University of Arkansas − Fort Smith
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General Syllabus

RADT 1204 Image Production

Credit Hours: 4 Lecture Hours: 4 Laboratory Hours: 0

Prerequisite: RADT 1232 Radiation Physics
Prerequisite or corequisite: HLTH 1473 Medical Terminology
Corequisites: RADT 1214 Radiographic Procedures II and RADT 1224 Clinical Education II,

Effective Catalog: 2019-2020

I. Course Information

A. Catalog Description

An introduction of the physics of x-ray production, emission, and the factors influencing quality image production. In-depth study will focus on the x-ray circuit, tube construction, and the factors that influence optimal radiographic technique and image quality.

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

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

1. Identify as well as describe the components of the x-ray generator.
2. Identify as well as describe the components of the x-ray tube, including the line-focus principle and the anode heel effect.
3. Discuss the various causes of tube failure.
4. Discuss the interactions between electrons and the x-ray target.
5. Explain how mAs, kVp, added filtration, target material, and voltage ripple affect x-ray emission spectra.
6. List and discuss factors affecting both the quantity and the quality of the x-ray beam.
7. Identify and discuss the radiographic qualities that are considered photographic properties and those that are considered geometric properties.
8. Define and discuss primary, scattered and remnant radiation.
9. Describe grid construction and errors associated with their use.
10. Calculate grid ratio, grid frequency, contrast, contrast improvement factor, Bucky

factor, and selectivity.

11. List some of the factors that control or influence each radiographic quality.
12. Describe equipment characteristics that are secondary factors in changing the quantity and quality of the x-ray beam.
13. Describe and calculate the 15% rule, magnification, recorded detail, penumbra and mAs,
14. Discuss the reciprocity law, subject contrast, radiographic contrast, differential absorption, attenuation, recorded detail, and penumbra.
15. State the exposure factor that is the controlling factor for radiographic contrast.
16. Describe the production of scattered radiation and its effect on radiographic contrast.
17. Explain how kVp affects the production of scattered radiation.
18. Explain the effect on density, contrast, recorded detail, and distortion with either an increase or decrease in various other factors.
19. Calculate the new mAs required to compensate for a change in various other factors.
20. Describe the characteristics of the different types of technique charts.
21. List some pathologies that may require the techniques as listed on the chart to be decreased or increased in order to produce a good-quality image.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will use analytical/critical thinking skills to draw conclusions and/or generate solutions to problems associated with radiographic imaging equipment and image production.

Quantitative Reasoning: Students will apply appropriate mathematical formulas to solve problems associated with radiographic image production. Students will interpret visual models and data in order to draw inferences associated with radiographic equipment and/or image production.

III. Major Course Topics

A. X-ray Generator Construction
B. X-ray Tube Construction
C. X-ray Production and Emission
D. X-ray Quality and Quantity
E. The Four Radiographic Imaging Factors
F. Beam Restricting Devices and Scattered Radiation
G. Grids
H. Radiographic Exposure Calculation
I. Radiographic Technique Factors
J. Technique Charts, Compensation, Conversation, and Comparison