Course Plan

Semester : 2	**Academic Year: 1404-05**
Level: Master of Medical Physics	**Major: Medical Physics**
Course Title: Principle of Radiation Detection and Dosimetry	**Department: Medical Physics Department**
Course Code: 1345991	**University Professor or Faculty member:**
Class NO: Room No#1	**Credit Hours:**
Prerequisite: Principle of Health Physics	**Credit Units:** **(2Theo and 0 Prac)**
Availability of Professor: [Saturday to Wednesday, 7-14:30]	**Tel:031-37929011**
Office Address: Medical Physics Department, School of Medicine	**E-mail: i.abedi@med.mui.ac.ir**
Name of Student Representative and Cellphone Number:	**Number of Students :2**

The General Purpose of the Lesson:
This course introduces the fundamental principles of radiation interaction with matter, operating principles of common radiation detectors, and basic dosimetry concepts used in radiological protection, medical applications, and nuclear industry.

Learning Outcomes (Objectives):
Upon successful completion of this course, students will be able to:

1. Describe the principles of interaction of charged particles, photons, and neutrons with matter.
2. Explain the operating principles of gas-filled, scintillation, and semiconductor detectors.
3. Calculate and interpret fundamental dosimetric quantities including Kerma, absorbed dose, and exposure.
4. Identify and analyze clinical and radiation protection applications of various radiation detectors.
5. Interpret radiation spectra and explain the principles of spectrum analysis.

Assessment Methods:

(The Assessment Methods that will be Used to Test Students Learning outcomes & the Skills & Competencies Stated in learning Outcomes)

Assessment	**Score From 20**
Mid Exam (Theory)	**8**
Final Exam	**8**
Practical Exam	**-**
Assignments:	**2**
Total Marks	**20**

Main References (Text Books):

- Knoll, G. F. (2010). Radiation Detection and Measurement, 4th ed. Wiley

References for More Reading:

- Turner, J. E. (2007). Atoms, Radiation, and Radiation Protection, 3rd ed. Wiley.
- Leo, W. R. (1994). Techniques for Nuclear and Particle Physics Experiments. Springer.
- Attix, F. H. (1986). Introduction to Radiological Physics and Radiation Dosimetry.

Student's Responsibilities:

- Upon successful completion of this course, students will be able to:
- Describe the principles of interaction of charged particles, photons, and neutrons with matter.
- Explain the operating principles of gas-filled, scintillation, and semiconductor detectors.
- Calculate and interpret fundamental dosimetric quantities including Kerma, absorbed dose, and exposure.
- Identify and analyze clinical and radiation protection applications of various radiation detectors.
- Interpret radiation spectra and explain the principles of spectrum analysis.

Attendance Rules:

- Attendance: ≥75% required for lab sessions.
- Late assignments: 10% deduction per day up to 3 days.
- Academic integrity: Plagiarism or falsified lab data results in zero for that component.
- Make-up exam: Only with valid documented excuse.

Department' s Attitudes :

Based on the nature of the Medical Physics Department and its educational objectives, the expected attitudes are:

1. Commitment to Professional Ethics: Adherence to academic honesty, integrity in reporting laboratory data, and avoidance of any form of plagiarism.
2. Responsibility: Regular and active attendance in classes, timely submission of assignments, and participation in class discussions.
3. Precision and Meticulousness: Attention to detail in dosimetric measurements and data analysis as an essential skill for a medical physicist.
4. Promoting Safety and Radiation Protection: Fostering a culture of safety when working with radiation sources and adhering to protection principles in clinical and research environments.
5. Effective Communication with the Medical Team: Ability to convey radiation physics concepts to other medical professionals to improve treatment quality.
6. Lifelong Learning: Continuous pursuit of up-to-date knowledge and technologies related to radiation detection and dosimetry.

Mid Exam Date: 1405-02-10 **Final Exam Date:1405-04-15**

NO of Session	Main Topic	Teacher's Name	Place & Time	Date	Method of Presentation
1	Interaction of Heavy Charged Particles	Dr. Iraj Abedi	Room No#1 10:00	1405-01-23	Lecture + Problem solving
2	Interaction of Electrons & Beta particles	Dr. Iraj Abedi	Room No#1 10:00	1405-01-30	Lecture + Problem solving
3	Interaction of Photons (Gamma/X-ray)	Dr. Iraj Abedi	Room No#1 10:00	1405-02-07	Lecture + Problem solving
4	Interaction of Neutrons	Dr. Iraj Abedi	Room No#1 10:00	1405-02-14	Lecture + Problem solving
5	Gas-Filled Detectors – Ionization Chambers	Dr. Iraj Abedi	Room No#1 10:00	1405-02-21	Lecture + Problem solving
6	Gas-Filled Detectors- Proportional & GM Counters	Dr. Iraj Abedi	Room No#1 10:00	1405-02-28	Lecture + Problem solving
7	Scintillation Detectors	Dr. Iraj Abedi	Room No#1 10:00	1405-03-07	Lecture + Problem solving
8	Semiconductor Detectors	Dr. Iraj Abedi	Room No#1 10:00	1405-03-16	Lecture + Problem solving
9	Dosimetry Fundamentals – Kerma & Dose	Dr. Iraj Abedi	Room No#1 10:00	1405-03-21	Lecture + Problem solving
10	Exposure & Measurement of Dose	Dr. Iraj Abedi	Room No#1 10:00	1405-03-28	Lecture + Problem solving

11	Personal Dosimetry & Protection	Dr. Iraj Abedi	Room No#1 10:00	1405-04-03	Lecture + Problem solving
12	Spectroscopy & Spectrum Analysis	Dr. Iraj Abedi	Room No#1 10:00	1405-04-08	Lecture + Problem solving