Spring 2-1-2024

AHXR 225.01: Radiobiology / Radiation Practicum

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UNIVERSITY OF MONTANA
MISSOULA COLLEGE

Spring Semester, 2024
AHXR 225-001 Radiobiology/Radiation Practicum
Credits: 2
Location: This class will be held in our Radiologic Technology Program Classroom/Lab.

Time/Day: Thursdays from 1:30 PM-2:50 PM.

Instructor:
Victor White, PhD, RT (R)
Office: Missoula College, Room 302.
Office Hours: Fridays Noon-500 PM or by appointment.
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Texts for this course:

- **Required**: ***Radiation Protection in Medical Radiography, 9th Ed., Statkiewicz Sherer, M.A., Visconti, P.J., Ritenour. E. R., & Haynes, K.W. (2022). Elsevier: St. Louis., MO. ISBN: 9780323825030, 0323825036***

- ***Supplemental Text: Selman's THE FUNDAMENTALS OF IMAGING PHYSICS AND RADIOBIOLOGY (10th Ed.)*** **White, V. 2021.**

- **Note: Some items will be provided by the course instructor.**

Controversial and/or Potentially Offensive Topics

Intellectual diversity is the foundation of a learning environment that exposes students to a variety of political, ideological, and other perspectives. This course may cover controversial and/or potentially offensive topics.

Completion of Exams and All Assignments

All tests and assignments must be completed or turned in no later than midnight on May 5, 2024

Make Up Tests and Assignments

Make up tests and assignments are at the discretion of the instructor.

Attendance is required for this course: In-Person or asynchronous online attendance for all classes is highly recommended to enhance student learning and successful course completion. **You must earn an "80% or "B" or better in all Radiologic Technology courses to continue in the Radiologic Technology program.** An excused absence, for illness, must be accompanied by a written and signed statement from your physician, PA or Nurse Practitioner explaining your absence. Emergency absences, such as death in the immediate family, will be handled on an individual basis, but the instructor should be notified before class when possible.

Methods of Instruction/Teaching Aids: In-Person, recorded or asynchronous online lecture, discussion and audio-visual aids. Use of Power Points and Instructor Handouts and online learning modalities will be utilized.

Course Description

Emphasizes radiation safety and the biological effects of radiation on the human body/ Explores the various modalities including equipment requirements, design and quality assurance.

At the conclusion of this course the student will:

- Demonstrate radiation protection for patients and personnel.
- Properly perform reduction in radiation doses.
- Identify the different interactions of X-radiation with matter.
- State the radiation dose limits for the public and staff of a radiology department.
- Explain the ALARA concept.
- Describe various radiation measuring devices.
- Discuss the many ways to block irradiation.
- Evaluate the effects of radiation on the human body.
- Discuss Radiation Safety Programs.

Grading Scale/Process

Attendance/Participation	**10%**	
Homework/Quizzes	**15%**	**A= 100% - 90%**
Test 1	**25%**	**B = 89% - 80%**
Test 2	**25%**	**C = 79% - 70%**
Test 3	**25%**	**D = 69% - 60%**
		F= 59% or below.
Total	**100%**	

Things You Will Be Learning

We will learn together about the definition of radiation, radiobiology, and radiation protection. We will learn how to protect the patient, the radiation worker and you from unnecessary radiation exposure. We will use mathematics, facts and concepts to teach each other important components of radiation safety practices. The following schedule of activities and due dates are simply a guide of what we would like to cover in this class this semester. Activities and due dates can be changed in order to enhance student learning and successful course completion.

Note: All content in this syllabus is subject to change per the instructor in order to enhance student learning and successful course completion.

Note: The Radiation Protection in Medical Radiography, 9th Ed., Statkiewicz Sherer, M.A., Visconti, P.J., Ritenour. E. R., & Haynes, K.W. (2022) textbook is the main book we will use and will guide all major topics of this class.

Homework: In addition to participation/attendance and tests you will write a 1-2 page review of each of the articles listed in the syllabus timeline. In your review discuss:

1. The main points of the article
2. Your impression of the article

These SEVEN reviews are due as submissions in Moodle by the last day of class before taking your final exam on **May 10, 2024 by Midnight.**

Tentative Schedule of Classes

AHXR 225 Radiobiology/Radiation Protection

Spring 2024 Thursdays from 1:30 PM-2:50 PM.

Wk	Date	Statkiewicz Sherer, Radiation Protection Text, 9th Edition Topic(s)	Statkiewicz Sherer, Radiation Protection Text, 9th Edition Assignments	Video Assignments & Other Resources	Instructor PowerPoints to View or Articles to Read	Selman's Textbook Readings & Assignments
1	1-18-24	**Introduction to syllabus, books and class.** Chapter 1: Introduction to Radiation Protection.	Read all of Chap 1 & complete all Chap 1 Review Questions.		**Read Article: X-Ray-Part 1** Risk Assessment PowerPoint and Risk Assessment.	

2	1-25-24	Chapter 2: Radiation: Types, Sources and Doses Received.	Read all of Chap 2 & complete all Chap 2 Review Questions	Watch: • What is ionizing radiation? • What is radiation? • Physics – Radioactivity – Introduction • Types of Nuclear Radiation	**Read Article: X-Ray Part II**	
3	2-1-24	Chap 3. Interaction of X-Rays with Matter.	Read all of Chap 3 & complete all Chap 3 Review Questions.	Watch: • XRayBob X-Ray Interactions with Matter	Harvard-Sources of Background Radiation PowerPoint. **Read Article: Radon**	
4	2-8-24	Chapter 4. Radiation Quantities and Units.	Read all of Chap 4 & complete all Chap 4 Review Questions.	Read: • Radiation Quantities and Units (FDA)	Harvard- Radiation Quantities and Units PowerPoint.	
5	2-15-24	Chap 5. Radiation Monitoring. **Review for Test 1.**	Read all of Chap 5 & complete all Chap 5 Review Questions. **Review for Test 1.**		Radiation Monitoring PowerPoint Chris Martel Harvard PowerPoint **Read Article: Japanese Earthquake**	
6	**2-22-24**	**Test 1: Chap 1-5, Harvard Power Points and Instructor Handouts/Items.**	**Test 1**			
7	2-29-24	Chap 6. Overview of Cell Biology.	Read all of Chap 6 & complete all Chap 6 Review Questions.	Watch: • Biology: Cell Structure | Nucleus Medical Media		

8	3-7-24	Chap 7: Molecular and Cellular Radiation Biology.	Read all of Chap 7 & complete all Chap 7 Review Questions.	Watch: • The effects of radiation on our health		
9	3-14-24	Chap 8: Early Tissue Reactions and Their Effects on Organ Systems. **Review for Test 2.**	Read all of Chap 8 & complete all Chap 8 Review Questions. **Review for Test 2.**	Watch: • Radiation Effects on the Body Early Effects • The Story of the Radium Girls | A Short Documentary | Fascinating Horror • The GLOWING CURSE: The Radium Girls' TRAGIC Fate	Early Effects Documents/Power Points. **Read Article: Radium Girls** **Read Article: Edison**	
10	3-21-24	Spring Break, No Class.	Spring Break, No Class.			
11	3-28-24	**Test 2: Chap 6-8, Harvard and Other Power Points and Instructor Handouts/Items.**	**Test 2**			
12	4-4-24	Chap 9: Stochastic Effects and Late Tissue Reactions and Radiation in Organ Systems.	Read all of Chap 9 & complete all Chap 9 Review Questions.	Watch: • Radiation Effects on the Body - Late Effects (youtube.com) • Hiroshima Victims + Nuclear Holocaust Test Footage at Bikini - Bing video	Late Deterministic Effects Documents/ PowerPoints. Harvard PowerPoint: Biological Effects of Radiation.	***Read Selman's Chap 27 Radiobiology*** **and** answer the End of Chapter Questions.
13	4-11-24	Chap 10: Dose Limits for Exposure to Ionizing Radiation.	Read all of Chap 10 & complete all Chap 10 Review Questions.	Watch: • MedPhys - 25.2 - Radiation Protection: Risk models, dose limits and monitoring. (youtube.com)		
14	4-18-24	Chap 11: Equipment Design for Radiation Protection.	Read all of Chap 11 & complete all Chap 11 Review Questions.	Watch: • An Introduction to Radiation Shielding (youtube.com)	Management of Patient Dose Power Points/Handouts. Imaging Personnel Dose. **Read Article: Cancer & You**	

15	**4-25-24**	Chap 12: Management of Patient Radiation Doses During Diagnostic X-Ray Procedures and Chap 14: Management of Imaging Personnel Radiation Dose During Diagnostic X-Ray Procedures. **Review for Test 3.**	**Review for Test 3.**	Watch: • Radiation Safety - Patient Protection (youtube.com) • Radiation Safety - Personnel Protection (youtube.com)		Read Selman's **Chapter 28 Protection in Radiology- Health Physics and answer the End of Chapter Questions**.
16	**5-2-24**	**Test 3:** **Chap 9,10,11,12 & 14.** **Selman's Chap 27 & 28,** **Harvard Power Points, Other Power Points & Instructor Handouts/Items.**	**Test 3**			

Classroom Etiquette

Instructors have the responsibility to set and maintain standards of classroom etiquette appropriate to the discipline and method of teaching. You are expected to be respectful and display professional behavior at all times which includes respectful behavior with your fellow students, guests and the instructor(s). Instructors have the right to remove students who are disrupting the learning environment from the classroom. Repetition of the activity may result in expulsion from the course or dismissal from the program. **Personal pagers and cellular phones (including texting) are not to be used in the classroom or clinical site except for emergencies and with the prior approval of the instructor/clinical instructor.**

Academic Honesty

Cheating, plagiarism, and other acts of academic dishonesty are regarded as serious offenses. Depending on the nature of the offense, serious penalties may be imposed, ranging from loss of points to expulsion from the class or college.

Academic Conduct

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321.

Disability Support Services (DSS)

The University of Montana and Missoula College are committed to providing equal access. Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely manner. Please be prepared to provide a letter from your DSS Coordinator.

Student Health Services

Student Health Services provides medical care, mental health counseling, wellness services and education, and violence advocacy and prevention services at the Curry Health Center. The Medical and Dental clinics, Pharmacy and Wellness are located on the upper level of the Curry Health Center. You can access these areas by using the main entrance and coming up the stairs. Counseling is located on the lower level and is accessed by the west entry. There are elevators at both of these entrances.

- Curry Health Center is located at: 634 Eddy Ave, Missoula, MT 59812.
- Phone: 406-243-4712
- Hours: Monday - Friday 8:00 A.M. - 5:00 P.M.
- Appointments are scheduled as tele-counseling or in-person thru the Curry Health portal or by calling 406-243-4712.
- 24/7 Montana's Suicide Prevention and Mental Health Crisis Lifeline, call 988
- For crisis after hours you can also contact the Emergency Room at St. Patrick Hospital or Community Medical Center

University of Montana Missoula College supports a drug free environment: Any student who demonstrates a pattern of behavior that suggests drug or alcohol abuse will be asked to leave class and must participate in a counseling program prior to continued attendance. Continued abuse may result in a reprimand, probation, restriction, suspension or expulsion.