RADT A265: PRINCIPLES OF DIGITAL IMAGING AND COMPUTER APPLICATIONS

Item	Value
Curriculum Committee Approval Date	11/01/2023
Top Code	122500 - Radiologic Technology
Units	2 Total Units
Hours	36 Total Hours (Lecture Hours 36)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

Introduction to computer aided medical imagings as used in radiology departments. Applications include computed and digital radiography (CR/DR), CT, MRI, and other modalities. Basic imaging principles are applied, including physics, imaging protocols, and systems electronics. Software and display strategies for varying modalities will be discussed. Course does not include clinical experience. PREREQUISITE: Acceptance into the OCC Radiologic Technology Program (Cohort Restriction). Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Explain the differences between Computed Radiography (CR), Direct and In-direct Digital Radiography.
2. Recognize Computed Tomography and Magnetic Resonance Images of the chest, abdomen, and brain.
3. Describe the diagnostic applications; including advantage and disadvantages, of CT and MR to various organ systems.

Course Objectives

- 1. Identify and explain the basic types of computers, basic components, and functions of the computer.
- 2. Evaluate the impact of the computer on medical imaging procedures.
- 3. Analyze the impact of computers on various functions performed in the radiology department that are not directly related to patient care (reporting, film file storage, patient records, etc.)
- 4. Apply computer knowledge as it relates to modern medical imaging, such as computer/digital radiography, CT, MRI, and other digital imaging modalities.
- 5. Identify the impact of PACS capabilities.
- 6. Identify the diagnostic applications in NM, MRI, and US
- 7. Evaluate the application of digital capabilities in CT, MRI, and angiography.
- 8. Identify and define terminology specific to computer aided imaging.

Lecture Content

Introduction to the course Course Objectives Methods of assessment Grading system Exams/Quizzes Attendance/Participation Computer literacy Historical overview Relevance to radiology Inside the digital computer Basic concepts Computer systems Architectures and processing capabilities Types of computers Functional components of a computer Control unit - CPU Arithmetic/Logic Unit - ALU Memory RAM ROM Operating systems Communicating with computers: HIS/RIS PACS Acquisition and storage Image transmission local global (web-based) PCs: Their role in medical imaging Basics of interfacing peripheral devices Analog-to-digital converters Video image processors Array processors Special purpose processors Graphic display devices Digital Imaging Basic Concepts Contrast enhancement Image enhancement and reconstruction Digital Imaging: Introduction to practical applications Radiography Computed radiography (CR) Direct radiography (DR) Fluoro Acquisition Post procedure processes image enhancement reconstruction Principles of computed tomography Historical perspectives/Comparison with conventional Radiography Equipment and applications Technical aspects Sca nner components Contrast media safety Principles of Magnetic Resonance Imaging Historical perspective/Comparison with conventional methods Equipment and applications Basic principles - signal production Scanner components Safety of MRI/contrast media Imaging protocols - T1, T2, spin echo Principles of Angiography Digital vs. conventional angiography Applications Subtraction MRA CTA Intravenous vs. intra-arterial Image post -processing Overview of Nuclear Medicine and Ultrasound Historical Perspective/Comparison to conventional methods Applications in NM SPECT PET Applications Applications in Ultrasound Overview of Radiation Theory Historical Perspective/Comparison to conventional methods Applications Safety and protection issues Administrative uses of computers in radiology Radiology department application Digital dictation and transcription: equipment and accessories Review: Computers Digital imaging Computed tomography MRI Digital angiography Other modalities Nuclear medicine Ultrasound Radiation therapy Medical/radiology information systems

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)

Instructional Techniques

Lecture and application of ideas; overhead and video presentations; guest lecturers; site visits

Reading Assignments

Approximately 1.75 hours per week for a total of 28 per semester. Some short essay questions in examination or quiz format; homework assignments

Writing Assignments

Approximately 0.5 hours per week for a total of 8 per semester. Some short essay questions in examination or quiz format; homework assignments

Out-of-class Assignments

Approximately 1.75 hours per week for a total of 28 per semester. Some short essay questions in examination or quiz format; homework assignments

Demonstration of Critical Thinking

Periodic quizzes; examinations; comprehensive final exam; written homework assignments; attendance and participation

Required Writing, Problem Solving, Skills Demonstration

Periodic quizzes; examinations; comprehensive final exam; written homework assignments; attendance and participation

Eligible Disciplines

Radiological technology: Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Long, B. W., Hall Rollins, J, Smith, B. J.. Merrills Atlas of Radiographic Position and Procedures. , 13th ed. Elsevier/Mosby,, 2016 2. Required Bushong, S. C. . Radiologic Science for Technologists, 11th ed. Elsevier/Mosby,, 2017 Rationale: -