

Common Course Outline

RADT 112

Radiography II

6 Semester Hours

The Community College of Baltimore County

Description

RADT 112 – 6 credits – Radiography II continues the Radiography sequence with the fourth course; consists of both classroom and clinical sessions. Radiographic Exposure discusses the multiple factors that control and influence the production of the radiographic image on film. The equipment used to produce diagnostic images including the x-ray machine and image receptors is discussed in Radiographic Imaging. Instruction will cover the physical positioning of the patient and equipment to produce routine diagnostic radiographs of the lower extremities and spine and thorax regions. Provides continued participation in actual radiographic procedures as students assist staff at the clinical sites.

Credit Hours: 4.5 lecture hours, 16 clinical hours, and 2 lab hours per week

Pre-requisites: RADT 121

Overall Course Objectives

Upon successful completion of Module 1. Radiographic Exposure, students will be able to:

1. identify and define the four components of a quality radiographic image;
2. identify and analyze the relationships of factors affecting radiographic density, radiographic contrast, recorded detail, and distortion;
3. explain the purposes of beam limiting devices in terms of patient dosage, scattered radiation production, radiographic density & contrast;
4. explain the purposes of beam filtration in terms of patient dosage, scattered radiation, radiographic density and contrast;
5. analyze the relationships of factors affecting both the production of scattered radiation and its effect on the radiographic image;
6. describe a grid in terms of its purpose, construction, and use; and
7. solve multiple technique problems using formulas and relationships discussed in class.

Upon successful completion of Module 2. Radiographic Imaging, students will be able to:

1. describe the construction and operation of a modern x-ray tube;
2. determine safe operating limits of x-rays tubes using tube rating charts and anode cooling charts;
3. compare various types of x-ray generators in terms of advantages, disadvantages, and usefulness;
4. evaluate the operation of an x-ray generator in terms of kilovoltage accuracy, timer accuracy and mA linearity;
5. explain the construction, function and proper use of intensifying screens, CR image receptors and direct digital radiography systems;

6. describe the purpose, construction, operation and use of an image intensifier;
7. describe the use of video tubes, video recorder, cine cameras, and spot film cameras in recording radiographic images;
8. discuss the digital imaging process and its use in diagnostic medical imaging; and
9. compare the methods for creating standardized technique systems, and demonstrate technique selection given clinical scenarios.

Upon successful completion of Module 3. Positioning of the Lower Extremities students will be able to:

1. describe the anatomy of the lower extremity that can be demonstrated on radiographs;
2. identify lower extremity anatomy on diagrams and radiographs; and
3. describe the patient preparation/instructions, patient position, part placement, film selection/placement, beam alignment angulation, collimation/shielding, and any special considerations for the following radiographic examinations:

a. toes	b. foot
c. ankle	d. heel
e. lower leg	f. knee
g. patella	h. femur
i. pelvis	j. hip.

Upon successful completion of Module 4., Positioning of the Spine and Thorax, students will be able to:

1. describe the anatomy of the spine and bony thorax that can be demonstrated on radiographs;
2. identify anatomy of the spine and bony thorax on diagrams and radiographs; and
3. describe the patient preparation/instructions, patient position, part placement, film selection/placement, beam alignment/angulation, collimation/shielding, and any special considerations for the following radiographic examinations:

a. cervical spine, trauma & non-trauma	b. thoracic spine
c. lumbar spine	d. sacrum
e. coccyx	f. sacro-iliac joints
g. ribs	h. sternum
i. sternoclavicular joints.	

During the clinical education portion of RADT 112, students will:

1. complete demonstration/practice sessions for category III (lower extremity), and category IV (spine and bony thorax);
2. complete labs (simulations) for category II (upper extremity), and category III (lower extremity);
3. present films for image evaluation in category I (chest & abdomen), and category II (upper extremity);
4. complete a minimum of eight successful competency exams in category I (chest & abdomen) and II (upper extremities). These must include: PA & lateral ambulatory chest and flat abdomen (KUB
5. complete area-specific performance objectives for scheduled RADT 112 clinical areas;
6. complete the corresponding chapters in the Bontragers workbook and MRO by the module test date;

7. prepare and present a film critique report;
8. read one professional journal article and write a summary, which includes a critical evaluation of the article, and submit to Blackboard;
9. attend and participate in Radiography Program Pinning Ceremony for the Class of 2013; and
10. demonstrate appropriate professional behavior while on clinical duty.

Major Topics

- I. Radiographic Exposure
 - A. Qualities of the Radiographic Image
 1. Visibility vs. Sharpness (Recognizability)
 2. Photographic Properties
 - a. Density
 - b. Contrast
 3. Geometric Properties
 - a. Recorded Detail
 - b. Distortion
 - B. Photographic Properties: Radiographic Density
 1. Measurement of Radiographic Density
 2. Controlling Factors
 - a. Milliamperage (mA)
 - b. Exposure Time (Sec.)
 - c. Milliampere-Seconds (mAs)
 - d. Reciprocity Law
 3. Influencing Factors
 - a. Kilovoltage
 - b. Source Image Receptor Distance (SID)
 - c. Focal Spot Size
 - d. Anode Heel Effect
 - e. Filtration
 - f. Collimation (Field Size & Beam Restriction)
 - g. Orthopedic Casts
 - h. Patient Factors
 - i. Film/Screen Combinations
 - j. Grids
 - C. Photographic Properties: Radiographic Contrast
 1. Film Contrast
 2. Subject Contrast
 3. Scale of Contrast
 - a. Long Gray Scale (Low Contrast)
 - b. Short Gray Scale (High Contrast)
 4. Controlling Factor
 - a. Kilovoltage
 5. Influencing Factors

- a. kVp-mAs Relationship
 - 6. Influencing Factors
 - a. Patient Factors
 - b. Control of Scatter/Secondary Radiation
 - c. Film/Screen Combinations
 - d. Filtration
 - e. Air-Gap Technique
 - D. Geometric Properties: Recorded Detail
 - 1. Definitions
 - a. Resolution
 - b. Penumbra/Umbra
 - 2. Motion Unsharpness
 - a. Voluntary and Involuntary
 - b. Control of Motion
 - 3. Materials Unsharpness
 - a. Film and Intensifying Screens
 - b. Film/Screen Contact
 - c. Quantum Mottle
 - d. Modulation Transfer Function
 - 4. Geometric Unsharpness/Blur
 - a. Object-Image Receptor Distance (OID)
 - b. Source-Image Receptor Distance (SID)
 - c. Focal Spot Size
 - d. Geometric Unsharpness Formula
 - 5. Geometric Properties: Distortion
 - a. Magnification (Size Distortion)
 - i. Source-Image Receptor Distance (SID)
 - ii. Object-Image Receptor Distance (OID)
 - iii. SID/SOD Ratio
 - b. Shape Distortion
 - i. Object Size and Shape
 - ii. Tube-Part-Film Alignment
 - iii. Angulation of Central Ray
 - E. Solving Multiple Technique Problems
- II. Radiographic Imaging
 - A. X-ray Tube Construction
 - B. Heat Loading of X-ray Tubes
 - 1. Factors affecting heat loading
 - 2. Heating and cooling charts
 - C. Calibration of X-ray Generators
 - 1. Types of Generators
 - 2. Testing Equipment
 - D. Fluoroscopic Imaging
 - 1. Image intensification
 - 2. Recording media and techniques

- 3. Digital fluoroscopy
- E. Digital X-ray Imaging
 - 1. Review of computer principles and terminology
 - 2. Equipment specifications for imaging
 - 3. Applications in imaging
- III. Positioning of the Lower Extremities
 - A. Anatomy and Positioning of the following views:
 - 1. toes
 - 2. foot
 - 3. ankle
 - 4. heel/calcaneus
 - 5. lower leg
 - 6. knee
 - 7. patella
 - 8. femur
 - 9. pelvis
 - 10. hip, trauma and non-trauma
- IV. Positioning of the Spine and Thorax
 - A. Anatomy and Positioning of the following views:
 - 1. cervical spine, trauma and non-trauma
 - 2. thoracic spine
 - 3. lumbar spine
 - 4. sacrum
 - 5. coccyx
 - 6. sacro-iliac joints
 - 7. ribs, anterior and posterior
 - 8. sternum
 - 9. sternoclavicular joints

Course Requirements

Grading/exams:

- I. Attendance, Dress Code, & Ethics **5 points****
 minus 0.5 points for each absence or late (clinical and class) or unprepared for lab, minus 1.0 points for a "NO-CALL"
 Absence from three (3) or more classes or three (3) or more absences from clinical may lower the course grade one letter unless accompanied by a physician's written reason, minus 0.5 points for each infraction of uniform policy minus 1.0 points for each infraction after 1st notice.
 Students must be appropriately attired to be permitted in the clinical areas.

Attendance at the Class of 2013's Pinning Ceremony is mandatory in uniform.

- II. Performance Objectives **10 points****

Papers are due on the Thursday morning following completion of rotation.

- III. Clinical Evaluations** **5 points**
Clinical evaluations are completed weekly by supervising clinical staff and are due on the Thursday morning following completion of rotation.
- IV. Laboratory Evaluations (Simulations & Experiments)** **5 points**
-0.5 points for each unprepared lab, including forgetting OWN markers for every lab and forgetting dosimeter for exposure labs
- V. Image Evaluations/PIE's** **5 points**
- VI. Competency Evaluations** **5 points**
A minimum of 8 successful competency tests is required for RADT 112.
- VII. Film Critique and Experiments** **5 points**
Students are responsible for preparing and presenting a film critique report.
- VIII. Journal Article Review** **5 points**
Students are responsible for reading and evaluating one professional journal article.
- *IX. Quizzes** **10 points**
- *X. Tests (completed after each module)** **20 points**
- *XI. Final Comprehensive Exam** **25 points**
100 points

The ARRT has established a minimum scaled passing score of 75. The radiography program has developed standards of grading that are consistent with grading systems of other programs. Letter grades will be distributed according to the following standards:

92 - 100	A	83 - 91	B
75 - 82	C	65 - 74	D
below 65	F		

Other Course Information

RADT 112 is the fourth course in the sequence of radiography courses that comprise the professional portion of the radiography curriculum. It consists of both a classroom portion and a clinical portion. Students continue to build upon their knowledge of radiographic and fluoroscopic examinations. During the clinical portion of RADT 112 students will continue to achieve additional clinical radiography skills by participating in the actual procedures performed in a radiology/medical imaging department.

Date Revised: 8/21/12