R T 74: ADVANCED CLINICAL EXPERIENCE: COMPUTED TOMOGRAPHY

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	14
Hours:	16 lecture, 480 laboratory per quarter (496 total per quarter) 2 hours lecture per week for the first 8 weeks; 40 hours clinical laboratory per week for 12 weeks. This is a clinical laboratory course with 16 hours of didactic content.
Prerequisite:	Current ARRT and CRT certification as a Radiologic Technologist; R T 62A and 62C.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- Demonstrate proper equipment manipulation and assist in the performance of computed tomography procedures, applying appropriate patient care and radiation protection principles in the clinical setting.
- Critique and distinguish relevant sectional anatomy and pathology related to computed tomography.

Description

This course focuses on patient care, safety, image production and procedures related to computed tomography as well as clinical practicum in a computed tomography department. Practical experience is implemented to expose the post-graduate radiologic technology student to the principles of CT with emphasis on mastery of the knowledge, insight and skills required to perform CT procedures.

Course Objectives

The student will be able to:

1. Review patient history to identify contraindications prior to the examination.
2. Perform venipuncture in the upper extremity for the purpose of injecting contrast media.
3. Relate how radiation interacts with human tissues for the purpose of radiation protection.
4. Maintain radiation protection for the patient, personnel, and self.
5. Exhibit knowledge and understanding in the proper use of the CT equipment.
6. Explain acquisition parameters and data reconstruction as it relates to CT image processing.
7. Critique and evaluate CT images for good diagnostic quality.
8. Select proper scanning parameters and patient positioning as outlined by the department protocols.
9. Differentiate between normal and abnormal anatomy as it relates to CT procedures of the head, spine, musculoskeletal, neck, chest, abdomen and pelvis.
10. Adhere to standards of attendance, punctuality and dependability.
11. Conduct self in a professional manner.
12. Apply theory to practice by exhibiting ongoing, satisfactory job performance.
13. Prepare a case study presentation based on literature search and clinical experience.

Course Content

1. Patient interactions and management
    a. Patient assessment and preparation
        i. Clinical history
        ii. Scheduling and screening
        iii. Education
        iv. Consent
        v. Immobilization
        vi. Monitoring
        vii. Management of accessory medical devices
        viii. Lab values
        ix. Medications and dosage
    b. Contrast administration
        i. Contrast media
        ii. Special contrast considerations
        iii. Administration route and dose calculations
        iv. Venipuncture
        v. Injection techniques
        vi. Post-procedure care
        vii. Adverse reactions
        viii. Universal/standard precautions
        ix. Patient discharge/post-procedure instructions
2. Safety
    a. Radiation safety and dose
        i. Radiation physics
            1. Radiation interaction with matter
            2. Acquisition (geometry)
            3. Physics principles (attenuation)
    b. Radiation protection
        i. Minimizing patient exposure
        ii. Personnel protection
        iii. Shielding
        iv. Dose measurement
        v. Patient dose reduction and optimization
3. Image production
    a. Image formation
        i. CT system principles, operation, and components
            1. Tube
            2. Collimation
            3. Generator
            4. Detectors

5. Data acquisition system
6. Computer and array processor

ii. Imaging parameters and data acquisition

iii. Image processing
1. Reconstruction
2. Post-processing

b. Image evaluation and archiving

i. Image display
1. Pixel/voxel
2. Matrix
3. Image magnification
4. Display field of view
5. Window level, window width
6. Cine
7. Geometric distance or region of interest

ii. Image quality
1. Spatial resolution
2. Contrast resolution
3. Temporal resolution
4. Noise and uniformity
5. Quality assurance and accreditation
6. CT number
7. Linearity

iii. Artifact recognition and reduction
1. Beam hardening or cupping
2. Partial volume averaging
3. Motion
4. Metallic
5. Edge gradient
6. Patient positioning
7. Equipment induced artifacts

iv. Informatics
1. Hard/electronic copy
2. Archive
3. PACS
4. Security and confidentiality
5. Networking

4. Procedures

a. Head, spine, and musculoskeletal

i. Head
1. Temporal bones
2. Pituitary fossa
3. Orbits
4. Sinuses
5. Maxillofacial
6. Tempomandibular joint
7. Base of skull
8. Brain
9. Cranium
10. Brain perfusion

ii. Spine
1. Cervical
2. Thoracic
3. Lumbar
4. Sacrum/coccyx
5. Post myelography
6. Discography

iii. Musculoskeletal
1. Upper extremity
2. Lower extremity
3. Bony pelvis
4. Shoulder and/or scapula
5. Sternum and/or ribs
6. Arthrography

b. Neck and chest

i. Neck
1. Larynx
2. Soft tissue neck

ii. Chest
1. Mediastinum
2. Lung
3. Heart
4. Airway
5. Low dose lung screening

c. Abdomen and pelvis

i. Abdomen
1. Liver
2. Biliary
3. Spleen
4. Pancreas
5. Adrenals
6. Kidneys and/or ureters
7. GI tract

ii. Pelvis
1. Bladder
2. Colorectal
3. Reproductive organs

5. Professionalism

a. Punctuality and dependability

i. Clinic time reporting

ii. Absenteeism

iii. Communicating whereabouts appropriately

b. Professional conduct

i. Taking initiative

ii. Communicating effectively

iii. Conducting oneself in a professional manner

c. Job performance

i. Scanning according to protocol

ii. Planning and organizing work efficiently

iii. Being alert and interested in examinations

iv. Reading and understanding requisitions

v. Communicating effectively

vi. Completing exam in a reasonable amount of time

6. Case study presentation

a. Topic selection

b. Presentation development

c. Oral presentation

Lab Content

1. Radiologic technology (computed tomography) clinical practice
    a. Radiation protection
    b. Equipment operation
    c. Physics and instrumentation
    d. Imaging procedures
    e. Patient care in a clinical setting

Special Facilities and/or Equipment

Clinical setting: Computed tomography equipment.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Presentation project: Case study
Clinical performance evaluation
Online quizzes

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Discussion
Demonstration
Clinical practice
Lecture

Representative Text(s) and Other Materials

Seeram, Euclid. Computed Tomography: Physical Principles, Clinical Applications & QC, 4th ed.. 2015.

Kelley, Lorrie. Sectional Anatomy for Imaging Professionals, 4th ed.. 2018.

Although the Seeram text is more than 5 years old, it remains the preeminent text in this area.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading assignments as required by the Computed Tomography Department.
2. Development of a case study presentation.
3. Participation in weekly Canvas discussions.
4. Self-study companion modules geared to meet ARRT category content specifications to meet the continuing education requirements for board licensure.

Discipline(s)

Radiological Technology