ROC 242
Clinical Radiobiology

COURSE OUTLINE

Course Description:

This course is an advanced study into the principles of biologic responses to radiation. Focus will be on the events that occur following absorption of energy from radiation at the cellular, tissue, and systemic whole body levels, and factors that influence the effects.

Semester Credits: 2

Lecture Hours: 1

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Course Outcomes:

At the completion of this course, the student should be able to:

1. Identify components of human cell and describe their function.
2. Define LET and RBE and influencing factors.
3. Describe biologic effects at the sub-cellular level.
4. Define and identify somatic and genetic radiation effects.
5. Explain the cell survival curve and define its components.
6. Identify and define the various radiation syndromes.
7. Discuss the role of oxygen in malignant tumors.
8. List and define the 4 R's of Radiobiology.
9. Define and discuss the significance of fractionation.

REQUIRED MATERIALS

Internet access required

TEXTBOOK

Hall, E. and Giaccia, A. (2012). Radiobiology for the radiologist. (7th edition) PA: Lippincott, Williams, and Wilkins. ISBN-13: 978-1-60831-193-4

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	Topics	Reading Assignments
Basics of Radiobiology		
Week 1	Review Class Expectations Review of Cellular Biology Physics of Radiation Absorption	Barron's Anatomy Chapter 3 Chapter 1 (Radiobiology for the Radiologist)
Week 2	Absorption of Neutrons, Protons and Heavy Ions DNA Mechanics, Damage, and Repair Cell Cycle	Pages 10-11 Chapter 2 Chapter 4 pages 54 – 62
	Test One	
Week 3	Cell Survival Curves	Chapter 3
Week 4	LET and RBE	Chapter 7
	Test Two	
Week 5	Clinical Response of Normal Tissues	Chapter 20
Week 6	Clinical Response of Normal Tissues	Chapter 20
Week 7	Clinical Response of Normal Tissues	Chapter 20
	Test Three	
Week 8	Fractionated Radiation Oxygen Effect	Chapter 5 Chapter 6
	Midterm Exam	
Radiobiology Clinical Usefulness		
Week 9	Radioprotectors Dose-Response Relationships Acute Radiation Syndrome	Chapter 9, 19, 8
Week 10	Time, Dose and Fractionation in Radiotherapy (4Rs)	Chapter 23
	Test Four	
Week 11	Radiation Carcinogenesis	Chapter 10
Week 12	Heritable Effects Effects on Embryo and Fetus	Chapter 11 Chapter 12
	Test Five	

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Week 13	Retreatment after Radiotherapy	Chapter 24
Week 14	Alternative Radiation Modalities New Radiation Therapy Technologies	Chapter 25
	Test Six	
Week 15	Chemotherapeutic Agents Chemotherapy Basics for Radiotherapists	Chapter 27
	Final Exam	

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