

IDAHO STATE UNIVERSITY
Department of Radiographic Science
CT Modules ASRT
Course Syllabus

Course Credit: 1 Credits
Time and Location: Web Course
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Overview:

This course has been developed for the student to learn the basics of computed tomography in an easy-to-follow format with the online CT modules developed by the ASRT. Whether you're trying to decide if CT is the specialty for you or you want to learn about CT, you can use this CT course to gain the expertise you need to succeed in the exciting medical field of computed tomography.

Required Text:

There is no required textbook for this course. The transcripts for the modules can be printed out from within the course.

Method of Presentation: Web Course, self study

Code of Ethics: This course adheres to the ISU Code of Conduct. In particular, academic dishonesty, however small, creates a breach in 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 ISU Code of Student Conduct.

Course Learning Objectives/Goals:

Module 1 — Fundamentals: Covers the history and evolution of CT including the design elements of the modern CT scanner.

Module 2 — Equipment and Instrumentation: Explores the mechanisms of the CT apparatus and explains how the operator can affect the quality of each image.

Module 3 — Data Acquisition: Describes how components of modern CT scanners construct images and how images are affected by selectable scan factors.

Module 4 — Image Processing and Reconstruction: Focuses on the tools and applications needed for viewing, specialized scanning and archiving CT data.

Module 5 — Patient Safety: Demonstrates the methods used to measure patient dose, increase patient safety and reduce occupational exposure in CT.

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Module 6 — Image Quality: Illustrates how image quality is a balance between selectable factors and radiation dose to the patient.

Module 7 — Procedures: Explores routine head, neck, chest, abdomen, pelvis, thoracic, lumbar spine and extremity examinations, as well as CT angiography of the chest.

Module 8 — Cross-sectional Anatomy of the Head and Neck: Provides the necessary tools for understanding anatomy in three dimensions by demonstrating the location, function and appearance of major structures in the head and neck.

Module 9 — Cross-sectional Anatomy of the Chest, Abdomen, and Pelvis: Provides the necessary tools for understanding anatomy in three dimensions by demonstrating the location, function and appearance of major structures in the thorax (chest), abdomen and pelvis.

Module 10 — Additional Applications: Covers advanced CT scanning techniques and the postprocessing applications that can be used to manipulate volumes of data.

Module 11 — Pathology Part I: Cover pathology as seen on CT scans.

Module 12 — Pathology Part II: Cover pathology as seen on CT scans.

The **Secretary's Commission on Achieving Necessary Skills (SCANS)**: This commission was appointed by the Secretary of Labor to determine the skills people need to succeed in the work place. The Commission's fundamental purpose is to encourage a high-performance economy characterized by high-skill, high-wage employment. The Commission's research found that effective job performance is what business calls *workplace know-how*. This know-how has two elements: competencies and a foundation. The SCANS report identifies five competencies and a three-part foundation of skills and personal qualities that lie at the heart of job performance. While the Commission's work ended with the report, its recommendations must be implemented; as the report stated, "...defining competencies and a foundation is not enough. Schools must teach them. Students must learn them."

<http://www.academicinnovations.com/report.html>

Description of SCANS competencies are as follows:

A Three Part Foundation	
1. Basic Skills	reads, writes, performs arithmetic and mathematical operations, listens and speaks
2. Thinking Skills	thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons

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3. Personal Qualities	displays responsibility, self-esteem, sociability, self-management, and integrity and honesty
The Five Competencies	
4. Resources	identifies, organizes, plans and allocates resources
5. Interpersonal	works with others
6. Information	acquires and uses information
7. Systems	understands complex interrelationships
8. Technology	works with a variety of technologies

Each of these foundations and competencies are listed after the objective that meet the competency or skill set described above.

Course Learning Outcomes:

Module 1 Fundamentals

Upon completion of this module the student will be able to:	SCANS
Describe the events leading to the discovery of computed tomography	1,2,3,4,,6,8
Explain the design of CT scanner generations	1,2,4
Identify the location and function of major CT components	1,2,4,
List the most common uses of computed tomography in medical imaging	1,2,3,4,7,8
Discuss the basic processes related to digital image processing	1,2,5

Module 2 Equipment and Instrumentation

Upon completion of this module the student will be able to:	SCANS
Explain the major components of the computed tomography computer system.	1,2,4,6
Trace the sequence of events in CT scanning from the application of the electrical current to the radiographic tube to image display.	1,2,6
Explain how adjusting operator console parameters affects CT image data	1,2,4,6
Discuss the elements of a digital image.	1,2,6

Module 3 Data Acquisition

Upon completion of this module the student will be able to:	SCANS
Name the methods of acquiring computed tomography images	1,2,4,6,7
Explain the functions of the data acquisition system (DAS)	1,2,6
Describe the process of data acquisition.	1,2,6,7
Identify the factors that influence data acquisition.	1,2,6
List the selectable scan factors used to acquire images	1,2,6,7

Module 4 Image Processing and Reconstruction

Upon completion of this module the student will be able to:	SCANS
Describe the steps required for computed tomography image reconstruction.	1,2,6
List the postprocessing techniques needed for image enhancements.	1,2,6
Define the tools needed used to view a CT image.	1,2,6

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List the workstation applications used for specialized CT scanning.	1,2,6
Describe the methods of recording and archiving CT data.	

Module 5 Patient Safety in Computed Tomography

Upon completion of this module the student will be able to:	SCANS
Describe and use methods to measure patient dose.	1,2,5,6
Discuss the role of the computed tomography technologist in reducing radiation dose, including technical factor selection, positioning and shielding.	1,2,4,6
Explain the basics of occupational exposure in computed tomography.	1,2,4,5
Discuss special considerations for pediatric patients.	1,2,3,4,5,6,7,8
Describe ethical considerations, including the overuse of CT, appropriate imaging of pediatric patients and how protocols can affect scanning.	1,2,6
Use the basics of patient care to ensue patient safety, including protocols, venipuncture, contrast administration and informed consent.	
Explain preprocedure and postprocedure instructions.	
Demonstrate emergency procedures.	

Module 6 Image Quality

Upon completion of this module the student will be able to:	SCANS
Discuss factors that affect image quality in CT.	1,2,5,6
Explain the methodology used to define image quality in CT.	1,2,4,6
Identify CT image artifacts.	1,2,4,5
List factors that influence artifacts.	1,2,3,4,5,6,7,8
Identify the tests associated with a quality control program.	1,2,6

Module 7 Procedures

Upon completion of this module the student will be able to:	SCANS
Properly position a patient and select appropriate scan parameters for common CT examinations.	1,2,5,6
Explain why different window widths and levels are selected.	1,2,4,6
List the required imaging planes for each procedure.	1,2,4,5
List the information that should be noted on each scout and scan images.	1,2,3,4,5,6,7,8
Review images for quality and accuracy to ensure no further imaging is necessary before the patient leaves the CT suite.	

Module 8 Cross-sectional Anatomy of the Head and Neck

Upon completion of this module the student will be able to:	SCANS
Name and describe the anatomical planes of the body.	1,2,5,6
List and define directional terminology related to the body.	1,2,4,6
Describe human embryo development.	1,2,4,5
Name the major structures of the head and neck discussed in this module.	1,2,3,4,5,6,7,8
Locate specific organs or structures on a schematic or CT image.	1,2,5,6

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Identify the anatomical plane in which cross-sectional images were either acquired or reformatted.	1,2,5,6
Recall the structures of the human vascular system.	1,2,4,6
Name the 12 cranial nerves, their distribution and function.	1,2,5,6
Identify selected muscular structures.	1,2,4,6

Module 9 Cross-sectional Anatomy of the Chest, Abdomen and Pelvis

Upon completion of this module the student will be able to:	SCANS
Define anatomical terms associated with the structures described in this module.	1,2,5,6
Name the major structures of the chest, abdomen and pelvis discussed in this module.	1,2,4,6
Describe the function of each anatomical structure discussed in this module.	1,2,4,5
Identify the abdominal quadrants.	1,2,3,4,5,6,7,8
Locate specific organs or structures on a schematic or computed tomography image.	1,2,6

Module 10 Additional Applications

Upon completion of this module the student will be able to:	SCANS
Describe current trends in computed tomographys (CT).	1,2,5,6
Explain the basic procedures for additional CT applications.	1,2,4,6
Identify modifications used for trauma and pathology.	1,2,4,5
Recognize the uses of virtual CT in medical imaging.	1,2,3,4,5,6,7,8
Explain how CT is used in radiation therapy treatment planning, nuclear medicine and portably.	1,2,6

Academic Dishonesty Policy:

Academic dishonesty (cheating, plagiarism, etc.) will not be tolerated in this class and may result in suspension or dismissal from this course and from the program. Cases will also be referred to the Dean of Students for possible dismissal from the university.

Cheating includes, but is not limited to, (1) use of any unauthorized assistance in taking quizzes, tests, or examinations; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or completing other assignments; or (3) 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 recognition, the published or unpublished works of another person. The use of materials generated by agencies engaged in "selling" term papers is also plagiarism.

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Many components of this course are designed to be highly interactive. Students are encouraged to take full advantage of the many resources available including Internet sites, handouts and workbooks, other textbooks and journals, faculty, and peers. This interactive collegial learning environment is conducive for life-long learning.

What does this mean: I have allowed ‘printed material’ from the Web site to be available to the student. This can present problems if not used properly. Material from quizzes and tests should be used for your OWN study endeavors. Because the quizzes are open book, you should not obtain the answers from other students prior to taking the quizzes. This defeats the intended learning methodology. Also, DO NOT obtain material (quizzes and tests) from previous students who have taken this course. I will consider this cheating and could result in an automatic ‘F’ for the quiz and the course. Failure to follow these instructions will result in a failure of the course.

When students submit their efforts for grading, they are attesting that they have abided by these rules.

Grading Procedure:

There will be no make-up quizzes, if you miss the deadline for a module you will receive a zero.

Assessment Method	Percentage Value
Each module counts as 5.83% of the course grade	70%
Final Exam	30%
Total	100%

This grading Scale will be used:

+/- System			
93-100%	A	73-76%	C
90-92%	A-	70-72%	C-
87-89%	B+	67-69%	D+
83-86%	B	63-66%	D
80-82%	B-	60-62%	D-
77-79%	C+	59% Below	F

Note: A grade of C or better is required in this course in order to receive a degree from the Department of Radiographic Science.

The minimum requirements to earn a passing grade are successful completion of all tests (70% minimum).

3. Computer Account: All students must have internet access to take this course.

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It is a requirement to take all tests offered during the semester. An incomplete will be issued for the class if a test is not taken.

Disability Services: Students with disabilities who wish to have accommodations provided by the University must self-identify with Disability Services (208-236-3599) in order to have accommodations provided. Information and applications are available in the Center and may be picked up in person or requested by telephone. The URL is <https://www.isu.edu/disabilityservices/>