

University of Arkansas – Fort Smith
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General Syllabus

RADT 1302 Radiation Exposures II

Credit Hours: 2 **Lecture Hours:** 2 **Laboratory Hours:**

Prerequisites: RADT 1202 Radiation Exposures I

Corequisites: RADT 1312 Radiographic Procedures II and RADT 1323 Clinical Education III

Effective Semester: S u m m e r 2 0 1 4

I. Course Information

A. Catalog Description

A continuation of Radiographic Exposures I. Discussion of high-voltage generators, transformers, and rectifiers as they relate to image production will demonstrate characteristic differences in image quality. The primary exposure factors of mA, time, and kVp are explained in relation to their impact on the photographic properties of density and contrast. In-depth study of the four radiographic qualities, along with calculation and manipulation of technique variables, will provide basic concepts in determining optimum radiographic technique based on the patient part.

B. Additional Information

II. Student Learning Outcomes

A. Subject Matter

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

1. Define primary, scatter, and remnant radiation.
2. Identify two kinds of x-rays that are responsible for remnant radiation.
3. List three factors that contribute to scattered radiation.
4. Discuss three devices developed to minimize scatter radiation. Define automatic exposure control.
5. Explain how the photocell stops the exposure at the correct time for patients of different sizes.
6. Explain why optimum kVp should be used with automatic exposure control.
7. Describe grid construction.
8. Calculate grid ratio, grid frequency, contrast, contrast improvement factor, Bucky factor, and selectivity.
9. Describe the different types of grids and the errors associated with their use.
10. Define radiographic quality, resolution, noise, and speed.
11. Interpret the characteristic curve and define portions of the characteristic curve including the toe, shoulder, and straight-line portion.
12. Distinguish the geometric factors affecting radiographic quality.

13. Analyze the subject factors affecting radiographic quality.
14. Examine the tools and techniques available to the radiographer to create high-quality films.
15. List four prime exposure factors (four radiographic qualities). Identify the radiographic qualities that are considered photographic properties and those that are considered geometric properties.
16. List some of the factors that control or influence each radiographic quality.
17. Discuss the relationship between mAs and kVp in relation to beam quality and quantity.
18. List the optimum kVp for commonly radiographed body parts. State the controlling factors for density and for contrast.
19. State the relationship for mAs and kVp respectively to density and contrast.
20. Describe and calculate the 15% rule.
21. Describe equipment characteristics that are secondary factors in changing the quantity and quality of the x-ray beam.
22. List four patient factors and explain their effects on radiographic technique.
23. Discuss the four image quality factors of optical density, contrast, recorded detail, and distortion and how they are used to describe the characteristics of a radiograph.
24. List and explain the three types of automatic exposure controls.
25. Define SID, FFD, OHD, OFD, SOD, and FOD.
26. Define size distortion.
27. Explain how OID and SID are used to control distortion.
28. Calculate for magnification.
29. Define the shape distortion and explain how it differs from shape distortion.
30. List the three types of shape distortion and describe how they occur.
31. Describe superimposition.
32. Explain why it is important that the central ray be placed directly over the structure of interest.
33. Define mAs and give its relationship to density, contrast, recorded detail, and distortion.
34. Calculate for mAs using fractions, decimals, or milliseconds.
35. Describe the reciprocity law by explaining how two different sets of mA and time stations can equal the same mAs.
36. Define radiographic contrast and differentiate between high and low contrast.
37. Define subject contrast.
38. Differentiate between short and long scale.
39. Define differential absorption.
40. State the exposure factor that is the controlling factor for radiographic contrast.
41. Describe the production of scattered radiation and its effect on radiographic contrast.
42. Explain how kVp affects the production of scattered radiation.
43. Define the term attenuation.
44. Define recorded detail.
45. List the seven factors that affect recorded detail.
46. Define penumbra.
47. Given relevant factors, calculate for unsharpness (penumbra).
48. Explain the effect on density, contrast, recorded detail, and distortion with either an increase or decrease in various other factors.
49. Calculate the new mAs required to compensate for a change in various other factors.
50. Calculate the new mAs to be used when several exposure conditions change at the same time.

51. Compare several exposure conditions to see which would produce the greatest and least density.
52. List the three types of technique charts.
53. Describe the characteristics of a variable kVp technique chart.
54. Describe the characteristics of a fixed kVp chart over a variable kVp chart.
55. Explain the advantages of a fixed kVp chart over a variable kVp chart.
56. 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

Students will use analytical/critical thinking skills to draw conclusions and/or solve problems associated with radiographic image production.

Technological Skills

Students will use appropriate technology to analyze and evaluate data.

Ethics

Students will apply ethical standards in relation to patient information.

III. Major Course Topics

- A. Beam Restricting Devices and Scattered Radiation
- B. Grids
- C. Radiographic Exposure Calculation
- D. Radiographic Quality
- E. Radiographic Technique Factors: Distortion, Density, Contrast, Detail
- F. Technique Compensation, Conversion, and Comparison: Compensation, Conversion and Comparison, Technique Charts