

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY RAD 141 – PRINCIPLES OF RADIOGRAPHIC QUALITY I (4 CR.)

Course Description

Presents factors that control and influence radiographic quality, as well as various technical conversion factors useful in radiography. Discusses automatic film processing, sensitometry, and quality assurance testing. Part I of II. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

General Course Purpose

Introduces the principles of x-ray production and image formation in a CR/DR imaging system. Teaches the definitions and interrelationships of optical density, image contrast and recorded detail and how they impact the quality of a radiographic image. Teaches the influences of a variety of technical factors, to include milliampereseconds, kilovoltage, source-image distance, object-image distance, grid ratio, collimation, and other factors. Provides correlated practical laboratory exercises that demonstrate the radiographic principles described in the classroom lecture sessions.

Course Prerequisites/Corequisites

Prerequisite: Radiography Program Admission

Corequisites: RAD 121, RAD 125, and RAD 196

Course Objectives

Upon completing the course, the student will be able to:

1. Perform simple arithmetic and algebraic manipulations required to solve technical problems in radiography.
2. Diagram the production of characteristic x-rays and bremsstrahlung x-rays.
3. Identify the two principle interactions that can occur between a photon and matter that are important in radiographic image production.
4. Compare the contributions of the photographic effect and the Compton effect to the quality and formation of a radiographic image.
5. Distinguish between x-ray quantity and x-ray quality.
6. Describe how changes in x-ray quantity and x-ray quality alter the appearance of a radiographic image.
7. Discuss the undesirable effects of scatter radiation on the radiographic image.
8. Describe the rationale and the proper use of grids in the control of scatter radiation.
9. Identify the three (3) principal exposure factors used by the technologist to control radiographic density and contrast.
10. Discuss the influence of each of the following factors on optical density, image contrast, and recorded detail:
 - a. Milliampereseconds (mAs)
 - b. Kilovoltage (kVp)
 - c. Source-Image Distance (SID)
 - d. Object-Image Distance (OID)
 - e. Grid Ratio (GF)
 - f. Collimation
 - g. Focal Spot Size (FSS)
11. Discuss automatic exposure control and the advantages and disadvantages associated with it.

Major Topics to be Included

- A. A Review of Mathematics for Radiography
- B. X-Ray Production

- C. The Interaction of X-Rays with Matter
- D. Radiographic Quality
- E. Optical Density
- F. Radiographic Contrast
- G. Recorded Detail
- H. Beam Restricting Devices
- I. The Grid
- J. Exposure Factor Relationships