



INSTRUCTIONAL PACKAGE

RAD 110

Radiographic Imaging I

201910
Fall/2019

INSTRUCTIONAL PACKAGE

Part I: Course Information

Effective Term: 201910 (Fall 2019)

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 in order 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; density, contrast, recorded detail, distortion, Automatic Exposure Control (AEC) and digital imaging will also be incorporated.

PREREQUISITES/CO-REQUISITES: RAD 101, and RAD 153

REQUIRED MATERIALS:

TEXT: Radiographic Imaging and Exposure, Terri Fauber, 4th Ed: Mosby 2013

Please visit the Bookstore online site for most current textbook information. Use the direct link below to find textbooks.

[BOOKSTORE](#).

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

ADDITIONAL REQUIREMENTS:

Students must have a basic calculator for math problems.

A positive attitude, initiative, persistence, and willingness to **“learn”** the material and not just memorize facts for exams. Inherent in the class is the effect the radiographer has on the variables and the overall quality of a radiograph. Integration of basic concepts of digital imaging is covered where appropriate throughout the chapters.

TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's student portal for course materials.
WaveNet and D2L email access.

STUDENT IDENTIFICATION VERIFICATION

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual event to support student identification verification. Please refer to your Instructor Information Sheet for information regarding this requirement.

CLASSROOM ETIQUETTE:

As a matter of courtesy to other students and your professor, ***please turn off cell phones*** and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate. ***Audio and/or Video recording is prohibited unless authorized by the instructor.*** Students using cell phones without the professor's permission will be asked to leave the classroom and will result in a recorded absence for the class.

As a group we are with each other for long periods of time and sometimes with familiarity we can become too comfortable with one another and we can display inappropriate behavior. Occasionally, we do not realize it is not appropriate for the classroom setting. Although we have a lot of policy and procedures already to follow, here is a review of proper classroom etiquette as adopted from Dr. Nardo of Ogelthorpe University. Demonstrating the following qualities shows respect for your professor and fellow students. It also upholds the integrity of the classroom.

1. Arrive on time to class.
2. Bring the materials needed for class.
3. ***Turn off cell phones and texting devices in class.*** First incident you will be asked to leave the classroom and be charged an absence and a written warning for insubordination. A second incident will result in a final written warning. A third incident is grounds for dismissal.
4. Use laptops/computers as it relates to classroom activities only.
5. Create appropriate emails from your wavenet account. Contact Dr. Gleasman at the following email address; douglas.gleasman@hgtc.edu
6. Be attentive in class. Be respectful of your fellow classmates, Professors and Clinical instructors. You are entering **Professional Career path**. ***We are all here for the same reason: For you to be successful in this program.***
7. Dress appropriately.
8. Stay the entire class.
9. ***Do the work and avoid excuses/complaints.***
10. Use professional language and ***avoid sarcastic and inappropriate comments.***
11. Take your own notes and do your own work.
12. ***Avoid asking inappropriate or thoughtless questions.*** (Example: "What's on the test?" "Are we getting out early?").

Abide by the honor and conduct code of HGTC as outlined in the College

Class Preparation: This Instructional Pkg. is subject to change; however, every effort will be made to adhere to it. This is an intense course with many new concepts. Some concepts will be easy while

others will take more thought. Reading the chapters prior to class is a must. I will try to present the material as simply as possible. Everyone learns differently and at a different pace. If you see a classmate struggling with a concept, offer to help them better understand after class. **You must take the responsibility for your own 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 film less image.

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. Explain the process of creating the various shades of radiographic densities.
26. 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, casts and 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 the 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 Neon 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 manifest image.
27. Differentiate between DR systems that use direct and indirect conversion.
29. Define all the key terms in the chapters.
30. 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.

Types of Questions: Questions will be based on knowledge, comprehension, application, analysis and evaluation skills. Most questions will be in a multiple-choice format, although short answer, true and false, matching and diagramming may be incorporated. ***Questions are designed to promote critical thinking*** and in most cases will require more than memorization to obtain the correct answer. Unit Exams, Final Exam, Homework assignments, Quizzes and Lab Assignments comprise your assigned final grade. ***If a student receives a grade below 75% on any Unit Test or 70% on a Quiz, it will be MANDATORY for the student contact the SSTC to schedule an appointment with the radiology tutor to review the material on the test or quiz.*** If the radiology tutor is unavailable, the student will be required to make an appointment with the course instructor. All examination and quiz grades will be posted on D2L a minimum of 24-48 hrs. after everyone in the class has completed the exam or turned in the assignment. The time frame may vary depending on the type of assignment or examination. Students will develop, perform, write-up the lab with appropriate documentation and turn the in lab experiments for a grade. Labs are considered in class assignments and should be performed during lab hours. Additional lab hours may be available upon request to the course instructor.

Students' performance will be assessed and the weight associated with the various measures/artifacts are listed below.

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:

State the College's or departmental grading system as delineated in the Catalog. 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. Due to the nature of RAD 110 and radiation exposure, it is important the student is learning and retaining the material presented to avoid harming themselves, classmates, clinical personnel, and patients. Therefore, the grading scale for RAD 110 is as follows:

<u>Grading scale:</u>	92 - 100	A
	83 – 91	B
	74 – 82	C
	65 – 73	D
	64 and below	F

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, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the academic calendar for deadlines for add/drop ([ACADEMIC CALENDAR](#)). You must attend at least one meeting of all of 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.

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 in order 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.**

Students at HGTC are responsible for all course work and assignments. Attendance is a must. In this course a student may not exceed more than **2 absences** as the Radiography Program requires a 90% attendance. **An oral warning results after your first absence. A second absence results in a written warning. A third absence will result in a Final Written Warning and any further absences are grounds for dismissal from the program.** If a student is absent on the day of a test or quiz, the student must notify the instructor within 24 hours to schedule a makeup exam. It is the student's responsibility to schedule an appointment at the Grand Strand Campus testing center to take the make-up test/quiz before the next scheduled class. If the instructor is not contacted within 24 hrs. of the rescheduled test time, the student will not be allowed to make up that test and will receive a zero for a grade on that test/quiz. Make up exams may be administered in several different formats; multiple choice, matching, fill-in-the-blank, short answer or essay. A student who calls in absent on a second occasion on a test day must present a valid written dated excuse for the absence in order to make up the test/quiz. A student who is **absent from class prior to a test on that day will not be allowed to sit for the test on that day** and he/she is responsible for contacting the testing center and the instructor to schedule a make-up examination. It is **MANDATORY** any student achieving a score of less than 75% on any given unit test or 70% on a quiz be required to make an appointment with the

radiology tutor via the Student Success and Tutoring Center (SSTC) to review the subject matter contained on the test/quiz. If unable to meet with the radiology tutor, the student will be required to meet with the course instructor.

Tardies- (3) tardies = (1) absence with a verbal warning, (4) Tardies = written warning, the (5)th a final written warning. A (6th) offense will result in dismissal from the program.

Academic Integrity: Students are expected to be forthright and honest in their academic endeavors. Any form of academic dishonesty will be dealt with according to the HGTC's policy on academic dishonesty. **During testing all books, bags, backpacks, computers etc. will be placed under the desks or along the walls of the classroom to eliminate the temptation of academic dishonesty.**

Part V: Student Resources



The Student Success and Tutoring Center (SSTC)

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

1. **Academic coaches** for most subject areas, **Writing Center Support**, and **college success skills**.
2. **On-line student success and academic support resources**.

Visit the SSTC website: [Student Success & Tutoring Center](#) and visit the student services tab in your WaveNet account to schedule appointments using TutorTrac. For more information, call: SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455 or go to the [Online Resource Center](#) to access on-demand resources any time.



Student Information Center: WaveNet Central (WNC)

WNC offers to all students the following **free** resources:

1. **Getting around HGTC:** General information and guidance for enrollment!
2. Use the [Online Resource Center \(ORC\)](#) for COMPASS support, technology education, and online tools.
3. **Drop-in technology support or scheduled training** in the Center or in class.
4. **In-person workshops, online tutorials and more services** are available.

Visit the WNC website: [Wavenet Central](#). Live Chat and Center locations are posted on the website. Or please call one of the following locations: WNC Conway, 349-5182; WNC Grand Strand, 477-2076; and WNC Georgetown, 520-1473.

Disability Services:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to Beth Havens, Director of Student Development on the Conway Campus Jaime Davis, Counselor/Advisor on the Georgetown Campus or Kristin Griffin, Counselor on the Grand Strand Campus. These individuals will review documentation of the student's disability and, in a confidential setting with the student, develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided.

Statement of Equal Opportunity/Non-Discrimination Statement

Horry-Georgetown Technical College prohibits discrimination and harassment, including sexual harassment and abuse, on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation in educational programs and/or activities.

Inquiries regarding the non-discrimination policies: Students and prospective student inquiries concerning Section 504, Title II, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs, Dr. Melissa Batten, VP Student Affairs, Title IX Coordinator, Building 1100, Room 107A, Conway Campus, PO Box 261966, Conway, SC 29528-6066, 843-349-5228, Melissa.Batten@hgtc.edu. Employee and applicant inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources, Jacquelyne Snyder, VP Human Resources, Section 504, Title II, and Title IX Coordinator, Building 200, Room 212A, Conway Campus, PO Box 261966, Conway, SC 29528-6066, 843-349-5212, Jacquelyne.Snyder@hgtc.edu.

Title IX Requirements

All students (as well as other persons) at Horry-Georgetown Technical College are protected by Title IX—regardless of their sex, sexual orientation, gender identity, part- or full-time status, disability, race, or national origin—in all aspects of educational programs and activities. Any student, or other member of the college community, who believes that he/she is or has been a victim of sexual harassment or sexual violence may file a report with the college's Chief Student Services Officer, campus law enforcement, or with the college's Title IX Coordinator, or designee.

*Faculty and Staff are required to report incidents to the Title IX Coordinators 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).

<p>Inquiries regarding the non-discrimination policies:</p>	
<p>Student and prospective student inquiries concerning Section 504, Title II, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs.</p>	<p>Employee and applicant inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources.</p>
<p>Dr. Melissa Batten, VP Student Affairs <i>Title IX Coordinator</i></p> <p>Building 1100, Room 107A, Conway Campus PO Box 261966, Conway, SC 29528-6066 843-349-5228 Melissa.Batten@hgtc.edu</p>	<p>Jacquelyne Snyder, VP Human Resources <i>Section 504, Title II, and Title IX Coordinator</i></p> <p>Building 200, Room 212A, Conway Campus PO Box 261966, Conway, SC 29528-6066 843-349-5212 Jacquelyne.Snyder@hgtc.edu</p>