



MIDWESTERN STATE UNIVERSITY

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

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**RADS 3763 Radiation Protection and Biologic Responses**

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**Course Information**

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<b>Name</b>	RADS 3763 Radiation Protection and Biologic Responses
<b>Credit</b>	3 hours
<b>Term</b>	Fall 2023
<b>Time &amp; Location</b>	Mondays & Wednesdays 1:00 pm – 2:20 pm Dillard 178
<b>Dates</b>	August 28, 2023 – December 11, 2023
<b>Time Commitment</b>	Students should expect to spend 3 hours in lectures and at least 9 hours per week on course material (15-week term)
<b>Prerequisites</b>	None

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**Professor**

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**Rodney Fisher, Ph.D., R.T. (R) (N) (CT) (BD), CNMT**

**Assistant Professor / Radiation Safety Officer**

**E-mail:** [Rodney.Fisher@msutexas.edu](mailto:Rodney.Fisher@msutexas.edu)

**Phone:** (940) 397-4615      **Fax:** (940) 397-4845

**Office:**      Midwestern State University  
                  3410 Taft Blvd, Centennial Hall 430N  
                  Wichita Falls, TX 76309

**Office hours:** Student Specific: Mondays 3:00 – 4:00, Tuesdays 1:00 – 3:00, and Wednesdays 10:00 – 12:00.  
Appointments always take preference over walk-ins. If calling, please email for a time first.

## **Communicating with the Professor**

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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 to or acknowledge all student communications within five (5) business days. If this time period is 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 I have asked for to respond before repeating your request.

## **Course Description**

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

## **Course Objectives**

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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 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**

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This course uses a hybrid of traditional lecture and social constructivism methodologies. There will be individual reading assignments, quizzes over reading material before class lectures and discussions, group projects and presentations, and closed book module tests and final examination.

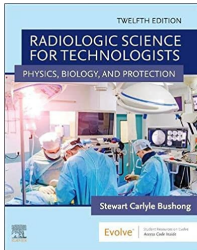
## Course Materials

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### Textbooks

#### Required

Bushong, S.C. (2021). *Radiologic Science for Technologists* (12<sup>th</sup> Ed.). Elsevier. ISBN: 978-0-323-366134-8



This book is approximately \$140.99 from the MSU Bookstore.

#### Rad Tech Boot Camp

You should already have a Rad Tech Boot Camp subscription from the summer.

### Computer Requirements

You need access to an up-to-date computer with an internet connection in this course. D2L does not work well with Internet Explorer or Edge. Chrome or Firefox are the preferred browsers when working in D2L.

## Assignments

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There are six 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. RAD TECH Boot Camp Assignments	10%
4. Chapter Quizzes	10%
5. Module Tests (4)	30%
6. Final Examination	30%

## Course Modules

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### **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 dates are subject to change as needed

Date		Chapter Lecture or Test	Quiz/Test/Project/Rad Tech Bootcamp
Aug	26	---	D2L is Open
	28	29	Monday - First Day of Class! Chapter 29 pre-lecture quiz closes at 12:00 pm
	30	29	Finish Chapter 29
Sept	4	---	Labor Day – No Class
	6	30	Chapter 30 pre-lecture quiz closes at 12:00 pm The lecture is online (no class)
	11	30	Finish Chapter 30
	13	31	Chapter 31 pre-lecture quiz closes at 12:00 pm
	18	32	Chapter 32 pre-lecture quiz closes at 12:00 pm
	20	32	Finish Chapter 32
	25	29 - 32	RTBC Assignment #1 due 12:00 pm Module 1 Test Chapters 29 - 32
	27	33	Chapter 33 pre-lecture quiz closes at 12:00 pm
Oct	2	33	Finish Chapter 33
	4	34	Chapter 34 pre-lecture quiz closes at 12:00 pm
	9		Finish Chapter 34
	11	33 - 34	RTBC Assignment #2 due 12:00 pm Module 2 Test Chapters 33 - 34
	16	35	Chapter 35 pre-lecture quiz closes at 12:00 pm
	18	35	Finish Chapter 35
	23	36	Chapter 36 pre-lecture quiz closes at 12:00 pm
	25	36	Finish Chapter 36 in class
	30	---	Last day for "W," 4:00 pm
Nov	1	35 - 36	RTBC Assignment #3 - #5 due 12:00 pm Module 3 Test Chapters 35 - 36
	6	37	Irradiated Seed Poster set-up and Presentation CE Lobby 8:00 am – 9:50 am Chapter 37 pre-lecture quiz closes at 12:00 pm
	8	37	Finish Chapter 37
	13	39	Chapter 39 pre-lecture quiz closes at 12:00 pm
	15	39	Finish Chapter 39
	20	40	Chapter 40 pre-lecture quiz closes at 12:00 pm
	22-24	---	Happy Thanksgiving – No Class
	27	37, 39 - 40	Module 4 Test Chapters 37, 39 - 40
	29	---	Review for Final Examination
Dec	4	---	Radiation Incident Presentations – Groups 1 – 6 Upload Presentation by 12/04/23 12:00 pm
	6		Radiation Incident Presentations – Groups 7 – 12 Upload Presentation by 12/04/23 12:00 pm
	11	29 – 37, 39-40	Final Examination DB 178 @ 1:00 pm – 3:00 pm

## Evaluation

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### 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 the 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. Select "change your email settings" and enter the new email address if you need to change this. This email address should be an email address you check frequently.

You can email questions to clarify concepts or look for further explanations. If I encounter 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

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 coursework 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 BSRT 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 BSRT 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. A student is only allowed to repeat this course once.

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## Radiation Protection and Biological Responses Assignment Details

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There are six 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. Rad Tech Bootcamp	10%
4. Chapter Quizzes	10%
5. Module Tests (4)	30%
6. Final Examination	30%

### **Irradiated Seed Group Project (10%):**

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Students will be in groups with 3-5 members. Each group will be given envelopes with seeds exposed to ionizing radiation. Each group will also have an envelope with control seeds not exposed to radiation. All envelopes will only have control numbers and will not say if the seeds have been exposed or are part of the unexposed control seeds. The groups will plant the seeds in the potted soil provided and care for them during the semester. The students 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 produce a poster detailing the experiment. The posters will be set up in the lobby of Centennial Hall for judging.

The posters will be set up in the lobby of Centennial Hall for judging. A group of five professors (not the instructor) will be given a rubric and tasked to grade each project. The students will make a 2-3 minute presentation about their project to the professors in front of their posters. They will then answer any questions the judges may have. Each group member must have a speaking role in the presentation. Projects will be graded on the accuracy, completeness, and artistic creativity of the poster and on the presentations by the students. Each judge will give each project a score between 0 – 100. The high and low scores will be discarded for each project, and the other three scores will be averaged together to determine a final score. This final score will be the grade for the project that each group member will receive based on the grading scale in this syllabus. Any group member reported by the group as not having participated is subject to receiving a reduced grade or a zero on the project based on individual circumstances.

In addition to the normal grade, the top three groups, if they earn a grade of 90% or higher, will receive a bonus, which will be described in class. Only the top three groups will qualify for any bonus and only if they earn an “A” on the project.

## **Radiation Accident Presentation Group Project (10%):**

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

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

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 research by finding articles in the incident files' reference section. Additional articles from Google Scholar or the MSU database may be needed for a complete discussion. Groups should choose their topics and post them on the appropriate discussion board. Only one group may do a particular topic, and topics are selected on a first-come, first-served basis.

## **Rad Tech Bootcamp (10%):**

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Each RAD Tech Bootcamp assignment corresponds to what is currently discussed in class. Students will watch the appropriate videos and take the quiz that follows each video. The points for each assignment are the number of videos in that assignment. Each assignment is graded on an "all or nothing" basis, and partial credit is not given. All assignments are due at 12:00 pm on the assigned date. Late submissions will not be accepted.

### **Assignment #1:**

Radiosensitivity (4 Videos and Quizzes)

### **Assignment #2:**

Radiation Biology (8 videos and Quizzes)

### **Assignment #3:**

Radiation Protection (2 Videos and Quizzes)

### **Assignment #4:**

Radiation Units of Measurement (5 Videos and Quizzes)

### **Assignment #5:**

Radiation Detection Devices (6 Videos and Quizzes)

## **Chapter Quizzes (10%):**

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Each of the 11 chapters will have a ~15-question quiz that will be taken through D2L according to the published schedule. Students will have 30 minutes to complete a quiz. Students are encouraged to read the chapter first, then take the quiz with their book and any notes ready. Students 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.



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### **Module Tests (30%):**

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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 typically have 30-75 questions and will be completed in the scheduled lecture session.

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### **Final Examination (30%):**

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The Final Examination will cover Chapters 29 – 37. 39, 40. The exam will be made up of 200 multiple-choice questions. Sources for the questions will be from the previous quizzes and module tests, the textbook, chapter power points, and lectures. Unless otherwise notified, it will be given on the scheduled date published in the university's final schedule. Students will need to bring a Scantron sheet capable of recording 200 answers. Students will have the two-hour final examination period to complete the examination.

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## **Radiation Protection and Biological Responses Course Policy Details**

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### **Professional Conduct**

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All students are expected to comport themselves professionally at all times while in class or working on course projects with other students on or off campus. If students have questions about what the proper professional conduct should be, please reference the University Student Handbook located on the [Office of Student Rights and Responsibilities](#) webpage and the Shimadzu School of Radiologic Sciences Academic and Clinical Handbook for the student's current cohort located on the [BSRT Program](#) webpage. Violations of either set of standards or policies may result in grade reduction and referral for disciplinary action.

### **Classroom Conduct**

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Students should come to class prepared for the topic being discussed that day. Students should also take care of any personal matters, including using the restroom, before the start of class so they do not need to leave during class. While there may be times when leaving the classroom is unavoidable, it should be an exception rather than a common occurrence. Phone use during class is not permitted unless cleared with the professor prior to the start of class and only for the most exigent of circumstances. If such exigent circumstances are approved that day, the student should attempt to sit close the back door so leaving the classroom to take a call is not a disruption. Leaving the classroom to refill a water bottle or for other inconsequential purposes is not allowed, and the professor may refuse re-entry to the classroom, and the student will be recorded as absent for the day.

### **Tardiness**

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Students are expected to be in the classroom prior to the start of class. Students entering the classroom after class has begun disrupts the learning environment for the other students. Any student entering the classroom after the start of class will be considered tardy. Three instances of being tardy will count as one absence (see Attendance policy below). Any student trying to enter the classroom ten minutes after the start of class will not be admitted and will be considered absent that day. If the student is more than ten minutes late to class

on a day when a module test is being given, the student must complete the exam in the remaining time and will not receive additional time. Students tardy on the final examination date must complete the exam in the remaining time and will not receive additional time.

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## Attendance

Attendance is required for all class sessions. A student may have up to three absences. If a student exceeds three absences, the professor may initiate an administrative withdrawal of the student from the course. This will result in the student being dismissed from the BSRT program at the end of the semester. If a student believes there are mitigating circumstances for any absence, the student must provide the professor with documentation prior to the absence or, if not possible, on the first day of returning to class. The professor has sole discretion to determine if an absence should be excused.

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## Requesting a Withdrawal

The last opportunity to drop this course with a grade of "W" is 4:00 pm on October 30, 2023. The student must initiate all withdrawals. 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 BSRT program.

In an emergency or extenuating circumstance, a student may request an incomplete grade before grades are submitted. If the professor grants the incomplete, the student has until thirty (30) days after the beginning of the next long semester to complete the course requirements. If the student does not complete the course requirements within the deadline, the incomplete grade will automatically convert into a grade of "F."

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## Technical Difficulties

Occasionally, you may experience problems accessing D2L, accessing class files located within D2L, connecting with your internet service, or other computer-related problems. Make the professor aware of a technical problem as soon as possible. A due date extension is typically granted if a problem occurs on the university's end, such as D2L failure. **However, remember that you are responsible for having (or accessing) a working computer in this class. Assignments and tests are due by the due date, and personal computer technical difficulties will not be considered a 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 when a problem is encountered. Failure to do so may result in lost points, 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 8 am and 5 pm.
- Use the D2L help link in D2L.
- Contact your professor.
- For other computer access issues, visit the MSU Information Technology Website online.

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## 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**

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Unresolved issues related to this course should first be addressed between the student and the professor. If there is no resolution, students 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**

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RADS 3513 adheres to the MSU Code of Conduct.

In particular, however small, academic dishonesty creates a breach of 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 MSU Code of Student Conduct. A student 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 or each student group as appropriate 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/artificial writing detection 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 or the use of artificial writing generators in place of the student's own work.

#### **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 from 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 they have previously submitted for this or other courses.
- The use of materials generated by agencies engaged in "selling" term papers is also plagiarism.

### **Using of Artificial Writing Generators includes but is not limited to**

- Using any artificial intelligent agent (e.g., Chat GPT) to generate written work that the student uses within their course paper, poster, presentation, or any other project, with or without proper citation, or;
- Using any artificial writing generator as a primary source, or;
- Using any artificial writing generators in place of traditional research methods to obtain sources and any interpretations about the content of those sources.

This class will not tolerate academic dishonesty (cheating, plagiarism, artificial writing generators, etc.). Whenever a student is unsure whether a situation will be interpreted as academic dishonesty, the student 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., and the student will not be given an opportunity to resubmit the assignment. Based on the severity of the cheating, plagiarism, or use of artificial writing generators, the professor reserves the right to fail the student in the course and refer the student to the department chair for further disciplinary action, which could include permanent dismissal from the program. Cases may also be referred to the Dean of Students for possible dismissal from the university and the ARRT as a possible ethics violation.

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

### **Please Note**

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

## **Campus Carry / Active Shooter**

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### **Campus Carry**

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit [Campus Carry](#).

### **Active Shooter**

The safety and security of our campus are the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor.

Please review the information provided by the MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit [Safety / Emergency Procedures](#)