



INSTRUCTIONAL PACKAGE

RAD 120
Principles of Computed Tomography

202310
Fall 2023

INSTRUCTIONAL PACKAGE

Part I: Course Information

Effective Term: Fall 2023 202310

COURSE PREFIX: RAD 120

COURSE TITLE: Principles of Computed Tomography

CONTACT HOURS: 2-0-2

CREDIT HOURS: 2-0-2

RATIONALE FOR THE COURSE:

This course will provide the Computed Tomography student with the basic knowledge of the inter-workings and physics principles behind a routine CT scan.

COURSE DESCRIPTION:

This course provides the basic understanding of the inter-workings of a CT scanner along with an in depth look at the physics behind image generation, quality assurance procedures, radiation dosimeter, and image reformation.

PREREQUISITES/CO-REQUISITES: RAD 103, RAD 135, RAD 140, RAD 145, AHS 206

***Online/Hybrid** courses require students to complete the [Dli Orientation Video](#) prior to enrolling in an online course.

REQUIRED MATERIALS:

Please visit the [BOOKSTORE](#) online site for most current textbook information. Use the direct link below to find textbooks. Textbook previously purchased

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.

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.

NETIQUETTE: is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat focused on online communications etiquette. For more information regarding Netiquette expectations for distance learning courses, please visit [Online Netiquette](#).

Part II: Student Learning Outcomes

COURSE LEARNING OUTCOMES and ASSESSMENTS*:

Week 1- Safety Essentials- ASRT Module 5- Patient Safety

1. Describe and use methods to measure patient dose.
2. Discuss the role of the CT Technologist in reducing radiation dose, including technical factor selection, positioning and shielding.
3. Explain the basics of occupational exposure in CT.
4. Discuss special considerations for pediatric patients.
5. Describe ethical considerations, including the overuse of CT, appropriate imaging of pediatric patients and how protocols can affect scanning.
6. Use the basics of patient care to ensure patient safety, including protocols, venipuncture, contrast administration and informed consent.
7. Explain pre-procedure and post-procedure instructions.
8. Demonstrate emergency procedures.

Week 2- Computed Tomography System Operations

1. Trace the history of digital imaging processing
2. Describe the key elements of image formation and image representation
3. Define each of the following: objects, images, analog image, digital image, digital image processing
4. Describe the following three steps in image digitization: scanning, sampling, quantization
5. Explain how an analog to digital converter works and describe the characteristics of speed and accuracy
6. List the advantages of digitizing images
7. List 4 image processing operations and explain how each works
8. Explain briefly each of the following: gray level mapping, look up table, histogram, spatial frequency filtering

9. List two ways to perform spatial frequency filtering and outlined the basics of the convolution technique
10. Draw and label the components of a generic digital image processing system
11. Describe the similarities between digital image processing NCT as a digital image processing system
12. List major image processing operations used in different medical imaging modalities
13. State the reason why image processing is an essential tool for CT technologist

Week 3 and 4- Radiation Dosimetry and Safety

1. State 2 reasons why the dose in CT is of importance to the CT technologist
2. Explain what is meant by exposure, absorbed dose, and effective dose
3. Explain what is meant by stochastic effects and deterministic effects of radiation exposure, and provide examples of each class of bioeffects
4. Describe the characteristics of the CT beam geometry that affect the dose distribution in a patient
5. State the function that describes an arbitrarily shaped dose intensity along the patient access
6. State several methods for measuring the dose in CT
7. State what is meant by the CTDI, MSAD, and DLP
8. Describe the characteristics of CT scanner dosimetry phantoms
9. Describe briefly the basic steps of the CT dose measurement procedure
10. Outline the factors affecting dose in CT and explain various dose reduction methods
11. Describe the basic principles of automatic tube current modulation
12. State what is meant by iterative reconstruction algorithms
13. Explain the meaning of the term "dose optimization"
14. Explain what the CT dose index registry is
15. Explain the image wisely and image gently campaigns

Week 5 and 6- Image Quality and Artifacts- ASRT Module 6- Image Quality

1. Discuss factors that affect image quality in CT.
2. Explain the methodology used to define image quality in CT.
3. Identify CT image artifacts.
4. List factors that influence artifacts.
5. Identify the tests associated with a quality control program.
1. Week 7- Image Gently- State the basic tenets and other considerations necessary for an effective pediatric CT examination
2. State the advantages of multi detector CT (MDCT) Compared to single-slice spiral CT (SSCT)
3. Identify new applications in pediatric CT imaging made possible with MDCT scanners
4. Explain critical elements of positioning the pediatric patient for a CT examination
5. Outline the necessary technical aspects of a pediatric CT examination
6. Describe the importance of using protocols in pediatric CT

Week 7- "Image Gently"

1. State the basic tenets and other considerations necessary for an effective pediatric CT examination
2. State the advantages of multi detector CT (MDCT) Compared to single-slice spiral CT (SSCT)
3. Identify new applications in pediatric CT imaging made possible with MDCT scanners
4. Explain critical elements of positioning the pediatric patient for a CT examination
5. Outline the necessary technical aspects of a pediatric CT examination
6. Describe the importance of using protocols in pediatric CT

****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*:

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

EVALUATION*

Tests	60%
Assignments	20%
Final Exam	20%
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	100%

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

GRADING SYSTEM:

Grading scale is as follows:

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. 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.**

For online and hybrid courses, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

Part V: Student Resources



THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

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

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

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at ssc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email ssc@hgtc.edu or 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.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring appointments using TutorTrac, visit the Student Services tab in WaveNet. Email ssc@hgtc.edu or 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.



STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following free resources:

1. **Getting around HGTC:** General information and guidance for enrollment, financial aid, registration, and payment plan support!
2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **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. Or please call (843) 349 – TECH (8324), Option #1.



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 are equipped with computers to support academic research and related school work; printing is available as well. Visit the [Library](#) website for more information or call (843) 349-5268.

STUDENT TESTING:

- Testing in an **online/hybrid** course and in **make-up exam** situations may be accomplished in a variety of ways:
- Test administered within D2L
- Test administered in writing on paper
- Test administered through Publisher Platforms (which may have a fee associated with the usage)

Furthermore, tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through RPNOW, our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

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. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability staff 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.

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).

INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:

Student and prospective student inquiries concerning Section 504, Title II, Title VII, 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, Section 504, and Title II 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

Affirmative Action/Equal Opportunity Officer and Title IX Coordinator

Building 200, Room 205B, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5212

Jacquelyne.Snyder@hgtc.edu