

Syllabus and Teaching Philosophy

Lecturer: Dr. Rachid Machrafi, Office ERC4064, Faculty of Energy System and Nuclear Science, email: rachid.machrafi@uoit.ca,

Tel: (905) 721 8668 x **5522**

Office Hours: Monday 8:30-10:30

Teaching Assistants:

Nafisah Khan From: January 7 to March 10
Ph.D. student, Faculty of Energy System and Nuclear Science
Email: nafisah.khan@uoit.ca,
Office: ERC4024,
Office Hours: Tuesdays: 11:00-12:00

Muhammad Ali, from Mach11 to April 12
Research Associate, Faculty of Energy System and Nuclear Science.
Email: Muhammad.Ali1@uoit.ca,
Office: ERC3084,
Office Hours: Thursdays: 13:30-14:30

Lecture Time: Monday: 6:40 -9:30, @UA1120

Evaluation:	Assignments	20%
	Midterm	30%
	Final	50%

Course objectives

Objective: To provide an overview of radiation and nuclear technologies and their applications in modern society.

The course provides an overview of nuclear and radiation applications in modern society. It is delivered in the form of a series of modules. Module topics cover fundamentals of nuclear and radiation science, fuel cycle, radiation sources, radiation detection, and radiation applications.

The course also provides an overview of safety and quality fundamentals and their applications in nuclear systems and technologies. This includes an introduction to nuclear reactors and principle of their operation, safety management & culture, defense in depth, safety analysis, human performance and quality management.

Specific course goals include:

- ❖ Exploring careers in nuclear/radiological and health physics
- ❖ Atomic nuclei and its structure
- ❖ Environmental radioactivity
- ❖ General principles of radiation machines
- ❖ Survey on radiation detection methodologies
- ❖ Overview of fission and fusion processes
- ❖ Discussions on radioactive waste
- ❖ Medical and Industrial use of radiation
- ❖ Nuclear power systems and technologies (Nuclear reactors)
- ❖ Principles of CANDU reactor
- ❖ Nuclear fuel cycle
- ❖ Safety management concepts and safety culture
- ❖ Defense in depth concepts and relationships to reactor design
- ❖ Control, cool, contains concepts and safety design approaches
- ❖ Practice human performance and factors related to nuclear technologies & systems
- ❖ Quality management and best practices

Course Structure

This course contains 5 modules:

Module 1

Introduction and Fundamentals

Module 2

Radiation Sources and Detection

Module 3

Radiation Applications

Module 4

Fuel Cycle and Environment

Module 5

Safety and Quality Management

× Lectures

- ❖ There is one, 3 hour (2 hr, 50 min) lecture per week
- ❖ I will give you a 10 minute break right around 8:00

× Assignments

- ❖ There will be an assignment roughly every second week

× Exams

- ❖ There are a midterm and a final exam in this course

Reporting

- ❖ Students must drop their assignments in the drop box on the fourth floor (ERC building).
- ❖ Only hard copy is accepted

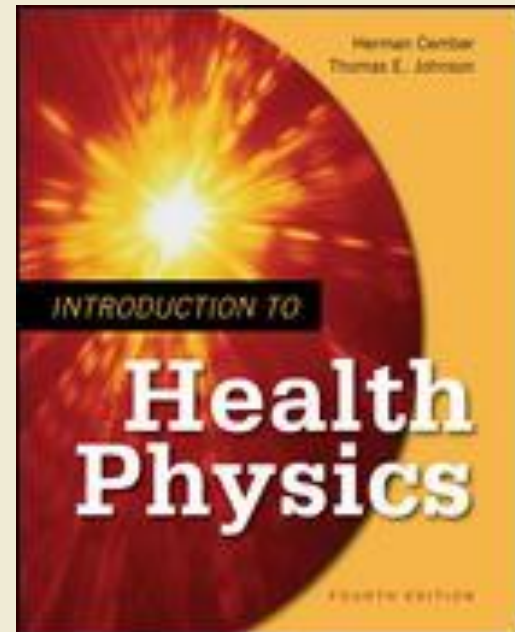
Syllabus and Teaching Philosophy

Text book

Lecture notes, practical exercises are given in parallel with lectures. On Blackboard, only PDF files are available. PowerPoint animation and important notes are given in classroom, so it is very important to attend classes



Radioactivity Radio-nuclides Radiation
Author: J. Magill and J. Galy



Introduction Health Physics
Author: H. Cember and T. Johnson

These text books are recommended but not obligatory.