

RAD 2601 - Radiation Biology and Protection

Fall 2026 Syllabus, Section 01, CRN 43625,

Credit hours: 3

Instructor

Lisa Galich

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Public Instructor Information

Professional Qualifications: Associate of Applied Science Radiologic Technology, Kent State University, 2008

Bachelor of Radiologic and Imaging Sciences Technology, Kent State University, 2011

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Course Description

2601. This course provides students with an overview of the principles of radiation protection, including the responsibilities of the radiographer for patients, personnel, and the public. Radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies and health care organizations are incorporated. An overview of the principles of the interaction of radiation with living systems is provided. Radiation effects on molecules, cells, tissues, and the body are presented. Factors affecting biological response are presented, including acute and chronic effects of radiation. 3 s.h.

Course Readings

Group	Title	Author	ISBN
Required	Radiation Safety and Radiobiology In Medical Imaging, 10th Edition	Mary Alice Statkiewicz Sherer, AS, RT(R), FASRT, Paula J. Visconti, PhD, DABR, E. Russell Ritenour, PhD, DABR, FAAPM, FACR and Kelli Welch Haynes, EdD, RT(R), FASRT, FAEIRS	9780443123535

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Day	Date	Reading(s)	Proposed Topic	Due/To Prepare for Class
Tue	8/25	Syllabus Chapter 1: Introduction to Radiation Protection	Introduction to Radiation Protection	
Thu	8/27	Chapter 2: Radiation; Types, Sources, and Doses	Radiation Types and Sources	
Tue	9/1	Chapter 3: X-Ray Interactions with Matter Clover Course: X-Ray Production & Safety Module: X-Ray Interactions with Matter Lessons: Attenuation, Coherent Scatter, Photoelectric Scatter, and Compton Scatter	X-Ray Interactions with Matter	QUIZ 1: Chapters 1 and 2



Thu	9/3	Chapter 4: Radiation Quantities and Units Clover Course: X-Ray Production & Safety Module: Radiation Units of Measurement Lessons: Radiation Measurements Overview, Air Kerma & Exposure, and Absorbed Dose	Radiation Units I	
Tue	9/8	Chapter 4: Radiation Quantities and Units Appendix A Clover Course: X-Ray Production & Safety Module: Radiation Units of Measurement Lessons: Equivalent Dose and Effective Dose	Radiation Units II and Dose Calculations	ASSIGN: Assignment 1 Radiation Measurements and Distance Safety Worksheet
Thu	9/10	Chapter 5: Overview of Cell Biology	Cell Biology	QUIZ 2: Chapters 3 and 4
Tue	9/15	Chapter 6: Molecular and Cellular Radiation Biology Clover Course: X-Ray Production & Safety Module: Radiation Biology Lesson: Direct vs Indirect Effect	Molecular Effects of Radiation	DUE: Assignment 1
Thu	9/17	Chapter 6: Molecular and Cellular Radiation Biology Clover Course: X-Ray Production & Safety Module: Radiosensitivity Lessons: Radiosensitivity Introduction, Radiosensitivity (Radiation Type), and Radiosensitivity (Oxygenation)	Factors Affecting Radiosensitivity	
Tue	9/22	Chapters 5-6 Clover Course: X-Ray Production & Safety Module: Radiosensitivity Lesson: Radiosensitivity (Tissue Type)	Cell and Tissue Radiosensitivity	QUIZ 3: Chapters 5 and 6
Thu	9/24		Exam 1: Chapters 1-6	
Tue	9/29	Chapter 7: Early Effects of Radiation Exposure Clover Course: X-Ray Production & Safety Module: Radiation Biology Lessons: Stochastic vs Deterministic and Early & Late Effects of Radiation Exposure	Early Radiation Effects	
Thu	10/1	Chapter 7: Early Effects of Radiation Exposure Clover Course: X-Ray Production & Safety Module: Radiation Biology Lesson: Acute Radiation Syndrome (ARS)	Acute Radiation Syndrome	
Tue	10/6	Chapter 8: Late Effects of Radiation Exposure Clover Course: X-Ray Production & Safety Module: Radiation Biology Lesson: Carcinogenesis	Late Radiation Effects and Carcinogenesis	
Thu	10/8	Chapter 8: Late Effects of Radiation Exposure Clover Course: X-Ray Production & Safety Module: Radiation Biology Lesson: Embryonic & Fetal Effects	Embryo and Fetal Effects	ASSIGN: Assignment 2 Radiobiology and Radiosensitivity Case Analysis
Tue	10/13	Chapters 7-8	Biological Effects of Radiation	QUIZ 4: Chapters 7 and 8
Thu	10/15	Chapter 9: Dose Limits for Exposure to Ionizing Radiation	Radiation Protection Agencies and Regulations	DUE: Assignment 2
Tue	10/20	Chapter 9: Dose Limits for Exposure to Ionizing Radiation	Radiation Dose Limits	QUIZ 5: Chapter 9 ASSIGN: Assignment 3 Dose Limits, Regulations, and Pregnancy Case Study



Thu	10/22		Exam 2: Chapters 7-9	
Tue	10/27	Chapter 10: Equipment Design for Radiation Protection Clover Course: X-Ray Production & Safety Module: Radiation Protection Lessons: Shielding, Filtration Measurements, and Half-Value Layers (HVL)	Equipment Design for Radiation Protection	DUE: Assignment 3
Thu	10/29	Chapter 11: Management of Patient Radiation Dose	Patient Protection in Radiography	
Tue	11/3	Chapter 11: Management of Patient Radiation Dose Clover Course: Fundamentals of Fluoroscopy Module: Safety Lesson: Fluoroscopic Dose Measurements	Patient Considerations and Dose Documentation	ASSIGN: Assignment 4 Patient Dose and Repeat-Reduction Plan
Thu	11/5	Chapter 11: Management of Patient Radiation Dose Clover Course: Fundamentals of Fluoroscopy Module: Modes of Operation Lessons: Spot Imaging & Last Image Hold, Multifield Intensification, Modes of Operation, and Pulsed Fluoroscopy and Frame Averaging Module: Safety Lesson: Reducing Patient Dose	Patient Protection in Fluoroscopy	
Tue	11/10	Chapter 12: Management of Occupational Radiation Dose Clover Course: X-Ray Production & Safety Module: Radiation Protection Review Lessons: Cardinal Rule (ALARA) and Shielding	Personnel Protection: ALARA, Time, Distance, and Shielding	QUIZ 6: Chapters 10 and 11 DUE: Assignment 4
Thu	11/12	Chapter 12: Management of Occupational Radiation Dose Clover Course: Fundamentals of Fluoroscopy Module: Safety Lesson: Reducing Occupational Dose	Protective Devices	ASSIGN: Assignment 5 Fluoroscopy and Mobile Personnel Protection Plan
Tue	11/17	Chapter 12: Management of Occupational Radiation Dose Clover Course: Fundamentals of Fluoroscopy Module: Safety Lessons: Fluoroscopy Iso Curves and Distance in Fluoroscopy	Mobile and Fluoroscopy Personnel Protection	
Thu	11/19	Chapter 13: Radiation Monitoring Clover Course: X-Ray Production & Safety Module: Radiation Detection Devices Lessons: Radiation Detection Overview, Occupational Dosimetry, and TLD & OSL Dosimeters	Personnel Dosimeters	QUIZ 7: Chapter 12 DUE: Assignment 5
Tue	11/24	Chapter 13: Radiation Monitoring Clover Course: X-Ray Production & Safety Module: Radiation Detection Devices Review Lessons: Occupational Dosimetry and TLD & OSL Dosimeters	Personnel Monitoring Program	ASSIGN: Assignment 6 Dosimetry Record and Radiation Safety Audit
Thu	11/26	No Class		
Tue	12/1	Chapters 14-16	Modality-Specific Radiation Safety and Radioactive Materials	QUIZ 8: Chapter 13 DUE: Assignment 6
Thu	12/3		Exam 3: Chapters 10-13, 16	
Thu	12/10	800am - 1000am	Final Exam	

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