HGTC

Horry-Georgetown Technical College

COURSE INSTRUCTIONAL PACKAGE

RAD 110

Radiographic Imaging I

202610

Fall 2026

Part I: Course Information

Effective Term: Fall 2026

COURSE PREFIX: RAD 110 COURSE TITLE: Radiographic Imaging I

CONTACT HOURS: 5 CREDIT HOURS: 3

RATIONALE FOR THE COURSE:

Radiography students need to learn the basic principles of x ray production and the acquisition of good quality images to progress in the program.

COURSE DESCRIPTION:

This course provides a detailed study of the parameters controlling radiation quality and quantity for radiographic tube operation and image production. This course entails the essential qualities of the radiographic image: brightness, contrast, recorded detail, distortion, Automatic Exposure Control (AEC), and digital imaging will also be incorporated.

PREREQUISITES/CO-REQUISITES:

RAD 101, RAD 102 and RAD 153

REQUIRED MATERIALS:

Please visit the BOOKSTORE online site for most current textbook information.

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

TECHNICAL REQUIREMENTS:

- Access to Desire2Learn (D2L), HGTC's learning management system (LMS) used for course materials.
- Access to myHGTC portal for student self-services.
- College email access – this is the college's primary official form of communication.

ATTENDANCE VERIFICATION:

The Add/Drop Period is the first 7 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format classes. Please refer to the academic calendar for deadlines for add/drop. You must attend at least one meeting of all your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly

IDENTIFICATION VERIFICATION:

Students enrolled in online courses will be required to complete identity verification. Please refer to your Instructor's Course Information Sheet for information regarding this requirement.

STUDENT COURSE EVALUATIONS:

Each semester, students are provided with an opportunity to participate in course evaluation surveys. These evaluations offer crucial feedback to instructors and the College, leading to enhancement of educational quality. By completing these surveys, you play a key role in the ongoing improvement of teaching methods and course content, ensuring future students enjoy a better learning experience. Students are encouraged to complete these surveys as your active participation in this process reflects your dedication to your education and drives positive change.

CLASSROOM ETIQUETTE AND STUDENT RIGHTS AND RESPONSIBILITIES:
The Radiologic Technology Program is committed to maintaining a professional, respectful, and productive learning environment that reflects the expectations of the healthcare profession. Students are expected to demonstrate behaviors consistent with professional practice, personal accountability, and academic integrity always.

Students are expected to comply with the requirements of **Student Policy 14: Use of Electronic Devices in the Didactic Setting**. The policy was revised for 2026 to establish stricter expectations regarding electronic device use during instructional activities.

Key Requirements:

- All personal electronic devices, including cell phones, smart watches, tablets, earbuds, and similar devices, must be turned off or silenced and stored out of sight during class.
- Electronic devices may only be used when specifically authorized by the instructor for academic purposes.
- Texting, messaging, social media, internet browsing, email, and any other non-academic use of electronic devices during class are prohibited.
- Students expecting an emergency communication must notify the instructor before class begins.
- Audio recording, video recording, photography, screenshots, or reproduction of lectures, laboratory activities, examinations, classroom discussions, or instructional materials is prohibited unless expressly authorized by the instructor.

Disciplinary Consequences:

- **First violation:** Removal from class, assignment of an absence, and issuance of a written warning.
- **Second violation:** Dismissal from the Radiologic Technology Program.

Students are responsible for reviewing and complying with the complete Electronic Device Policy contained in the current Radiologic Technology Student Handbook.

Professional Classroom Conduct:

Students are expected to always demonstrate the following professional behaviors:

1. Arrive on time and prepared for each class session.
2. Bring all required textbooks, assignments, supplies, and learning materials.
3. Use laptops and computers only for instructor-approved educational activities.
4. Communicate professionally using your HGTC email account. Program-related communication should occur through your official college email account. Questions or concerns may be directed to **douglas.gleasman@hgtc.edu**.
5. Remain attentive and actively engaged during class activities and discussions.

6. Demonstrate respect toward classmates, faculty, clinical instructors, guest speakers, and college staff.
7. Dress appropriately and maintain a professional appearance consistent with healthcare expectations.
8. Remain in class for the entire scheduled session unless excused by the instructor.
9. Complete assigned work and take responsibility for your own academic success.
10. Always use professional and respectful language. Disruptive, sarcastic, disrespectful, or inappropriate comments are unacceptable.
11. Maintain academic integrity by completing your own work and taking your own notes unless collaboration has been specifically authorized.
12. Contribute positively to the learning environment through thoughtful participation and professional interactions.

Students must comply with all provisions of the **HGTC Student Code of Conduct**, **Honor Code**, and all policies contained within the Radiologic Technology Student and Clinical Handbooks.

Class Preparation and Student Responsibility:
This Instructional Package is subject to revision; however, every effort will be made to follow the schedule as outlined.

Radiologic Technology courses are rigorous and require preparation outside the classroom. Students are expected to read assigned materials before class, review course content regularly, and actively participate in learning activities.

Faculty are committed to supporting student success; however, each student is ultimately responsible for their own learning, preparation, attendance, and academic performance.

Success in this program requires professionalism, preparation, accountability, and a commitment to continuous learning.

Part II: Student Learning Outcomes

COURSE LEARNING OUTCOMES and ASSESSMENTS*:

The course provides the student with background knowledge of the intricacies involved in producing radiographic images. Information presented in the course will prepare the students for quality image assessment based on exposure and processing principles. Upon completion of the course the student will be able to:

1. Explain exposure principles and imaging processes and how this relationship affects radiographs.
2. Solve mathematical calculations to exposure problems.
3. Apply mathematical calculations to exposure experiments
4. Analyze radiographs for their radiographic quality content.
5. Define the basic principles of a digital imaging.

Course Learning Outcomes - Module #1 (Week 1-5)

1. Define the key terms listed in each chapter
2. Describe the relationship of x rays to wavelength and frequency
3. Name the properties of X-Rays
4. Name and describe the parts of the cathode.
5. Describe the appearance of the anode and the material the anode is made of.
6. Explain the purpose of the X-Ray tube housing.
7. Explain the production of X-Rays.
8. Explain the purpose of the different parts of the anode and cathode.
9. Explain the role of primary exposure factors in determining the quality and quantity of X-Rays.
10. Explain the line focus principle.
11. State how the anode heel effect can be used in radiography.
12. Describe the relationship of mA, time and mAs
13. Solve conversion problems related to time, mA and mAs.
14. Name and define the types of radiation produced at the target.
15. Define the different types of filtration and the uses applied in radiography
16. Describe the benefits of beam filtration.
17. Calculate heat units
18. State the purpose of a tube rating chart
19. List the guidelines to follow to extend the life of an X-Ray tube

20. Describe the importance of a rotating anode and the effect of heat dissipation
21. Explain why kVp causes a heterogeneous beam.
22. Explain the process of beam attenuation.
23. Describe the X-Ray interactions termed Photoelectric effect and Compton Effect.
24. State the composition of exit/Remnant Radiation.
25. State the effect of scatter radiation on the radiographic image.
26. Explain the process of creating the various shades of radiographic densities.
27. Differentiate among conventional and digital imaging.

Course Learning Outcomes - Module #2 (Week 6-8)

1. Define all the key terms in the chapter
2. State all the important relationships of the chapters
3. Define the necessary components of radiographic imaging quality
4. Differentiate between the photographic and geometric properties of a radiograph
5. Differentiate among an optimal, diagnostic and unacceptable radiograph
6. Discuss the controlling and influencing factors of radiographic density (brightness)
7. State how mAs and kVp can be used to adjust a density error
8. Calculate changes in mAs and kVp to adjust radiographic density
9. Define radiographic contrast and discuss the controlling and influencing factors
10. Calculate changes in kVp to adjust radiographic contrast- 15% Rule
11. Explain methods to obtain desired levels of radiographic contrast
12. Discuss the importance of density and contrast in visibility of detail
13. Identify exposure technique modification for the following considerations: body habitus, pediatric patients, projections and positions, soft tissue, cast, splints, and pathology

14. Calculate inverse square law and maintenance density formula math problems
15. Relate SID and OID to density and contrast outcomes
16. Explain the reciprocity law as it relates to X-Ray images.
17. Define scale of contrast
18. Define recorded detail and discuss factors affecting geometric unsharpness, receptor unsharpness, and motion unsharpness
19. Relate recorded detail to OID, SID and focal spot size
20. Discuss the factors that affect size and shape distortion
21. Calculate the magnification factor and the % of magnification for an object that has been imaged.

Course Learning Outcomes - Module #3 (Week 9-10)

1. Define all key terms in the chapters
2. State the purpose of beam restricting devices
3. Describe each type of beam restricting device
4. Differentiate between the different grid types
5. Explain how a grid absorbs scatter radiation
6. Define grid ratio and calculate grid ratio problems
7. Identify the factors to be considered in using a grid
8. Explain how scatter control affects digital imaging
9. State which grid ratio is the most efficient
10. Define the terms grid cutoff, grid frequency and grid radius
11. Describe the five types of grid cut off
12. Calculate grid ratio problems
13. List the advantages of restricting the x-ray beam
14. Calculate new technique for field size conversions
15. Explain the air gap technique
16. Compare the different type of image receptors used in radiography
17. Describe the components of the PSP (CR) and Flat Panel Detector (DR)
18. Explain how the latent image is formed

19. Describe the purpose and function of the Neom Laser beam, PMT, and ADC
20. Describe sampling and quantization
21. Describe how matrix size and pixel size effect spatial resolution
22. Describe pixel pitch and sampling frequency
23. Describe factors that affect exposure time
24. Explain effect exposure speed has on recorded detail
25. Describe the function and construction of a CR and DR cassettes
26. Describe the components of CR and DR, and how the latent image is converted to the manifested image
27. Differentiate between DR systems that use direct and indirect conversion
28. Define all the key terms in the chapters
29. State the purpose of radiographic processing

Course Learning Outcomes - Module #4 (Week 11-15)

AEC - Reason for its development, Different types of radiation detectors, Mechanism of how AEC functions, Factors controlling exposure time when using AEC, Physical location of AEC, minimum response time, advantages of AEC, How detector size, selection and, patient positioning/alignment will effect AEC function, AEC calibration, Function of back-up time, Back-up time limits, mAs readout, density controls and AEC. Body habitus and caliper use in AEC use. Collimation and AEC.

APR or Automatically Programmed Radiography- What is it? How it works and why we use it. What does Histogram analysis have to do with APR? What is a look-up table and what does it control in a digital image?

Exposure Technique Charts. - What factors must be considered when developing a good technic chart? What are calipers used for? What characteristics should be included on a technique chart? Types of technic charts: advantages/disadvantages of each? Basis for changing factors when utilizing each type of chart. Concept of Comparative Anatomy.

Image Evaluation – Brightness vs. Density, Spatial resolution/recorded detail, Types of distortion and influencing factors, Quantum Mottle/Noise, Exposure indicators and their meaning. Artifacts –scatter, dirt, Minus and plus density artifacts, types of Image receptors etc. technical factors of exposure and how they affect image quality: kVp, mAs, focal spot, time, collimation, tube angle, filtration, SID, OID, tissue thickness etc.

Students – please refer to the Instructor's Course Information sheet for specific information on assessments and due dates.

Part III: Grading and Assessment

EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS*:

Methods of Instruction: Lecture, laboratory experiments, discussion, note taking, AV materials, problem solving and class handouts.

Methods of Assessment
Student learning will be evaluated through a variety of assessment methods designed to measure knowledge acquisition, comprehension, application, analysis, and critical thinking skills. Assessment formats may include multiple-choice examinations, short-answer questions, true/false questions, matching exercises, diagram identification, laboratory activities, homework assignments, quizzes, and comprehensive examinations. While some assessments evaluate factual knowledge, many require students to apply concepts, analyze information, solve problems, and make informed decisions consistent with professional radiologic practice.

Final course grades are determined through performance on unit examinations, quizzes, laboratory assignments, homework assignments, and the final examination.

Academic Support and Required Remediation
Students earning a score below **75% on any unit examination** or below **70% on any quiz** are required to participate in academic remediation. The student must contact the **Student Success and Tutoring Center (SSTC)** to schedule an appointment with the designated radiology tutor to review the assessment

material and identify strategies for improvement. If a radiology tutor is unavailable, the student will be required to schedule a remediation session with the course instructor.

Grade Posting
Grades for examinations, quizzes, and assignments will typically be posted in Desire2Learn (D2L) within **24–48 hours** after all students have completed the assessment or assignment submission period has closed. Grading timelines may vary depending on the type, length, and complexity of the assessment.

Laboratory Assignments
Students are responsible for submitting all laboratory assignments through the designated course submission method or D2L drop box, as directed by the instructor. Laboratory activities are considered in-class assignments and are expected to be completed during scheduled laboratory sessions. Additional laboratory time may be available with instructor approval.
Assignments not submitted by the established deadline will receive a grade of **zero (0)** unless otherwise permitted by the instructor in accordance with course and program policies.

EVALUATION*

Tests	50%
Homework Assignments	5%
Laboratory Experiments	5%
Quizzes	20%
Final Exam	20%
	100%

Students, for the specific number and type of evaluations, please refer to the Instructor's Course Information Sheet.

GRADING SYSTEM:

Please note the College adheres to a 10-point grading scale A = 100 – 90, B = 89-80, C = 79 – 70, D = 69 – 60, F = 59 and below.

The Radiologic Technology Program utilizes a grading scale that differs from the standard college grading scale due to the rigor and professional requirements of

the curriculum. In accordance with **Student Policy 7: Didactic Course Grading**, the grading scale for all RAD didactic courses is as follows:

Grade	Percentage
A	92–100
B	83–91
C	74–82
D	65–73
F	0–64

A minimum final course grade of **74% (C)** is required to successfully complete a RAD course and progress within the Radiologic Technology Program. Students earning a final course grade below 74% will not be permitted to continue in the program sequence.

Final course grades are calculated using weighted course components as outlined by the instructor. Scores on individual assignments, examinations, quizzes, and other graded activities are calculated to the hundredth decimal place (two decimal places). Final course grades are also calculated to the hundredth decimal place and **will not be rounded under any circumstances**.

Example: A final course average of **73.99%** will remain **73.99%** and will be recorded as a failing grade. It will not be rounded to **74%**.

Students are responsible for monitoring their academic progress throughout the semester and seeking assistance from faculty as needed to maintain satisfactory academic standing.

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of that course of action. Ds, Fs, Ws, and Is also negatively impact academic progression and financial aid status.

Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a student has missed over 20% of the course or has missed two (2) consecutive weeks, the faculty is obligated to withdraw the student, and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

Part V: Student Resources

HGTC
Student Success & Tutoring Center

THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers all students the following **free** resources:

1. Academic tutors for most subject areas, Writing Center support, and Academic Coaching for college success skills.
2. Online tutoring and academic support resources.
3. Professional and interpersonal communication coaching.

Visit the Student Success & Tutoring Center website for more information. To schedule tutoring or coaching, contact the SSTC at sstc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email sstc@hgtc.edu or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the SSTC Online Resource Center to access on-demand resources.

HGTC
TECH Central

STUDENT INFORMATION CENTER - TECH Central:

TECH Central offers all students the following free resources:

1. Getting around HGTC: General information and guidance for enrollment, financial aid, registration, and payment plan support!

2. In-person and remote assistance are available for Desire2Learn, Student Portal, Degree Works, and Office 365.

3. Chat with our staff on TECH Talk, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552. Visit the Tech Central website for more information. Live Chat and Center locations are posted on the website. You may also call (843) 349-5199.

HGTC LIBRARY:

Each campus location has a library where HGTC students, faculty, and staff may check out materials with their HGTC ID. All three HGTC campus libraries have librarians and staff who can aid with research, computers to support academic research and related school-work, and individual/group study rooms. Printing is available as well at each location. Visit the Library website for more information or call (843) 349-5268.

STUDENT TESTING:

Testing in HGTC courses may occur during regularly scheduled class time or online, with or without proctoring. Tests may be delivered in the following formats:

- Digitally through D2L
- In writing on paper
- Through a publisher platform (note: some publisher platforms carry an associated fee)

Tests may include time limits and may require proctoring depending on the course.

When proctoring is required and is not provided by the course instructor in the classroom, students may complete their test face-to-face at an HGTC Testing Center or another approved testing site, or online using HGTC's online proctoring provider. For more information about available proctoring options, visit the Online Testing section of the HGTC Testing Center webpage.

Students testing at an HGTC Testing Center should note the following:

- **Appointments must be scheduled at least 24 hours in advance.**
- **A physical, government-issued photo ID is required to test.**

The **Instructor Information Sheet** will have more details on test requirements for your course.

DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Students seeking accommodations are encouraged to visit HGTC's Accessibility and Disability Service webpage for detailed information.

It is the student's responsibility to self-identify as needing accommodations and to provide appropriate documentation. Once documentation is submitted, the student will participate in an interactive process with Accessibility and Disability Services staff to determine reasonable accommodations. Students may begin the accommodations process at any time; however, accommodations are **not retroactive** and will only be applied from the point at which they are approved. Students must contact the office **each semester** to renew their accommodations.

For assistance, please contact the Accessibility and Disability Services team at disabilityservices@hgtc.edu or 843-796-8818 (call or text).

COUNSELING SERVICES:

HGTC Counseling Services strives to optimize student success through managing personal and academic concerns that may interfere with achieving educational goals. Staff are available to every student for assistance and guidance on personal matters, academic concerns and other areas of concern. HGTC offers free in-person and telehealth counseling services to students. For more information about counseling services, please reach out to counseling@hgtc.edu or visit the website the Counseling Services webpage.

STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:

Our sincere commitment to both effective business management and equitable treatment of our employees requires that we present this Policy Statement as an embodiment of that commitment to the fullest.

Discrimination is conduct that includes unjust or prejudicial treatment based upon

an individual's age, race, color, sex, religion, national origin, disability, and genetic information or any other protected classes deemed unlawful under State or Federal law that excludes an individual from participation in, denies the individual the benefits of, treats the individual differently, or otherwise adversely affects a term or condition of a person's working or learning environment. This includes failing to provide reasonable accommodation, consistent with state and federal law, to persons with disabilities.

All inquiries regarding the federal laws as they relate to discrimination on the basis of sex may be directed to Jen Riddei, Title IX Coordinator, Horry-Georgetown Technical College**,** Building 1100C, Room 107B, 2050 HWY 501 E, PO Box 261966, 843-349-5218, Jenifer.Riddei@hgtc.edu.

Student and prospective student inquiries concerning the federal laws and their application to the College or any student decision may be directed to Dr. Melissa Batten, Vice President, Student Affairs, and Section 504 & Title II Coordinator, Horry-Georgetown Technical College, Building 1100C, Room 107A, 2050 HWY 501 E, PO Box 261966-6066, 843-349-5228, Melissa.Batten@hgtc.edu.

Employee and applicant inquiries concerning the federal laws and their application to the College may be directed to Jacquelyne Synder, Vice President, Human Resources and Employee Relations and the College's Affirmative Action/Equal Opportunity Officer, Horry-Georgetown Technical College**,** Building 200C, Room 205B, 2050 HWY 501 E, PO Box 261966, Conway, SC 29528-6066, 843-349-5212, Jacquelyne.Snyder@hgtc.edu.

TITLE IX REQUIREMENTS:

Title IX of the Education Amendments of 1972 protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination.

HGTC prohibits the offenses of sexual harassment, domestic violence, dating violence, sexual assault, and stalking and will provide students, faculty, and staff with necessary information regarding prevention, policies, procedures, and resources.

Any student, or other member of the college community, who believes that they have been a victim of sexual harassment, domestic violence, dating violence, sexual assault, or stalking may file a report with the college's Title IX Coordinator or campus law enforcement*.

> *Faculty and Staff are required to report these incidents to the Title IX Coordinator when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

All inquiries regarding the federal laws as they relate to discrimination on the basis of sex may be directed to Jen Riddei, Title IX Coordinator, Horry-Georgetown Technical College**,** Building 1100C, Room 107B, 2050 HWY 501 E, PO Box 261966, 843-349-5218, Jenifer.Riddei@hgtc.edu.

PREGNANCY ACCOMMODATIONS

Under Title IX, colleges must not exclude a pregnant student from participating in any part of an educational program. Horry-Georgetown Technical College is committed to ensuring that pregnant students receive reasonable accommodations to ensure access to our educational programs.

Students should advise the Title IX Coordinator of a potential need for accommodations as soon as they know they are pregnant. It is extremely important that communication between student, instructors, and the Title IX Coordinator begin as soon as possible. Each situation is unique and will be addressed individually.

Title IX accommodations DO NOT apply to Financial Aid. Financial Aid regulations do not give the College any discretion in terms of Financial Aid eligibility.

Certain educational programs may have strict certification requirements or requirements mandated by outside regulatory agencies. Therefore, in some programs, the application of Title IX accommodations may be limited.

To request pregnancy accommodations, please complete the *Pregnancy Intake Form* that can be found here.