

COURSE OUTLINE
RAD-123
Equipment Maintenance and Operation
3 Credit Hours

Received by
HOWARD COMMUNITY COLLEGE
from
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Description

An introductory course to the science of medical radiation physics: This course concerns itself with a description of the various types of ionizing radiations, their origins, and their effect on biological materials. Topics covered will include X-ray circuitry and equipment, X-ray production, X-ray interactions with matter, and beam characteristics. Basic atomic structure and fundamental physics will be covered at the beginning of the course to insure that the student has a basic foundation upon which to build. Additional topics will include quality control, image intensification, a review of the physical principles of radiographic imaging and beam restriction devices and their effect on image quality. Prerequisites: RAD-111, RAD 112 and MAT 131. Corequisites: RAD-121 and RAD 122.

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Describe the atom relative to its component parts, configurations, and energy states.
2. Identify and describe the parts of a typical X-ray circuit.
3. Explain how X-rays are produced.
4. Define the radiation interactions with matter.
5. Describe the properties and characteristics of radiation.
6. Identify the physical principles of radiographic imaging.
7. Describe the factors that affect X-ray quantity and quality.
8. Manipulate X-ray controls to demonstrate the function of X-ray circuitry utilizing computerized windows.
9. Describe the five basic X-ray interactions with matter utilizing computerized windows.
10. Describe the effect of filtration, grids, and other beam restrictors on image quality.
11. Identify X-ray circuitry malfunctions using critical-thinking skills and writing skills.
12. Explain the difference between single-phase, three-phase, and high-frequency X-ray generators.
13. Recognize the voltage waveforms (characteristics) of the three types of X-ray generators.
14. List the voltage ripple values for the three types of X-ray generators.
15. Calculate the power rating for the three types of X-ray generators.
16. Identify the main components of an AEC system.
17. Explain the differences between mobile X-ray generators.
18. List the main components of a modern fluoroscopic system.
19. Discuss how the image brightness of fluoroscopic images is maintained.
20. Describe the various methods of monitoring fluoroscopic images.

Major Topics

The student will rotate through the following areas of the radiology department during the semester:

- I. Concepts of Radiation
- II. Fundamental Physics Principles
- III. Units of Measurement
- IV. Matter, Energy, Atom
- V. Atomic Structures
- VI. Ionizing Radiation
- VII. Electromagnetic Radiation
- VIII. Electricity/Magnetism
- IX. Electromagnetism
- X. Transformers
- XI. X-ray Equipment
- XII. X-ray Tubes
- XIII. X-ray Circuits
- XIV. Rectification
- XV. X-ray Production
- XVI. X-ray Emission
- XVII. Factors Affecting X-ray Quantity/Quality
- XVIII. X-ray Interactions with Matter
- XIX. Fluoroscopy
- XX. Image Intensification
- XXI. Quality Assurance/Quality Control of R/F Systems

Course Requirements

Attendance:

1. Telephone the instructor or lead technologist at the clinical education center prior to the clinical experience to state the reason for the absence.
2. All absences in the clinical laboratory must be made up and will be noted in the student's master clinical record.

Other Course Information

Grade Determination:

Quizzes (unannounced, lowest grade not counted)	25%	
Tests (3)		50%
Final Examination		<u>25%</u>
TOTAL	100%	

This is a Radiologic Technology Core course.