RADR 2313: Radiation Biology and Protection

Course Information

Name	RADR 2313: Radiation Biology and Protection
Credit	3 hours
Term	Spring 2021
Time	**This course is online. Content will release Monday mornings at 8:00 am.**
Dates	January 11 – May 7
Time Commitment	Students should expect to spend 5 hours per week on course material (15-week term)
Prerequisites	● Successful completion of all previous radiology course work ● Current enrollment in RADR 1213, 1361 & 2401

Professor

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Course Description

This course examines interactions of radiation with matter, biologic effects of ionizing radiation, quantities and units of measurement, dose-response curves, and patient/personnel protection.

Course Objectives

Upon completion of this course, the student will:

- Explain the effects of radiation exposure on biological systems.
- Describe the biophysical mechanisms of radiation damage and the somatic/genetic effects of radiation exposure on humans.
- State typical dose ranges for routine radiographic procedures.
- Explain the basic methods and instruments for radiation monitoring, detection, and measurement.
- Identify methods for protecting personnel and patients from excessive radiation exposure.
- Apply appropriate radiation protection practices.

Teaching Methodology

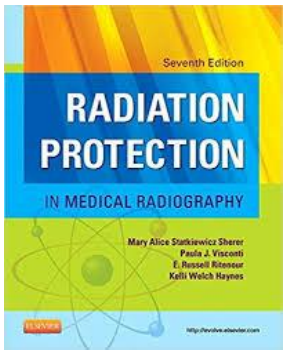
This course is taught using a flipped model of classroom instruction. This includes virtual topic content on Canvas modules, individual assessment quizzes, reading assignments, module tests over reading material, discussions, and a closed book final examination.

Course Materials

Textbooks

Required

Statkiewicz-Sherer, M. A., Visconti, P., Ritenour, E. R., and Haynes, K. W. (2014). *Radiation protection in medical radiography* (7th Ed.). Maryland Heights, MO: Elsevier. ISBN: 978-0-323-17220-2



Computer Requirements

You need access to an up-to-date computer with an internet connection in this course.

Assignments

There are four types of assignments in this course. The grading will be as follows:

1.	Video Assessments	10%
2.	Radiation Accident Presentation Group Project	20%
3.	Module Tests	30%
4.	Final Examination	40%

Course Modules

Module 1: Molecular, Cellular, & Whole-Body Radiobiology

- Chapter 6: Overview of Cell Biology
- Chapter 7: Molecular and Cellular Biology
- Chapter 8: Early Deterministic Radiation Effects on Organ Systems
- Chapter 9: Late Deterministic and Stochastic Radiation Effects on Organ Systems

Module 2: Radiation Protection

- Chapter 2: Radiation: Types, Sources, and Doses Received
- Chapter 3: Interaction of X-Radiation with Matter
- Chapter 4: Radiation Quantities and Units

Module 3: Radiation Dosimetry

- Chapter 5: Radiation Monitoring
- Chapter 10: Dose Limits for Exposure to Ionizing Radiation
- Chapter 11: Equipment Design for Radiation Protection
- Chapter 12: Management of Patient Radiation Dose during Diagnostic X-Ray Procedures
- Chapter 13: Management of Imaging Personnel Radiation Dose during Diagnostic X-Ray Procedures

Important Dates

The schedule is subject to change.

Date	Topic Content will release **Monday's at 8:00** am on Canvas	Assignment Due	Module Test
1/11 – 1/17	**Go Over Syllabus & Course Expectations**	Discussion (1/17)	
1/18 – 1/24	Overview of Cell Biology	• Video Assessment #1 (1/20)	
1/25 – 1/31	Molecular & Cellular Radiation Biology	• Video Assessment #2 (1/27)	
2/1 – 2/7	Early Deterministic Radiation Effects	• Video Assessment #3 (2/3)	
2/8 – 2/14	Late Deterministic & Stochastic Radiation	• Video Assessment #4 (2/10)	
2/15 – 2/21	Radiation: Types, Sources, and Doses Received	• Video Assessment #5 (2/17)	**Test 1 (2/17)**
2/22 – 2/28	Interaction of X-Radiation with Matter	• Video Assessment #6 (2/24)	
3/1 – 3/7	**EXIT EXAM**		**EXIT EXAM (3/3)**
3/8 – 3/14	**Happy Spring Break!!!** 😊		
3/15 – 3/21	Radiation Quantities and Units	• Video Assessment #7 (3/17)	
3/22 – 3/28	Radiation Monitoring	• Video Assessment #8 (3/24)	**Test 2 (3/24)**
3/29 – 4/4	Dose Limits for Exposure to Ionizing Radiation	• Video Assessment #9 (3/31)	
4/5 – 4/11	Equipment Design for Radiation Protection	• Video Assessment #10 (4/7)	
4/12 – 4/18	Management of Patient Radiation Dose during Diagnostic X-Ray Procedures	• Video Assessment #11 (4/14)	
4/19 – 4/25	Management of Imaging Personnel Radiation Dose during Diagnostic X-Ray Procedures	• Video Assessment #12 (4/21)	
4/26 – 5/2	**Project Presentations**	**Project Presentations**	**Test 3 (3/28)**
5/5	**COMPREHENSIVE FINAL EXAM**	**FINAL**	**Final (5/5)**

Evaluation

Grade Scale

A=100-90
B=89-80
C=79-75
D=74-60
F=59 and below

Grading Cycle

All assignments are graded together as a group to maintain a higher level of consistency. Grading begins on the first business day after a due date (outside of university holidays and professional meetings) and is typically completed before the next due date. You may track your progress through the Gradebook in CANVAS.

Feedback

Feedback varies throughout the course. The announcement section of the course is where I will send messages to the entire class. It is best to set up your CANVAS account to receive an email notification (to the email of your choice) when announcements are posted, so you do not miss important updates.

1. Click the Account tab
2. Select Notifications
3. Each notification is set to a default preference. To change a notification for a contact method, locate the notification, and click the icon for your preferred delivery type.
4. Check the email address you wish to send email notifications. If you need to change this, go to the Settings Tab and enter the new email address. This email address should be an email address you check frequently.

You are welcome to email questions to clarify concepts or look for further explanations. If I come across repeated questions, I will provide feedback or supplementary resources in the Announcement section of the course so that everyone can benefit from it. You might look there first, because your question may be located there.

Late Work

The professor normally does not accept late assignments without prior approval and proper documentation for the rationale. In extreme emergencies, the professor may grant an extension after the due date has passed with acceptable documentation from the student. Group projects will **never** be granted extensions. All course work must be completed in the semester the course is taken. The professor does not give incomplete grades.

Final Course Grade

This is a progression course in the radiology program. A final course score of 75% is required to pass this course. Any grade below 75% will result in the student being dismissed from the program. Any withdrawal from this course will result in the student being dismissed from the radiology program. If the student is dismissed, the student will need to reapply for program admission under the rules then in force. This course will have to be repeated.

Radiation Biology and Protection Assignment Details

Video Assessments (10%):

These video assessments will follow each video lecture. They will only be 5-10 questions. The purpose of these are to assess student understanding of each topic presented and they will be used to track student attendance. Students are to complete these individually **ON CANVAS** by date indicated on the schedule.

Radiation Accident Presentation Group Project (20%):

This presentation will be on a radiologic incident/accident from an academic database…aka NOT Wikipedia. Students should use the information from the database to create a 10 minute presentation that includes:

- A description of the incident/accident
- How the accident could have been prevented (if preventable)
- Relate the radiological effects to topics covered in this class

Students may need to find more than one source to be able to have adequate discussion. Groups should choose their topics and post them in the appropriate discussion board. Only one group may do a particular topic and topics are selected on a first come - first served basis. Students should not choose topics such as Chernobyl, Hiroshima and Nagasaki, or Three Mile Island as these topic cover more than what can be discussed in 10 minute presentation.

Module Tests (30%):

There are 3 module tests. These tests will be made up of multiple choice, matching, and fill in the blank questions. Sources for the questions will be from: the textbook, chapter power points, and video lectures. Module tests will typically have 20-50 questions and will be **COMPLETED ON CANVAS** on the date indicated in the schedule.

Final Examination (40%):

The Final Examination will cover Chapters 2 - 13. The exam will be made up of 100 multiple choice questions. Sources for the questions will be from: the previous quizzes and module tests; the textbook; chapter power points; and lectures. This exam will be **CONDUCTED ON CAMPUS**. Students will have the two-hour final examination period to complete the examination. There will be **NO FINAL REVIEW** for this exam.

Technical Difficulties

On occasion, you may experience problems with accessing CANVAS, accessing class files located within CANVAS, connecting with your internet service, or you may encounter other computer related problems. Make the professor aware of a technical problem as soon as possible. If a problem occurs on our end, such as CANAS failure, then a due date extension will typically be granted**. However, keep in mind it is your responsibility to have (or have access to) a working computer in this class.** ***Assignments and tests are due by the due date, and personal computer technical difficulties will not be considered reason for the instructor to allow students extra time to submit assignments, tests, or discussion postings.***

Dropbox assignments that can be attached in an email should be emailed to the professor as soon as a problem is encountered. Failure to do so may result in points being lost, regardless of connection issues.

Attendance

Attendance is required for all class sessions. Grayson College states that a student may have up to three absences before they are dismissed from the program. Students arriving 5 minutes or later will be tardy and 3 tardies counts as 1 absence. Students that leave early will be counted as tardy. A clinical absence the day before an exam will result in an automatic 10-point deduction from the exam.
****This course is conducted with majority online. Attendance is monitored through video assessment. Students must complete assignments within due dates indicated on schedule to receive attendance grade.**

Requesting a Withdrawal

The Grayson College administration has set deadlines for withdrawal from any college course. These dates and times are published in the semester's schedule of classes. All withdrawals **must be initiated by the student**. After this date dropping the course results in a grade of "F". Withdrawal from this course will result in the student being dismissed from the radiology program.

Special Needs

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Grayson College endeavors to make reasonable adjustments in its policies, practices, services, and facilities to ensure equal opportunity for qualified persons with disabilities to participate in all educational programs and activities.

The Office of Disability Services (ODS) provides information and assistance, arranges accommodations, and serves as a liaison for students, professors, and staff. The ODS has assistive devices such as books on tape, recorders, and adaptive software which can be loaned to qualified individuals. A student/employee who seeks accommodations based on disability must register with the Office of Disability Services in the Student Success Center; Room 115. Documentation of disability from a competent professional is required.

Individuals with grievances related to discrimination or lack of accommodation based on a disability are encouraged to resolve the problem directly with the area involved. If the matter remains unresolved, the Office of Disability Services for resolution will provide advice and/or assistance.

The contact for the Office of Disability Services is:

Jeffri Hodge: (903)463-8751 or hodgej@grayson.edu

Academic Integrity

RADR 2313 and all radiology course work adheres to a higher standard.

In particular, academic dishonesty, however small, creates a breach in academic integrity. A student's participation in this course comes with the expectation that his or her work will be completed in full observance of the academic integrity.

All components of RADR 2313 are designed to represent the efforts of each student individually and are NOT to be shared, copied, or plagiarized from other sources. When students submit their efforts for grading, they are attesting they abided by this rule.

An online plagiarism service may be used in this course. Student assignments may be uploaded to the service for identification of similarities to other student papers and published works.

Cheating includes, but is not limited to

- Use of any unauthorized assistance in taking quizzes, tests, or examinations;
- Dependence upon the aid of sources beyond those authorized by the professor in writing papers, preparing reports, solving problems, or completing other assignments; or
- The acquisition of tests or other academic materials belonging to the university faculty or staff without permission.

Plagiarism includes, but is not limited to

- The use of, by paraphrase or direct quotation without correct citation in the text and in the reference list,
- The published or unpublished works of another person.
- Students may NOT submit papers and assignments that they have previously submitted for this or other courses.
- The use of materials generated by agencies engaged in "selling" term papers is also plagiarism.

Academic dishonesty (cheating, plagiarism, etc.) will not be tolerated in this class. Whenever a student is unsure of whether a particular situation will be interpreted as academic dishonesty, he/she should ask the professor for clarification. If students are guilty of academic dishonesty, a grade of zero (0) will be given for the quiz, assignment, etc.

Students are encouraged to review the tutorials and suggested websites for more information about plagiarism. If you have any questions about what constitutes plagiarism, please consult:

- The University Academic Dishonesty Policy
- The website Plagiarism.Org, or
- The professor