Course Syllabus

Prerequisite: Acceptance to CT Certificate Program
Current BLS/ACLS card
Member of the ASRT

Course Description
This course will provide specific knowledge and skills for the professional practice of computed tomography. Course topics will include: CT Physics and Instrumentation, patient care safety and management. This course will also include whole body cross-sectional anatomy, pathology, imaging procedures with protocols, and special procedures in CT.

Hours per class: 1
Number of classes per week: 2
Term: January - June

Course Objectives – The student will be able to:
- Describe components of the CT imaging system and commonly used post processing techniques for various procedures.
- Identify the hardware and software needs for various CT procedures.
- Review common computer terms applicable to CT image information.
- Identify and describe the basic components of data acquisition scheme in CT with consideration to generator type, detector characteristics, and the five generations of CT scanners.
- List and explain the functions of computer data processing, array processor, data acquisition system (DAS) and electronic signal formation from detector to analog to digital convertor.
- Discuss and explain the slip ring technology used for spiral scanning.
- Distinguish between - raw data, image data and scan data.
- Identify materials used in different types of CT detectors.
- Identify filters, algorithms and kernel settings commonly used for CT.
- Be able to discuss the selectable scan factors and how each affect the CT image.
- Discuss and describe the appearance of different types of CT artifacts and how they can be eliminated or reduced.
- List and describe the radiation protection devices and technique selection methods that are used to reduce patient dose in CT and the correct application of each.
- Identify the indicated CT procedure for specific anatomical structures, patient symptoms or pathology.
- Specify the proper procedures for patient screening and patient preparation required for each procedure.
- Determine if contrast media is indicated for a specific procedure and if indicated, name the type and specify the dosage and route of administration.
- List the range, anatomical landmarks, patient orientation and position and technical factors for adults and pediatric patients used to produce scout and scan images for a given procedure.
- Provide correct information concerning the scan field of view (SFOV), display field of view (DFOV), scan mode, algorithm, gantry angle, technical factors, scan range, table incrementation and slice thickness (z-axis) selection for each procedure.
- Select different window width and levels for each procedure.
- Differentiate between scanning parameters for conventional vs. spiral procedures.
- Determine correct matrix size selection for each procedure studied.
- Identify pathology resulting from trauma or pathological conditions on CT images, for adults and pediatric patients.
- Relate an understanding of multiplanar (MPR) images (axial, sagittal, coronal and oblique) of human anatomy created by CT.
- Differentiate classifications of postprocessing techniques and methods to improve image quality for postprocessed images.
- List and describe anatomical structures located and identified in the axial, sagittal, coronal and oblique planes.
- List and describe types of contrast agents.
- Describe indications and contraindications of contrast agent use.
- State the five-rights of medication.
- Identify methods and techniques for administering various types of contrast agents.
- Demonstrate appropriate venipuncture technique.
- Identify, describe and document complications that arise with venipuncture and appropriate actions to resolve these complications.
- Differentiate and document dose calculation for adult and pediatric patients.
- Prepare for injection of contrast agents using aseptic techniques.
- Relate complications and identify symptoms associated with contrast agents and medications to specific emergency situations.
- Demonstrate competent assessment skill through effective management of the patient's physical and mental status.
- Respond appropriately to medical emergencies and demonstrate basic life support procedures.
- Identify and describe components and implication of informed consent.
- Identify manual and power injector options when delivering contrast.
- Describe and identify specific types of tubes, lines, catheters and collection devices.
- Describe vital signs and lab values used to assess patient condition, including sites for assessment and normal values.
- Identify special procedural scans encompassing biopsies, drainages, angiography, colonography, and cardiac CT

**Grading Scale**

90 – 100 A  
80 – 89 B  
70 – 79 C  
60 – 69 D  
≤ 59 F

Excessive absenteeism will reduce the student’s final course grade. If you are not present when role is taken, you will be marked absent. If absent from class, the student will be responsible for getting lecture notes from fellow classmates. Make up tests and quizzes are at the discretion of the instructor.

Course progression is contingent upon the student maintaining at least 2.0 course average.

The course instructor has the flexibility to modify or change the syllabus/schedule during the course of the semester. If changes are made, the student will be notified in advance.

**Required Text**

*Computed Tomography for Technologists: A Comprehensive Text*, Romans, Lois
Computerized Tomography

I. CT Overview & Digital Image Processing
   a. Introduction & Lecture
   b. Chapters 1 & 2 (Seeram)

II. Physical Principles of CT & Data Acquisition Concepts
    a. Introduce modules
    b. Lecture Chapters 3 & 4 (Seeram)

III. Image Reconstruction & Sectional Anatomy
     a. Quiz
     b. Lecture Chapter 5 (Seeram)
     c. Neuroanatomy Chapter 15 (Romans & online)

IV. Iterative Reconstruction & Basic Instrumentation
    a. Modules
    b. Lecture Chapters 6 & 7 (Seeram)
    c. Neuroanatomy Chapter 15 (Romans & online)

V. Image Postprocessing and Visualization Tools & Sectional Anatomy
   a. Quiz
   b. Lecture Chapter 8 (Seeram)
   c. Thoracic anatomy Chapter 16 (Romans & online)

VI. Image Quality & Sectional Anatomy
    a. Modules
    b. Lecture Chapter 9 (Seeram)
    c. Thoracic anatomy Chapter 16 (Romans & online)

VII. Radiation Dose in CT & Multislice CT & Sectional Anatomy
     a. Quiz
     b. Lecture Chapters 10 & 11 (Seeram)
     c. Abdomen/Pelvis anatomy Chapter 17 (Romans & online)

VIII. Other Technical Application of CT imaging: Basic Principles & Sectional Anatomy
      a. Modules
      b. Lecture Chapter 12 (Seeram)
      c. Abdomen/ pelvis anatomy Chapter 17 (Romans & online)
IX. Three Dimensional CT: Basic Concepts & Sectional Anatomy
   a. Quiz
   b. Lecture Chapter 13 (Seeram)
   c. Musculoskeletal anatomy Chapter 18 (Romans & online)

X. PET/CT & SPECT/CT & Anatomy
   a. Modules
   b. Lecture Chapter 14 (Seeram)
   c. Musculoskeletal anatomy Chapter 18 (Romans & online)

XI. CT Head, Cerebral Vessels, Neck & Spine Procedures
   a. Quiz
   b. Lecture Chapter 15 (Seeram)
   c. Neurologic Imaging Procedures Chapter 19 (Romans)

XII. CT of the body
     a. Modules
     b. Lecture Chapter 16 (Seeram)
     c. Thoracic Imaging Procedures Chapter 20 (Romans)

XIII. CT of the body (cont)
      a. Quiz
      b. Lecture Chapter 16 cont. (Seeram)
      c. Abdomen / Pelvis Imaging procedures Chapter 21 (Romans)

XIV. Musculoskeletal Imaging Procedures & IR CT and CT Floroscopy
     a. Modules
     b. Lecture Chapters 22 & 23 (Romans)

XV. Pediatric CT & Quality Control for CT scanners
    a. Quiz
    b. Lecture Chapters 17 & 18 (Seeram)

XVI. PET / CT Fusion Imaging & Pathology
     a. Modules
     b. Lecture Chapter 24 (Romans)

XVII. Pathology
      a. Quiz
      b. Lecture
XVIII. Pathology  
a. Modules  
b. Lecture  

XIX. Patient Education & Patient Assessment  
a. Quiz  
b. Monitoring normal and abnormal values.  

XX. Contrast Agents and Power Injectors  
a. Modules  
b. Lecture  

XXI. Medications Types, Routes Indications & Contraindications, Prep & Dosage  
a. Quiz  
b. Lecture  

XXII. Asepsis & Sterile Technique  
a. Modules  
b. Lecture  

XXIII. Emergency Care: Contrast Reactions  
a. Quiz  
b. Lecture: Reactions, Medications symptoms and treatment  

XXIV. Emergency Care  
a. Modules  
b. Lecture  

XXV. Review  
a. MIC study modules  
b. Quiz  

XXVI. Review  
a. MIC study modules  
b. Quiz  

XXVII. Review  
a. Final Exam