

Course Book

1. Course name	Protection from radiation (radiation protection)
2. Lecturer in charge	Sarwar Ibrahim Saleh
3. Department/ College	Radiology
4. Contact	Sarwar.ibrahim@epu.edu.iq
5. Time (in hours) per week	Theoretical: 1 hour per week Practical :6 hours per week
6. Office hours	
7. Course code	
8. Teacher's academic profile	I got a Bachelor degree in physics, I graduated in 1995-1996 of the physic department of faculty of Education at Salahadden university then I take MSc degree in KOYA University college of science in 2008. I got a PhD degree in medical physics in 2018-2019 at the Sutcu Imam University in Turkey.
9. Keywords	Radiation protection, ionizing radiation, interacted ionizing radiation with matter, biological effects, shielding,
10. Course overview:	This course Providing the philosophical and scientific background for radiation protection in medicine. Discussing units and tools used in radiation protection. Introducing concepts of radiation protection in the workplace and necessary shielding for work place. Also understanding of the biological effects of radiation
11. Course objective:	The purpose of this course to understand the students of the effect of ionizing radiation on human health, and how to protect themselves of this effects, Also understand the radiation units. Show theoretically and practically how we can decrease the risk of ionizing radiation. Teaching the students how to protect themselves from radiation in the workplace and protect patients. The students will get to know with those tools which are used for radiation protection.
12. Student's obligation	At the end of this course the students will understand; the concept of radiation protection, the risk of exposed radiation doses, and how to protect themselves from hazard radiation. They obligation through theory and practical lecture, report, quiz, and exam.
13. Forms of teaching	Data show, work sheet, white board, and experiment in laboratory.
14. Assessment scheme	1 st and 2 nd Semester 40% (theoretical and Practical with quizzes& reports) Final 60% (theoretical and Practical)
Total : 100%	

15. Course Reading List and References:

1. **Radiation protection, ionizing radiation, biological effects of ionizing radiation, shielding,**
2. **Useful references:**
 - **Radiation Protection A guide for scientists, Regulators, and physicians**
Jacob Shapiro
 - **Atoms, Radiation, and Radiation Protection**
James E. Turner
 - **An Introduction to Radiation Protection in Medicine**
Jamie V. Trapp & Tomas Kron
 - **Radiation Proteomics The effects of ionizing and non-ionizing radiation on cells and tissues**
 - **Radiation Safety Officer Nevada Technical Associates**
P. Andrew Karam, Ph.D.
 - **Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (N.C.R.P) 2005**
 - **The relative biological effectiveness of radiation of different quality (N.C.R.P)**

16. Methods of Instruction

In the lectures, first of all, explain the subject then discusses the main scopes in the lectures with students and indication to practical if there is exist any connection between theoretical and practical.

17. Theoretical and practical Course outline:

Theoretical outline

n.	Outline	Weeks
1	A brief history of radiation protection Atom structure and radiation	1 st
2	Type of radiation (ionizing , non-ionizing radiation) Ionizing radiation (x-ray, gamma ray, alpha particle, beta particle, and neutron) half life	2 nd 3 rd
3	Radiation units (Rad , Roentgen, Rem, Becquerel)	4 th

4	The radiation weighting and quality factor	5th
5	Tissue weighting factors and the Effective dose	6th
6	Basic principle for protection 1- Time 2- distance 3- shielding	7th 8th
7	Equipment's used for radiation protection in medicine	9th
8	Physical → Chemical → Biological Effects of ionizing radiation	10th
9	The biological Effects of ionizing radiation 1-Direct effect 2-Indirect effect	11th 12th
10	External exposure	13th
11	Internal exposure	14th
12	Radiation detectors and dosimeters	15th 16th
13	Personal radiation dosimeter	17th 18th
14	Gamma Radiation Shielding	19th
15	Radiation shielding	20th
15	Nucleus Radiation Detectors	21th
16	Ionizing radiation and public health	22th
17	Radiation Protection in Diagnostic and Interventional Radiology	23th 24th
18	Radiation protection in nuclear medicine	25th
19	Time exposure Cancer effect	26th
20	Bone cancer Lung cancer	27th
21	Other type of cancer	28th
22	Time Averaged Dose-Equivalent Rates	29th
23	Patrol medical examination for workers who working in radiation field	30th

Practical outline

No	Outline	Weeks
1	Studying of gamma ray absorption, using Aluminium	1 st
2	Lamberts law attenuation	2 nd
3	The invers square law of light	3 rd
4	Finding the linear absorption coefficient	4 th
5	Studying of gamma ray absorption use copper	5 th
6	Studying of gamma ray using lead	6 th
7	Studying of beta ray absorption using Aluminium	7 th
8	Studying of beta particle absorption using copper	8 th
9	Studying of beta particle absorption using lead	9 th
10	Relation between voltage current and radiation intensity	10 th
11	Measuring of ionizing current using G.M counter	11 th
12	Measuring of ionizing current proportional counter	12 th
13	Measuring of ionization current using ionizing chamber	13 th
14	Relation between voltage and ionizing current using G.M counter	14 th
15	Relation between voltage and ionization current using proportional counter	15 th
16	Relation between voltage and ionization current using ionization chamber	16 th 17 th
17	TLD or dose meter in many hospitals	18 th 19 th
18	Measuring of radiation intensity, using body generality counter in many hospital	20 th 21 th

18. Examinations:

1. **Compositional:** In this type of exam the questions usually starts with Explain how, definition or compare

2- **True or false:** mark the following True or false

3. **Multiple choices:** choose the right answers

What is the difference between Sievert and Gray

The three factors of protection is and.....

The material which is block the ionizing material is.....

How you can protect yourself from ionizing radiation

How can we handle radioactive material in a laboratory

20. Extra notes:

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21. Peer review:

دوایی پیداچوندهوی کورس بوکی م. نه به زاحمد له بابته تی خو پاراستن له تیشک و له نه نجامدا بوم دهرکه وت بابته و ناویشانی وانه کان به گشتی له روی زانستی و پزشکیه وه گونجاوه له گهل وانه که و زانیاری قوتابیان پر ده کاته وه له و بواره کی قوتابیان سوودی لی ببینن له پیشه که یاندا

م. چیم بکر اسماعیل

ماستر له فیزیا/ په یمانگای ته کنیکی پزشکی