



MIDWESTERN STATE UNIVERSITY

*Gunn College of Health Sciences and Human Services
Shamadzu School of Radiologic Sciences
Bachelor of Science, Radiologic Technology Program
Course Syllabus - Dr. Rodney Fisher*

RADS 3763 Radiation Protection and Biologic Responses

Course Information

Name	RADS 3763 Radiation Protection and Biologic Responses
Credit	3 hours
Term	Fall 2020
Time & Location	Wednesday, Centennial Hall 230 Section A: 1:00pm-1:50pm Section B: 2:00pm-2:50pm Section C: 3:00pm-3:50pm
Dates	August 24, 2020 – December 10, 2020
Time Commitment	Students should expect to spend 2 hours online, 1 hour in lecture and at least 9 hours studying per week on course material (15 week term)
Prerequisites	None

Professor

Rodney Fisher, PhD, R.T. (R) (N) (CT) (BD), CNMT

Assistant Professor, Radiologic Sciences

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Office: Midwestern State University
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Wichita Falls, TX 76309

Office hours: Student Specific: Tuesdays 1 pm – 4 pm & Wednesdays 9 am – 11 am
General: Thursdays 9 am – 12pm & 1 pm – 3 pm
and by appointment (preferred)

Communicating with the Professor

I prefer email so there is a record of the communication and often I am away from my desk. Phone calls may be answered by email when appropriate. I will respond or at least acknowledge all student communications within five (5) business days. If this time period will be longer because I am out of town or for another reason, a news item will be posted online in D2L for the class. Please always give me the time asked for to respond before repeating your request.

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 and personnel protection.

Course Objectives

Upon completion of this course, you will:

- Explain the effects of radiation exposure on biological systems.
- Describe the biophysical mechanisms of radiation damage and the somatic and genetic effects of radiation exposure on humans.
- State typical dose ranges for routine radiographic procedures.
- Explain 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

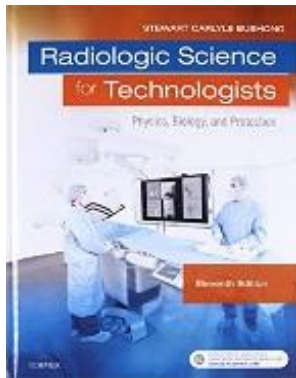
This course is taught using a hybrid of traditional lecture and social constructivism methodologies. There will be individual reading assignments, quizzes over reading material prior to class lectures and discussions, group projects and presentations, and a closed book final examination.

Course Materials

Textbooks

Required

Bushong, S.C. (2017). *Radiologic Science for Technologists* (11th Ed.). St. Louis, MO: Elsevier. ISBN: 978-0-323-35377-9



Computer Requirements

You need access to an up-to-date Windows or Mac computer with an good internet connection in this course. You will also need a webcam and microphone for any Zoom sessions and remote testing. NOTE: Chromebook will not work for this course. D2L does not work well with Internet Explorer. Chrome or Firefox are the preferred browsers when working in D2L.

You will also need a subscription to Top Hat. Several courses in Fall 2020 and Spring 2021 including this one will use Top Hat as a curriculum delivery method.

You will also need a subscription to Rad Tech Boot Camp (RTBC). I will incorporate some of the content in RTBC for you to review. You will use RTBC in multiple courses throughout the remainder of your program.

Assignments

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

- | | |
|---|-----|
| 1. Irradiated Seed Group Project | 10% |
| 2. Radiologic Accident Presentation Group Project | 10% |
| 3. Chapter Quizzes | 10% |
| 4. Module Tests (4) | 40% |
| 5. Final Examination | 30% |

Course Modules

Module 1: Molecular and Cellular Radiobiology

Chapter 29: Human Biology

Chapter 30: Fundamental Principles of Radiobiology

Chapter 31: Molecular Radiobiology

Chapter 32: Cellular Radiobiology

Module 2: Whole Body Radiobiology

Chapter 33: Deterministic Effects of Radiation

Chapter 34: Stochastic Effects of Radiation

Module 3: Radiation Protection

Chapter 35: Health Physics

Chapter 36: Designing for Radiation Protection

Module 4: Radiation Dosimetry

Chapter 37: Radiography/Fluoroscopy Patient Radiation Dose

Chapter 39: Patient Radiation Dose Management

Chapter 40: Occupational Radiation Dose Management

Important Dates**All times are MSU campus time. Schedule is subject to change.**

Date	Required Reading	Lecture Videos	Quiz/Project
August 26	29 Human Biology	Course Introduction 29-1: Cellular Biology and Reproduction 29-2: Radiosensitivity of Cells	Quiz Chapter 29 due Friday, August 28 11:59pm
September 2	30 Fundamental Principles of Radiobiology	30-1 Ionization and Linear Energy Transfer 30-2 Biological Factors Affecting Radiosensitivity 30-3 Dose Response Curves	Quiz Chapter 30 due Tuesday, Sept 1 11:59pm
September 9	31 Molecular Radiobiology	31-1 Radiation Cellular DNA Responses 31-2 Radiolysis of Water	Quiz Chapter 31 due Tuesday, Sept 8 11:59pm
September 16	32 Cellular Radiobiology	32-1 Target Theory 32-2 Cell Survival Kinetics 32-3 Radiation Effect Modifications	Quiz Chapter 32 due Tuesday, Sept 15 11:59pm
September 23	Module 1 Test (Chapters 29-32)		
September 30	33 Deterministic Effects of Radiation	33-1 Acute Radiation Syndrome 33-2 Local Tissue Damage	Quiz Chapter 33 due Tuesday, Sept 29 11:59pm
October 7	34 Stochastic Effects of Radiation	34-1 Risk Estimates 34-1 Radiation Induced Malignancy	Quiz Chapter 34 due Tuesday, October 6 11:59pm
October 16	Module 2 Test (Chapters 33-34)		

All times are MSU campus time. Schedule is subject to change.

Date	Required Reading	Lecture Videos	Quiz/Project
October 23	35 Health Physics	35-1 Cardinal Principles of Radiation Protection 35-2 Types of Radiation Doses and Radiologic Terror Devices 35-3 Radiation Shielding	Quiz Chapter 35 due Tuesday, October 22 11:59pm
October 30	36 Designing for Radiation Protection	36-1 Radiographic Protection Features 36-2 Design of Protective Barriers 36-3 Radiation Detection Devices	Quiz Chapter 36 due Tuesday, October 29 11:59pm
November 4	Module 3 Test (Chapters 35-36)		
November 11	37 Radiography & Fluoroscopy Patient Radiation Dose	37 Radiography & Fluoroscopy Patient Radiation Dose	Quiz Chapter 37 due Tuesday, Nov 10 11:59pm Seed Project Presentations
November 18	39 Patient Radiation Dose Management -&- 40 Occupational Radiation Dose Management	39-1 Reducing Unnecessary Radiation Dose 39-2 Patient Pregnancy 40 Occupational Radiation Exposure Limits and Regulations	Quiz Chapter 39 and 40 due Tuesday, Nov 17 11:59pm Group Project Presentations
November 25	No class – Thanksgiving November 26th!		

All times are MSU campus time. Schedule is subject to change.

Date	Test
December 2 (Online)	Module 4 Test (Chapters 37,39-40) Respondus Lockdown Browser
December 9 (Online)	Final Examination with ProctorU at 10am Campus Time

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 D2L.

Feedback

Feedback varies throughout the course. The News section of the course is where I will send messages to the entire class. It is best to set up your D2L account to receive an email notification (to the email of your choice) when News items are posted, so you do not miss important updates.

1. Click the down arrow in the News section on the 3763 course home page
2. Select Notifications
3. Check the box next to "News - new item available" and then check any other boxes you wish to receive an email notification from.
4. Check the email address you wish to send email notifications. If you need to change this, select "change your email settings" 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 News 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

Online quizzes may not be made up if they are not completed by the due date. Module tests may be given prior to the testing date with prior approval. I normally do not give late tests except in extreme emergencies with acceptable documentation from the student. I reserve the right in this case to give a substitute test which may be a different format and could be more difficult. **Group projects and presentations** will never be granted extensions. All course work must be completed in the semester the course is taken. I do not give incomplete grades except as noted below.

Final Course Grade

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

Radiation Protection and Biological Responses Assignment Details

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

1. Irradiated Seed Group Project	10%
2. Radiologic Accident Presentation Group Project	10%
3. Chapter Quizzes	10%
4. Module Tests (4)	40%
5. Final Examination	30%

Irradiated Seed Group Project (10%):

Students will be in groups with 3-4 members. Each group will be given envelopes with seeds that have been exposed to ionizing radiation. Each group will also have an envelope with control seeds which have not been exposed to radiation. All envelopes will only have control numbers on them and will not say if the seeds have been exposed or if they are a part of the unexposed control seeds. The groups will plant the seeds in the potted soil provided and care for them during the semester. You will chart the progress of their plants taking photographs at assigned times. At the end of the project, each group will identify which of their pots had the control seeds, and which pots had seeds that had been irradiated. The groups will then estimate the radiation dose based on information in this course and information provided to them by the professor. This information including the photographs will be used to produce a poster detailing the experiment. Each group will be given a grade based upon a rubric which scores their participation during the semester and the final poster. All students in a given group will earn the same grade.

Radiation Accident Presentation Group Project (10%):

This presentation will be on a radiologic incident/accident from the following database:

<http://www.johnstonsarchive.net/nuclear/radevents/#4>

You 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

You may need to do research by finding any articles listed in the reference section of the incident files.

Additional articles from Google Scholar or the MSU database may be needed for a complete discussion of the topic. Groups should choose their topics 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. You 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.

Chapter Quizzes (10%):

Each of the 11 chapters will have a multiple-choice question quiz or quizzes that will be taken through Top Hat according to the published schedule. You are encouraged to first read the chapter, then take the quiz with their book and any notes ready. You should attempt the quiz individually and not work together. The purpose of the pre-lecture quizzes is for the student to determine what is not understood and create a list of questions that should be answered through the lecture.

In any class, I reserves the right to have a “pop quiz” without notice. If a pop quiz is given, it will be averaged into the chapter quiz grade.

Module Tests (40%):

There are four module tests. These tests will be made up of multiple choice and matching questions. Sources for the questions will be from: the previous quizzes and module tests; the textbook; chapter power points; and lectures. Module tests will typically have 30-75 questions and will be completed in the scheduled lecture session.

Final Examination (30%):

The Final Examination will cover Chapters 29 – 37, 39, and 40. 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. It will be given on the scheduled date published in the university final schedule unless otherwise notified. The examination will be given via ProctorU. You will have one hour to complete the examination

Technical Difficulties

On occasion, you may experience problems with accessing D2L, accessing class files located within D2L, 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 D2L 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. For help options:

- For D2L issues go online go to the Distance Education Helpdesk
- By phone call the Distance Education office at 940-397-4868 between 8am and 5pm.
- Use the D2L help link in D2L.
- Contact me.
- For other computer access issues, go online to the MSU Information Technology Website.

Attendance

Attendance is required for all class sessions. Since we only meet once a week, you may have one absence without penalty. However, remember that lab experiments and worksheets cannot be made up. Each absence after the first will result in 10% being taken off your semester grade. Should you be mathematically unable to achieve a semester grade of 75% due to a combination of grades and excessive absences, I may initiate your administrative withdrawal from the course. This will result in you being dismissed from the BSRT program at the end of the semester.

However, with the current pandemic, you are not to come to class if you are exhibiting any symptoms associated with COVID-19. You will need a physician's documentation of the illness and the physician's clearance to return to any class. In the event of a documented illness, I will help you to meet the requirements of this course, including providing alternative assignments, unless the duration of the illness precludes you having time to complete the course in a meaningful way. In this eventuality, your individual circumstances, and any decision to grant an incomplete grade, will be handled on a case-by-case basis. Please refer to the University's policies and expectations from [MSU Texas Return to Campus webpage](#) and [MSU Texas Coronavirus Update webpage](#). The health and safety requirements on these pages will be strictly enforced in all classes.

Requesting a Withdrawal

The last opportunity to drop this course with a grade of "W" is 4:00pm on December 4, 2020. All withdrawals **must be initiated by you**. After this date dropping the course results in a grade of "F". Withdrawal from this course will result in you being dismissed from the BSRT program.

In an emergency or extenuating circumstance, you may request a grade of "Incomplete" before grades are submitted. If I grant the "Incomplete," you have until thirty (30) days after the beginning of the next long

semester to complete the course requirements. If you do not complete the course requirements within the deadline, the grade of "Incomplete" will automatically convert into a grade of "F".

Special Needs

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Midwestern State University 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 Counseling Center; Clark Student Center Room 108. 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 grievance procedure may be found in the Student Handbook and Activities Calendar.

The Director of the Counseling Center serves as the ADA Coordinator and may be contacted at (940)397-4618, TDD (940)397-4515, or 3410 Taft Blvd., Clark Student Center Room 108.

Administrative Process

Unresolved issues related to this course should be first addressed between you and me. If there is no resolution, you must follow this sequence:

1. Department Chair – Dr. Beth Vealé (940-397-4611)
2. College Dean - Dr. Jeff Killion (940-397-4594)
3. Dean of Students – Matthew Park (940-397-7500)

Honor System

RADS 3763 adheres to the MSU Code of Conduct.

In particular, academic dishonesty, however small, creates a breach in academic integrity. Your participation in this course comes with the expectation that your work will be completed in full observance of the MSU Code of Student Conduct. You should consult the current Student Handbook for answers to any questions about the code.

All components of RADS 3513 are designed to represent the efforts of each student individually and are NOT to be shared, copied, or plagiarized from other sources. When you submit your efforts for grading, you are attesting you are abided by this rule.

An online plagiarism service may be used in this course. Your 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 me 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.
- You may NOT submit papers and assignments that you 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 you are unsure of whether a particular situation will be interpreted as academic dishonesty, you should ask me for clarification. If you are guilty of academic dishonesty, a grade of zero (0) will be given for the quiz, assignment, etc. Cases may also be referred to the Dean of Students for possible dismissal from the university.

You 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
- Me

Please Note

By enrolling in this course, you expressly grant MSU a "limited right" in all intellectual property created by you for the purpose of this course. The "limited right" shall include, but shall not be limited to the right to reproduce your work/ project in order to verify originality and authenticity, and for educational purposes. Specifically, faculty may submit your papers and assignments to an external agency to verify originality and authenticity, and to detect for plagiarism.

Senate Bill 11

Senate Bill 11 Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's campus carry webpage. If you have questions or concerns, please contact MSU Chief of Police Patrick Coggins by email at mpatrick.coggins@msutexas.edu.