

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

- d. Shielding accessories
- C. 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

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

- Quizzes
- Midterm
- Simulated registry examinations
- Final examination

Method(s) of Instruction

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

- 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