you to succeed in the course. Discussion with other students on assignment questions is always welcomed but make sure you can do the problems yourself as all in-class exams are closed books, and you will be working on exams yourself. Late submission without a valid reason will affect your grade, e.g. 10% cost for a single day delay and 100% cost for a week or so delay!

	Assignment	Assignment	
	Handing out	Due	Quiz
01	Sep. 13	Sep. 20	Sep. 27
02	Oct. 25	Nov. 01	Nov. 08
03	Nov. 19	Nov. 26	Dec. 03

## Exams

Quizzes: In class

Midterm: October 10, 2024 (Thursday) [Time: 11:30 am – 12:20 pm]

Final: The final exam date will be set by the University registrar.

# Method of Instruction

- Face-to-face at **SCHW 289**
- Online (if necessary): <https://ca-iti.bbcollab.com/collab/ui/scheduler/session>

## Course Schedule

**Note:** Based on time and situation, we might include or discard some of the contents in the table below.

Week/Date	Topic	Assignment (Reading, Exercises, Hand-in Assignment) and Quiz
Week 1 – 3	Module 1: Basic physical concepts <ul style="list-style-type: none"><li>■ Introduction to Medical Imaging</li><li>■ Light and atoms</li><li>■ Light-matter interaction</li><li>■ Notion of image quality</li><li>■ Data storage and processing</li></ul>	<ul style="list-style-type: none"><li>■ Assignment one</li><li>■ Quiz one</li></ul>
Week 4 - 8	Module 2: Diagnostic radiology <ul style="list-style-type: none"><li>■ X-Ray production</li><li>■ Radiography</li><li>■ Mammography</li><li>■ Fluoroscopy</li><li>■ Computed tomography (CT)</li><li>■ Magnetic resonance imaging (MRI)</li><li>■ Ultrasound</li></ul>	<ul style="list-style-type: none"><li>■ Assignment two</li><li>■ Quiz two</li></ul>
Week 7	<b>Study break</b>	
Week 9 & 11	Module 3: Nuclear medicine <ul style="list-style-type: none"><li>■ Principle of radioactivity</li><li>■ Radionuclide production</li><li>■ Radiation measurement and detection</li><li>■ Nuclear imaging and emission tomography</li></ul>	<ul style="list-style-type: none"><li>■ Assignment three</li><li>■ Quiz three</li></ul>
Week 12	Module 4: Radiation protection	<ul style="list-style-type: none"><li>■ Assignment four</li></ul>
Week 13	Module 5: Artificial intelligence and diagnostic	

## Course Materials & Resources

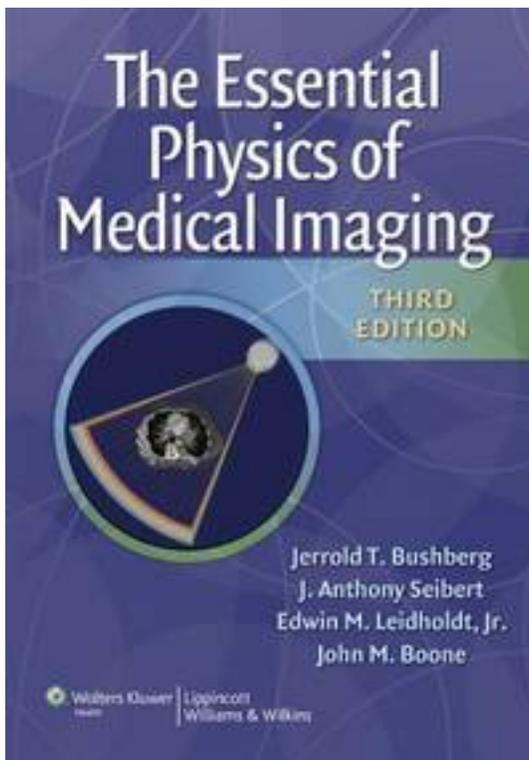
Besides in-class lectures, the course webpage (Moodle page) is the primary source of the course materials. Lecture slides, assignments, quizzes, and solutions (if any) will be uploaded to the Moodle page accordingly. To avoid any biases, I usually upload lecture slides after my in-class lectures. Any announcements, formula sheets, practice problems (if any), and other materials (if any) will also be uploaded on Moodle page. Students are strongly advised to follow the

Course webpage: <https://moodle.stfx.ca/course/view.php?id=37447>

## Required Text(s)

The Essential Physics of Medical Imaging (Third/Fourth Edition) by Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholdt, Jr, and John M. Boone

Available in the StFX Bookstore



## Academic Integrity

The university has a strict policy against academic dishonesty. For a precise definition of what St. Francis Xavier University considers to be academic dishonesty, please refer <https://www.stfx.ca/applications-admissions/registrars-office/academic-integrity>. It is your responsibility to know what constitutes academic dishonesty.