



SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
PHY	471	Introduction to Medical Physics	3	2	0	2	5	PHY 321	8	English

A. Course Description

This course covers basic radiation physics, interaction of radiation with matter, nuclear detectors, nuclear structure and instability, radioactive decay, radiation producing devices, characteristics of the different types of radiation and mechanisms of their interactions with materials. This course presents also the fundamental principles the quantities of radiation dosimeter, the characterization and proper use of health physics instrumentation, and will finally cover the Physics of medical imaging with their techniques.

B. Course Outcomes

At the end of this course the student will be able to:

1. Learn and basic understanding of radiation physics concepts.
2. Define the radiation quantities (units) used in measurement of dose.
3. Understand the interactions of radiation with atoms in material and tissue.
4. Have a general understanding of the physical principles, construction and function of a diagnostic X-ray unit.
5. Interpretation of radiological imaging with an understanding of the physical limitations of the technique.
6. Have a basic knowledge of the principles of physics as they pertain to nuclear medicine.

C. References

Required Textbook

- James E. Turner, *Atoms, Radiation, and Radiation Protection*, 3rd Edition (2007).
- Johns H.E and Cunningham J.R., *Physics of Radiology*, 4th Edition (1983).

Other references

- Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholdt Jr. John M. Boone, *The Essential Physics of Medical Imaging*, 3rd Edition (2011).
- Frank Herbert Attix, *Introduction to Radiological Physics and Radiation Dosimetry*, 1st Edition (1986).

Course Website: <http://www.imamm.org/>

D. Topics Outline

1. **Radiation and the Atom:** Basic quantities and units, radiation quantities and units, atomic and nuclear structure (Contact hours: 8).
2. **Interaction of Radiation with Matter:** Particle interaction, X-and Gamma ray interactions, attenuation of X-ray and gamma ray, absorption of energy from X-and gamma rays (Contact hours: 12).



3. **Radiation Dosimetry:** Quantities and units in radiation dosimetry, energy fluence, KERMA, absorbed dose, equivalent dose & effective dose, exposure (Contact hours: 8).
4. **Production of X-Rays:** Introduction to X-ray production, X-ray tubes, X-ray generator function and components, X-ray exposure rating charts (Contact hours: 12).
5. **Radiological Imaging:** Introduction to imaging, conventional X-ray imaging, computed tomography, diagnostic ultrasound (Contact hours: 12).
6. **Nuclear Medicine:** Introduction to nuclear medicine, how the nuclear medicine Scan is performed, isotopes used in nuclear medicine, image reconstruction (Contact hours: 8).

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	Midterm 2: 20 %	Final Exam: 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95]	[85, 90]	[80, 85]	[75, 80]	[70, 75]	[65, 70]	[60, 65]	[0, 60]

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Exams](#)

goo.gl/ykm7t3

