Course Description Form

1. Course Name: **Radiobiology** (Theory)

2. Course Code:

3. Semester / Year: first 2025/2026

4. Description Preparation Date:2025

5. Available Attendance Forms: Live attendance in the classroom

6. Number of Credit Hours (60) / Number of Units (4)

2 hours/2

7. Course administrator's name (mention all, if more than one name)

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8. Course Objectives

| **Course Objectives**

General Objective | By the end of the academic year, students will be able to understand the principles of radiology and how radiation affects cell and tissue function. | | Specific Objectives

1. To identify the effects of radiation on cells and tissues.

2. To understand the mechanisms of cell and tissue function during radiation exposure.

3. To recognize the stages of disease development and the mechanisms of its occurrence.

9. Teaching and Learning Strategies

Strategy	Discription
Interactive Lectures	Delivering content via modern presentation tools
Case-Based Learning	Studying the relationship between diseases, cells, and tissues
Project-Based Learnir	Assigning students to prepare research and reports on disease-related topics and cell responses
Group Discussions	Organizing discussions on disease-cell-tissue radiation relationships to enhance crit thinking and problem-solving
E-Learning	Providing digital resources via university platforms; students watch educational videos submit reports
Formative Assessmen	Short quizzes during the semester to trackn progess and reinforce understanding

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method
first	2	Knowledg	• Introduction to Radiobiology Radiation chemistry: - Initial physical event - Radiolysis of water - Direct Effect of Radiation - Indirect Effect Radiation	Giving a lecture using modern presentation methods
second	2	Knowledge	• - Oxygen Effect (OER) - Radiosensitizers - RadioProtectors (DMF) • Irradiation-induced damage and the DNA damage response - The DNA damage response - Sensors of damage	Giving a lecture using modern presentation methods
third	2	Knowledge	• Cell death after irradiation: - programmed cell death - Apoptosis - Autophagy - Necrosis, Senescence - mitotic catastrophe	Giving a lecture using modern presentation methods
fourth	2	Knowledge	•Molecular Repair of DNA Damage - Base Excision Repair - Homologous Recombination - Nonhomologous and Joining • Target theory - Single target - Single hit, - Multiple target-single hit •Molecular Repair of DNA	Giving a lecture using modern presentation methods

			Damage - Base Excision Repair - Homologous Recombination - Nonhomologous and Joining • Target theory - Single target - Single hit, - Multiple target- single hit	
fifth	2	Knowledge	• Cell survival curves - Recovery - Cell-Cycle Effects - Radiation Effect Modification	Giving a lecture using modern presentation methods
sixth	2	Knowledge	• Types of Cellular Damage due to Radiation	Giving a lecture using modern presentation methods
seventh	2	Knowledge	Radiobiology of Tissue and Organs Response to Radiation - The Most Sensitive - Sensitive - Moderately Sensitive - Less Sensitive	Giving a lecture using modern presentation methods
eighth	2	Knowledge	The severity of radiation effect: - Subacute Effects - Acute Effects - Chronic Effects	Giving a lecture using modern presentation methods
ninth	2	Knowledge	• Tumor Response to Radiation - Therapeutic index (combined radiation and drug treatments) - Tumor control probability - Normal Tissue complication Probability	Giving a lecture using modern presentation methods

tenth	2	Knowledge	• Introduction to Biosafety and Security - Key components of Biorisk Management - Components of safety in all laboratories - Universal safety precautions	Giving a lecture using modern presentation methods
eleventh	2	Knowledge	• Biosafety barriers in laboratories - Personal protective equipment(PPE) - Facility Design	Giving a lecture using modern presentation methods
twelfth	2	Knowledge	• Biological Agents - Routs of infection - Basis for control Measures - Hazard group classification system - A Biosafety cabinet (BSC)	Giving a lecture using modern presentation methods
thirteenth	2	Knowledge	• Biorisk and biohazards - Control of substances hazardous to health - Assessing risk for work with human blood and tissues hazards - Control measures for work with human blood and tissue - Containment level	Giving a lecture using modern presentation methods
fourteenth	2	Knowledge	• Types of biological wastes - Categories of biological wastes - Decontamination of biological wastes	Giving a lecture using modern presentation methods
fifteenth	2	Knowledge	• Transportation of biological wastes - International Transport Regulations - The Basic Triple Packaging System	Giving a lecture using modern presentation methods

exam
11. Course Evaluation
Distributing the score out of 60 marks according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
12. Learning and Teaching Resources

Main references (sources)	1.Beyzaeoglu, M, ;Ozyigit, G. and Ebruli, C. (2010). B***asic Radiation Oncology***. Springer, Berlin, Heidelberg. 2. Elizabeth o Grady, Jason Cashmore, Marsha, Carol Wismer (2018) ***Principles of Biology- An introduction to Biological Concepts***, second edition. 3. international Atomic Energy Agency. ***Radiation Biology*** Hand book for Teacgers and students (2010). Series no.42.