

R T 63: ADVANCED RADIOGRAPHIC PRINCIPLES

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	3
Hours:	3 lecture per week (36 total per quarter)
Prerequisite:	R T 62B.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- The student will pass a 25-point test on patient care with a score of 75% or higher.
- The student will pass a 15-point quiz on imaging procedures with a score of 75% or higher.

Description

Special emphasis on reviewing the content specifications for the ARRT Examination in Radiography; radiation protection, equipment operation and quality control, image acquisition and evaluation, imaging procedures, patient care and education. Intended for students in the Radiologic Technology Program; enrollment is limited to students accepted in the program.

Course Objectives

The student will be able to:

- Define terminology related to the electromagnetic spectrum.
- Discuss human exposure to types of background radiation.
- Identify dose-response curves and discuss the application of each.
- Identify NCRP recommendations for reducing patient exposure.
- Explain how the cardinal principles of radiation protection are used to decrease occupational exposure.
- Describe primary and secondary barriers.
- Describe the operation of each type of personal dosimeter.
- Identify the occupational dose limits and discuss their similarities and differences to patient protection.
- Explain the function and operation of transformers.
- Describe the fundamentals of anatomically programmed radiography (APR).
- Identify the structure and function of the x-ray tube.
- Describe and compare CR and DR.
- Explain the use of exposure indication systems.
- Describe care and maintenance of IPs and PSPs.
- Describe care and maintenance of protective apparel.
- Compare the fundamental imaging of digital versus screen-film imaging.
- Identify and discuss the factors unique to digital imaging that influence image visibility.
- Identify various digital artifacts.
- Explain the function of histograms and LUTS.

- Critique images for resolution, distortion, brightness and gray scale.
- Explain the concepts and steps involved in performing an accurate and efficient imaging procedure.
- Identify human anatomy as displayed on illustrations and x-ray images.
- Explain accurate positioning details for routine imaging of the body parts.
- Assess and critique x-ray images for positioning accuracy and quality.
- Discuss ways in which routine imaging can be modified for trauma, mobile imaging and other nonroutine circumstances.
- Identify the purpose of an Advanced Care Directive and its impact on patient autonomy and decision-making.
- Discuss the value of objective and subjective patient information.
- Explain the cycle involved in transmitting infectious disease.
- Identify the types of contrast media and cite examples of their usage.

Course Content

- Review radiation protection
 - Biologic aspects of radiation
 - Radiosensitivity
 - Somatic effects
 - Acute radiation syndrome
 - Embryonic and fetal risks
 - Genetic impact
 - Photon interactions with matter
 - Minimizing patient exposure
 - Exposure factors
 - Shielding
 - Beam restriction
 - Filtration
 - Exposure reduction
 - Image receptors
 - Grids
 - Fluoroscopy
 - Personnel protection
 - Sources of radiation exposure
 - Basic methods of protection
 - Protective devices
 - Special considerations
 - Radiation exposure and monitoring
 - Units of measurement
 - Dosimeters
 - NCRP recommendations for personnel monitoring
 - Medical exposure of patients
- Review equipment operation and quality control
 - Principles of radiation physics
 - X-ray production
 - Target interactions
 - X-ray beam
 - Imaging equipment
 - Components of radiographic unit
 - X-ray generator, transformers, and rectification system
 - Components of fluoroscopic unit
 - Components of digital imaging (CR and DR)
 - Types of units
 - Accessories
 - Quality control of imaging equipment and accessories
 - Beam restriction
 - Recognition and reporting of malfunctions
 - Digital imaging receptors systems
 - Shielding accessories
- Review image acquisition and evaluation

1. Selection of technical factors
 - a. Factors affecting radiographic quality
 - b. Technique charts
 - c. Automatic exposure control
 - d. Digital imaging characteristics
2. Imaging processing and quality control
 - a. Image identification
 - b. Film screen processing
 - c. Digital imaging processing
 - d. Image display
 - e. Digital image display informatics
3. Criteria for image evaluation
 - a. Brightness/density
 - b. Contrast/gray scale
 - c. Recorded detail
 - d. Distortion
 - e. Demonstration of anatomical structures
 - f. Identification markers
 - g. Patient considerations
 - h. Image artifacts
 - i. Fog
 - j. Noise
 - k. Acceptable range of exposure
 - l. Exposure indicator determination
 - m. Gross exposure error
- D. Review imaging procedures
 1. Thorax
 2. Abdomen and GI studies
 3. Urological studies
 4. Spine and pelvis
 5. Head
 6. Extremities
- E. Review patient care and education
 1. Ethical and legal aspects
 - a. Patient's rights
 - b. Legal issues
 - c. ARRT Standards and ethics
 2. Interpersonal communication
 - a. Modes of communication
 - b. Challenges in communication
 - c. Patient education
 3. Infection control
 - a. Terminology and basic concepts
 - b. Cycle of infection
 - c. Standard precautions
 - d. Additional or transmission-based precautions
 - e. Disposal of contaminated materials
 4. Physical assistance and transfer
 - a. Patient transfer and movement
 - b. Assisting patients with medical equipment
 - c. Routine monitoring
 5. Medical emergencies
 - a. Allergic reactions
 - b. Cardiac or respiratory arrest
 - c. Physical injury or trauma
 - d. Other medical disorders
 6. Pharmacology
 - a. Patient history
 - b. Complications/reactions
 7. Contrast media
 - a. Types and properties
 - b. Appropriateness of contrast media to exam

- c. Patient education
- d. Venipuncture
- e. Administration

Lab Content

Not applicable.

Special Facilities and/or Equipment

- A. Multimedia classroom
- B. Internet access
- C. Classroom with viewboxes
- D. Subscription to the online RadReview ARRT Exam Preparation

Method(s) of Evaluation

- Quizzes
- Midterm
- Simulated registry examinations
- Final examination

Method(s) of Instruction

- Lecture
- Discussions
- Online testing

Representative Text(s) and Other Materials

Bushong, Stewart. [Radiologic Science for Technologists, 11th ed.](#) 2017.

Sherer, Mary Alice. [Radiation Protection in Medical Radiography, 8th ed.](#) 2018.

Saia, D.A.. [Radiography PREP Program Review & Exam Preparation, 9th ed.](#) 2018.

Saia, D.A.. [Lange Q & A: Radiography Examination, 11th ed.](#) 2018.

Bontranger, Kenneth L.. [Textbook of Radiographic Positioning and Related Anatomy, 9th ed.](#) 2018.

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

- A. Students are assigned weekly reading assignments from the textbook, [Radiography PREP Program Review & Exam Preparation](#).
- B. To test their knowledge and retention of the read material, students take weekly exams online where they are required to obtain a certain percentage correct.

Discipline(s)

Radiological Technology