The Shimadzu School of Radiologic Sciences

Gunn College of Health Sciences and Human Services
The Shimadzu School of Radiologic Sciences
Bachelor of Science in Radiologic Sciences Program
Course Syllabus - Dr. Rodney Fisher

RADS 3033 Image Acquisition and Processing

Spring 2026
Lecture: Tuesday, Thursday 11:00 AM – 12:20 AM Centennial 340
Lab A: Monday 1:00 – 2:50 PM Centennial 230
Lab B: Monday 3:00 – 4:50 PM Centennial 230
Lab C: Wednesday 1:00 – 2:50 PM Centennial 230
Lab D: Wednesday 3:00 – 4:50 PM Centennial 230
January 20 – May 12, 2026

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Office Hours: Tuesdays 2:00 PM – 4:00 PM, Wednesdays 10:00 AM – 11:00 AM, and Thursdays 2:00 PM – 4:00 PM. Also, times outside of office hours may be available by appointment.

WHY ARE YOU TAKING THIS COURSE?

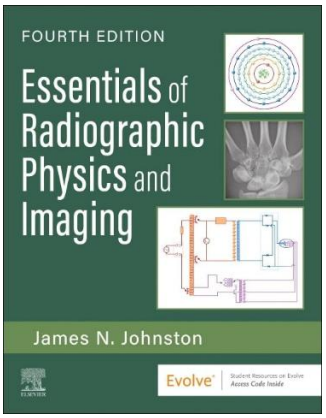
This course has material in it, which you will be tested on by the ARRT Registry after you graduate. This is why this is a progression course. More importantly, this course discusses how radiographic images are created, how to use various technical factors to control the image output, and how to perform quality control on your X-ray systems. This course uses lectures, videos with accompanying assessment quizzes, and laboratory experimentation as part of your curriculum.

Among the topics we will discuss this semester:

- How radiographic images are acquired
- The characteristics of radiographic images
- How radiographic images are processed and manipulated
- How quality control is performed on radiographic equipment

THE TEXTBOOK / COURSE MATERIALS YOU WILL NEED

1. Johnston, J. (2024). Essentials of Radiographic Physics and Imaging (4th Ed.). Elsevier. [ISBN: 978-0323930673]. $99.99 – 152.99 at the MSU Bookstore. You should still have this book from RADS 3513.



2. An up-to-date computer running either Windows or MAC operating systems. Note: Chromebooks do not work with MSU's online proctoring systems.

3. An electronic device, such as a smartphone or tablet, in class for attendance and participation in Kahoot quizzes.

HOW TO CONTACT ME

I prefer email rather than telephone for most questions and concerns. This gives me a written record of what we talked about, so I do not forget anything important. Also, I am away from my desk quite often and may be hard to reach by telephone. My scheduled office hours are Tuesdays, 1 – 4 pm, and Wednesdays, 10 – 11 am and 3 – 4 pm. Walk-ins are welcome during office hours, but appointments always take priority. All office visits outside of my office hours require a prior appointment, and please check in with the secretary when entering the office suite.

HOW I GRADE THIS COURSE

I use the following grading scale:

A = 100 – 90
B = 89.99 – 80
C = 79.99 – 75
D = 74.99 – 60
F = 59.99 and below

While I do not round individual assignments, I will round your semester grade up to the next grade if you are within 0.5 points of the next grade. This is a progression course. **You must pass the course with a 75% or higher to progress to the next semester.** A "D," "F," or a withdrawal by you or me will stop your progression in the program at the end of this semester. You will need to reapply to the program and successfully repeat this course next year to continue your progression. Late assignments are not accepted without my prior approval.

Your semester grade will be made up of the following types of assignments:

Quizzes (9)	10 %
Rad Tech Boot Camp	10 %
Radiographic Poster	05 %
Lab	25 %
Module Tests (4)	25 %
Final Examination	25 %

WHAT IS THE CLASS SCHEDULE / DUE DATES?

Note: Schedule subject to change if needed

Class Date	Chapter or Activity	Assignments: Quizzes and RTBC Due 8:00 am Experiments Due 11:59 pm
Tuesday 01/20	Course Introduction and Module 1 Part 1: Exposure Indices	First Day Quiz
Thursday 01/22	Module 1 Part 2: Chapter 8 Image Production	Chapter 8 Quiz
Labs 01/26-28	1. Divide into Groups 2. Technique Chart Project Introduction 3. Konica C-7 Functions: A. Image Information B. Image Annotation C. Image Rejection D. Saving to Flash Drive 4. Experiment 1: Bring Your Own Item (Technique Optimization)	
Tuesday 01/27	Module 1 Part 3: Histograms and Look Up Tables (LUT)	
Thursday 01/29	Module 1 Part 4: Image Sampling	
Labs 02/02-04	Work on Technique Chart	
Tuesday 02/03	Module 1 Part 5: Chapter 9 Image Visibility	Chapter 9 Quiz
Thursday 02/05	No Class – ACERT Conference	
Labs 02/09-11	Experiment 2: Compton Scatter and IR Exposure Experiment 3: Homogeneity, Subject Contrast, and Spatial Resolution	
Tuesday 02/10	Module 1 Part 6: Chapter 9 Spatial Resolution	
Thursday 02/12	Module 1 Part 7: Chapter 9 Distortion and Exposure Indices	Experiment 1 Report
Labs 02/16-18	Experiment 4: Elongation and Foreshortening	
Tuesday 02/17	Module 1 Review	
Thursday 02/19	Module 1 Exam Chapters 8 - 9	RTBC Module 1 Experiment 2 Report Experiment 3 Report
Labs 02/23-25	Experiment 5: The 15% Rule and Its Effects on Contrast, Compton Scatter, and Quantum Noise	
Tuesday 02/24	Image Receptors	Chapter 10 Quiz
Thursday 02/26	Image Display Part 1	Experiment 4 Report
Labs 03/02-04	Experiment 6: Collimation: Scatter Control and Quality Control	
Tuesday 03/03	Image Display and Quality Control Part 2	Chapter 15 Quiz
Thursday 03/05	Fluoroscopic Flat Panel Detectors	Experiment 5 Report
March 09-13	Spring Break	
Labs 03/16-18	Lab Midterm	
Tuesday 03/17	Module 2 Review	
Thursday 03/19	Module 2 Test (Chapters 10 & 15)	RTBC Module 2 Experiment 6 Report
Labs 03/23-25	Experiment 7: Grids, Air Fluid Levels, and Artifacts	
Tuesday 03/24	Secondary Factors Part 1	Chapter 11 Quiz
Thursday 03/27	Secondary Factors Part 2	Experiment 7 Report
Labs 03/30 - 04/01	Experiment 8: CR alignment and QC Filters	
Tuesday 03/31	Combined Square Law, Scatter Control, Umbra & Penumbra	Chapter 12 Quiz
Thursday 04/02	Easter Break – No Class	

Labs 04/06-08	**Experiment 9:**	
Tuesday 04/07	**Scatter Control with Grids**	
Thursday 04/09	**Module 3 Review**	**Experiment 8 Report** **Experiment 9 Report**
Labs 04/13-15	**Experiment 10:**	
Tuesday 04/14	**Module 3 Exam Chapters 11 & 12**	**RTBC Module 3**
Thursday 04/16	**Module 4 Part 1: Digital Radiographic Image Processing and Manipulation Part 1**	**Chapter 13 Quiz** **Experiment 10 Report**
Labs 04/20-22	**Experiment 11:**	
Tuesday 04/21	**Module 4 Part 2: Digital Radiographic Image Processing and Manipulation Part 1**	
Thursday 04/23	**Module 4 Part 3: Exposure Technique Selection and Image Evaluation**	**Chapter 14 Quiz** **Experiment 11 Report**
Labs 04/27-29	**Technique Chart**	
Tuesday 04/28	**Module 4 Review**	
Wednesday 04/29	**Last Day to Withdraw with a "W"**	
Thursday 04/30	**Module 4 Exam Chapters 13 - 14**	**RTBC Module 4** **Technique Chart Due – Bring Flash Drive to Class** **Experiment 12 Report**
Labs 05/04-06	**Lab Finals**	
Tuesday 05/05	**Final Review (Required)**	
Thursday 05/07	**Final Review (Optional)**	
Tuesday 05/12	**FINAL EXAM 1 pm – 3 pm in CE 340/Lab**	

WHAT ARE THE ASSIGNMENTS?

Chapter Quizzes (10%)

Chapter Quizzes will be given over each chapter before any lecture or discussion of the chapter. It is critical that you read each chapter in this syllabus prior to the date for the start of each chapter. Quizzes will typically be around 10 multiple-choice questions. Your total grade for all 9 quizzes will account for 10% of your course grade.

Rad Tech Boot Camp (10%)

Each module will have a set of RTBC assignments. These assignments will be due at 10:00 am on your test days. Because you will have several weeks to complete these, late work will not be accepted. Here are the RTBC assignments:

Module 1	• Radiography Image Production
	  ○ X-Ray Beam – 5 videos and quizzes
	• Radiography Image Evaluation & Quality Control
	  ○ Image Quality Factors – 14 videos and quizzes
	• Fundamentals of Digital Radiography
	  ○ Imaging Informatics – 2 videos and quizzes

Module 2	• Fundamentals of Digital Radiography
	  ○ Digital Radiography – 11 videos and quizzes
	• Fundamentals of Fluoroscopy
	  ○ Flat Panel Detector – 2 videos and quizzes
	  ○ Modes of Operation – 4 videos and quizzes

Module 3	• Radiography Image Production
	  ○ Advanced Exposure Factors – 8 videos and quizzes
	• Radiography Math Functions
	  ○ Direct Square Law Equation – 1 video and quiz
	  ○ Image Quality Math – 1 video and quiz
	  ○ 15% Rule Equation & Practice – 1 video and quiz
	  ○ Magnification Formulas & Practice – 1 video and quiz
	  ○ Focal Spot Equation – 1 video and quiz

Module 4	• Radiography Image Evaluation & Quality Control
	  ○ Image Evaluation – 5 videos and quizzes
	  ○ Quality Control – 5 videos and quizzes

Radiographic Poster Project (5%)

You will make posters for the Texas Society of Radiologic Technologists Scientific Display contest. You may work by yourself or in groups of two. Groups of three may be possible, but it depends on the TXSRT rules for that year. I will provide you with the due dates for the poster at the beginning of the semester. You will submit your poster to both TXSRT and in a dropbox on D2L. This is a participation grade, and you will not be graded on how well your poster does in the contest. However, posters that are not well done will be given partial or no credit at my discretion. TXSRT will provide the instructions for making and submitting the poster, which I will pass on to you. You will be required to join TXSRT as part of the assignment. You do not have to attend the conference as part of this assignment. You will be given an opportunity to attend TXSRT if you desire, and I encourage you to do so.

Imaging Lab (25%)

Your lab grade will be divided into three components:

Lab Experiment Reports	30 %
Technique Chart Project	25 %
Lab Midterm	20 %
Lab Final	25 %

In the lab, you will be in a group of three to four students. You will use these groups for all your experiments and your technique chart project. Once the groups are established, you will not be able to change groups. You will be expected to work as a team, and good teamwork is necessary to receive full credit.

Lab Experiment Reports

You will perform 11 experiments over the semester. Each experiment will require taking images, recording techniques, and imaging parameters and evaluating your work. The experiments are listed in the course schedule. The lab report for each experiment will be due one week after the experiment is performed. You will have a form to fill out in D2L. Each group will fill out one report for the entire group and upload their images. The group will receive a common grade, although I reserve the right to change individual grades if warranted based on relative participation.

Technique Chart Project

As a group, you will also work during the semester to create a technique chart. This technique chart will cover the major X-ray procedures you have been learning in your other courses. You will work in one X-ray room during the semester to find the optimal technique for each position. This will require finding the optimal kVp and mAs combination, which will provide the best DI number for the image while employing dose reduction techniques such as the 15% Rule. Your technique chart will include one image for each procedure, demonstrating your optimal settings. Each group will turn in one technique chart with images at the end of the semester. The group will receive a common grade, although I do reserve the right to change individual grades if warranted based on relative participation.

Lab Midterm

Your lab midterm will be a combination of taking images with anatomical phantoms and then processing the images. You will have 20 minutes to complete it. You will be given two images to take using anatomic phantoms. The images must have a DI within the -0.5 to 0.5 range. Images must be of diagnostic quality without any artifacts, including collimation edge errors. You are not allowed to adjust the S#. You may repeat an image as many times as needed; however, each repetition will take up your time. You will reject all unused images and should have only two images at the end of the test. With one of the final images, you will demonstrate to your testing professor your ability to:

- Annotate each image with the technique used and the exposure indices (kVp, mAs, SID, DI, and S#)
- Zoom in and out of an image
- Reject and restore an image
- Save an image to a flash drive (bring a flash drive with you to the test)

You will be graded on an all-or-nothing basis as follows:

- Each diagnostic-quality image with an acceptable DI - 25 points x 2
- Each of the above five post-processing tasks is worth 10 points each.

The total possible points for the lab midterm are 100 points.

Lab Final

The lab test is open book and notes. You will need your calculator with you. You will have 20 minutes to complete four scenarios. Each scenario requires you to solve a math problem. Two of the scenarios require you to take an image. The images must have a DI within the -0.5 to 0.5 range. Images must be of diagnostic quality without any artifacts, including collimation edge errors. You are not allowed to adjust the S#. You may repeat an image as many times as needed; however, each repetition will take up your time. Your grade will be based on successfully completing each scenario.

- Each math problem is worth 10 points.
- Each image is worth 30 points.

- Each item is an all-or-nothing score.

The total possible score is 100 points.

Each math problem will give you a clue about how to open a locked box at the end of the test. Successfully opening a locked box within your 20 minutes will earn you a bonus.

Module Tests and Final Examination (Module Tests 25% & Final 25%)

All Tests are closed book and notes. There will be four module tests of various lengths. The final examination will be taken at the prescribed date, time, and location established by the university. The final will be 200 multiple-choice questions and will be comprehensive. All tests will be taken in class using Scantron sheets. You are responsible for any errors or incomplete erasers on your Scantrons. It is recommended you have at least two Scantrons with you for any tests.

Image Acquisition and Processing Course Policy Details

Professional Conduct

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

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, prior to the start of class so it is not necessary for them 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, then the student should attempt to sit as close to the back door as possible 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

Students are expected to be in the classroom or lab prior to the start of class. Students entering the classroom or lab after class has begun disrupts the learning environment for the

other students. Any student entering the classroom or lab 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 or lab 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 or lab test is being given, the student will be allowed to test, but no additional time will be given. Students who are tardy on the final examination date must complete the exam in the remaining time and will not receive any additional time.

Attendance

Attendance is required for all class and lab 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 any mitigation should occur.

Requesting a Withdrawal

The last opportunity to drop this course with a grade of "W" is 4:00 pm on April 9, 2026. 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."

Technical Difficulties

Occasionally, you may experience problems with 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. If a problem occurs because of a system error, such as D2L failure, then a due date extension will typically be granted**. However, remember that 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 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 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 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.

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 the student and the course professor. If there is no resolution, students must follow this sequence:

1. Department Chair – Dr. Lynette Watts (940-397-4845)
2. College Dean - Dr. Jeff Killion (940-397-4594)
3. Dean of Students – Matthew Park (940-397-7500)

Honor System

RADS 3033 adheres to the MSU Code of Conduct.

In particular, academic dishonesty, however minor, breaches 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 3033 are designed to represent each student's individual efforts or, as appropriate, each student group's efforts and are NOT to be shared, copied, or plagiarized from other sources. When students submit their work for grading, they attest that they have 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 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.

Artificial Intelligence (AI) Usage Policy

In this course, the use of Generative AI tools (such as ChatGPT, Claude, Gemini, etc.) is permitted with specific limitations to ensure academic integrity and the development of critical research skills.

- Research & Sourcing: You may use AI tools for preliminary research and topic exploration. However, to ensure the validity and scholarly weight of your work, at least 50% of the sources cited in any assignment must be retrieved directly from the MSU Moffett Library online databases.
- Writing & Content: The use of AI in the writing process is strictly limited to spelling and grammar correction. AI tools are not permitted to generate text, arguments, analysis, or the bulk content of any assignment, including research papers, posters, and discussion board posts.
- Verification: To maintain the integrity of your research, you must be prepared to provide PDF copies of all sources used upon request.
- Consequences: Failure to adhere to these guidelines will be treated as a violation of academic integrity. A violation will result in a grade of zero for the assignment. Egregious cases of academic dishonesty involving AI may result in a failing grade (F) for the course, and may result in dismissal from the program and university, and an ethics violation referral to the ARRT.

Academic dishonesty (cheating, plagiarism, AI, etc.) will not be tolerated in this class. Whenever a student is unsure of whether a particular 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 allowed to resubmit the assignment. Based on the severity of the cheating, plagiarism,

or use of AI, 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

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 is 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