

Theoretical and practical courses-Ilam University of Medical Sciences

Introduction to the course: Radiation hygiene and protection in the second semester of the academic year 2020-2021

School: Health Department: Environmental Health Engineering

Course and degree: Environmental Health - Undergraduate

Day, time and place: Sunday 10-12

Number and type of theoretical unit 1.5 practical unit 0.5

Name of the person in charge of the course (course instructor): Ali Nikonhad

Prerequisite courses:

Office address: School of Health

Phone and contact days: 09188425954

**General purpose of the course:** Familiarity with ionizing radiation in the workplace, methods of evaluation and control in the workplace, Familiarity with non-ionizing radiation in the workplace, methods of evaluation and control in the workplace.

**Lesson Description:** Humans are exposed to ionizing and non-ionizing radiation due to medical, industrial, agricultural, home appliances, and naturally, which have adverse effects on human health in the short and long term, so familiarity with the amount of this radiation, control them. And measuring them can reduce the amount of exposure to these rays, and students will have a good ability to achieve the mentioned goals after completing this course.

**Specific or partial objectives of the course:** At the end of this course, students can:

- 1- Explain the basic concepts of radiology.
- 2- Express the types of ionizing and non-ionizing rays, particle and electromagnetic.
- 3 - Explain how to produce ionizing and non-ionizing beams.
- 4 - Explain the principles governing the energy equations of rays.
- 5- Mention the use of different types of rays in professional and industrial environments.
6. Explain the types of radiological theories and theories of atomic structure.
- 7 - Explain the types of subatomic particles.

8. Mention the biological properties of different types of radiation.
- 9 - Explain the difference between direct and indirect ionization.
- 10 - Explain the mechanisms of ionizing and non-ionizing rays colliding with materials.
- 11 - Be able to solve the equations for calculating the half-life and constant decomposition of ionizing radiation.
- 12 - Describe the types of natural radioactive chains.
- 13 - Explain how the elements radiate.
- 14 - Describe the types of definite and possible effects of exposure to radiation.
15. Describe the types of processes that lead to nuclear fission.
  
16. Express the units of measurement of ionizing and non-ionizing rays.
- 17 - Explain the limits of occupational exposure to ionizing and non-ionizing rays.
18. Describe the types of internal and external organizations related to radiation standards.
19. Describe the various methods of measuring ionizing and non-ionizing radiation.
20. Explain how to measure ionizing and non-ionizing rays.
- 21 - Explain the principles of protection against ionizing and non-ionizing radiation.
- 22 - Describe the quantities related to radiation and irradiation and their units

**Student duties (student homework during the semester):**

- 1- Studying the issues raised in previous meetings
- 2- Asking possible questions about the ambiguities of the previous session
- 3- Participate in class discussion + do class assignments

The main sources of the lesson: 1

- 1- Practical protection against radiation and applied radiology - Translated by Hosseini Fardarani Tarbiat Modares University Press
- 2- Introduction to Health Physics - Zahra Khorasani, Davood Esmaili - Nokta Publications - 1998
- 3- Radiation safety in nuclear medicine - Author Max H. Lombardi - Translated by Farhad Forouharmajd

1- Salvato. J.A (2003) Environmental Engineering and Sanitation

2-International Atomic Energy Agency (IAEA) "Monitoring Radiation Protection

**Teaching method + teaching aids used:** video projector, computer and internet, educational articles, Powerpoint

**Methods and time of assessment and evaluation of the student and the bar related to each evaluation:**

- Class question 2 points + quiz 3 points + final exam 15 points

**Lesson rules and expectations from students:**

**Schedule and predicted contents of each theory session**

| Session | Topic  | Necessary preparation of students before the start of the class   |
|---------|--|---|
| 1       | 1- Explaining the lesson of rays<br>2- Assessing students' knowledge of radiation hygiene<br>3- Description of the lesson chapter, content and evaluation methods<br>4- Introduction to radiation and radiation protection               | Timely attendance at class<br>Asking possible questions about the lesson  |
| 2       | Recognition of types of ionizing and non-ionizing rays   | Study the contents of the previous session lesson<br>Timely attendance at class<br>Asking possible questions about the ambiguities of the previous lesson |
| 3       | 1- Recognition of alpha, beta and gamma rays<br>2. Familiarity with radon gas  |   |
| 4       | 1. Familiarity with the components of the atom<br>2- Understanding the structure of the atom   |   |
| 5       | 1. Familiarity with the classification of nuclei<br>And types of decay<br>2- How to produce alpha, beta and gamma<br>3- How to produce X-rays, radio and microwave waves, and electromagnetic waves<br>4. Source of radiation production |   |
| 6       | Knowledge of isotopes, isotones, isobars and isomers   |   |

|    |   |  |
|----|---|--|
| 7  | Visit hospital radiation production centers   |  |
| 8  | Half Time Radiation and Semi-Physical Equations:  |  |
| 9  | Visit hospital radiation production centers   |  |
| 10 | Radiation and at-risk populations   |  |
| 11 | Radiation protection  |  |
| 12 | Visit hospital radiation production centers   |  |
| 13 | Set of beam rules   |  |
| 14 | Familiarity with non-ionizing rays  |  |
| 15 | Visit the provincial health center (Introduction to electromagnetic wave measuring devices) |  |
| 16 | Radiation energy units  |  |
| 17 | Familiarity with radiation detection  |  |
| 18 | Visit the lab (Familiarity with beam measuring devices)                                     |  |
| 19 | Laser radiation and its health effects  |  |
| 20 | Radon gas   |  |
| 21 | Exam  |  |