

0916BERGEN COMMUNITY COLLEGE
Division of Health Professions/Radiography Program
Fall 2016

A. General Course Information

Title: Radiography I
Credits: 5
Semester: Fall (6 hrs. laboratory and 3 hrs. lecture per week)
Code: RAD 181
Prerequisites: Official acceptance into the radiography program
Corequisites: RAD 180 (Introduction to Radiography)
RAD 182 (Radiography Clinical I)

B. Course Instructor

Elizabeth Ministero-Romano MS Ed. R.T. (R)(M)

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Email: eromano@bergen.edu
Office hours: Tue. 7:15-8:00am
 Wed. - 7:15-8:00am & 11:00-11:30am
 Thurs- 7:00-8:00 am

Course Description

RAD 181 - Radiography I, introduces the study of radiography and the ethical considerations of this medical field. The theory and application of positioning, radiation protection techniques, and basic radiographic exposure, along with associated film critiques and laboratory experiments are covered in this course.

C. Statement of Purpose:

The purpose of this course is to:

- Become familiar with all aspects of modern radiography and how it relates to patient care
- Introduce basic positioning principles and practices
- Introduce the processes of analysis, critical thinking and problem solving
- Become proficient in all phases of radiography clinical under the supervision of clinical faculty.
- Prepare the student for clinical experience on patients in the hospital environment.
- Comply with a competency-based education system with regard to lectures, observation, testing, and demonstration and competency evaluations.

D. Course Objectives:

Upon completion of this course, the radiography student will be:

- Able to explain the role of the radiographer and the part radiology plays in medicine.
- Able to provide information on various standards, the positions of the structures and organs of the body, supplemented with practical instruction and application in the lab. Procedures learned and tested on campus can be started within each of the hospitals at a progressive pace.
- Familiar with the factors influencing radiographs and their effect on the quality of a radiograph including patient and operator protection.
- Familiar with the proper handling of patients and meeting their psychological needs.
- Provided with the information on radiation dosages, monitoring devices, and protection devices used to reduce radiation exposure.
- Familiar with the basic medical terminology commonly used in radiography.
- Functioning well under various hospital situations and applying the principles of radiography as taught at the college.

- Defining and describing the clinical data necessary, including the patient's name, x-ray number, examination date, institution's name, and proper anatomical markers.
- Analyzing and describing the radiographic image.
- Recognizing and describing the proper film size required for the examination, and that proper collimation was used.
- Defining and describing the routine projections for the part, and that the part has been properly positioned, that positioning landmarks have been identified and utilized, radiographic evidence of proper positioning is demonstrated, and, if applicable, that positioning or immobilizing devices were used.
- Identifying and describing the gross anatomy of the part or region being examined, the anatomy presented on the radiographic image, and any anatomical anomalies present on the radiograph.
- Identifying and analyzing the general quality of a radiograph, identifying any artifacts present on the radiograph, and the corrections that are necessary. Presenting acceptable radiographs to the radiologist for interpretation.

E. Course Materials

1. A small notebook for positioning notes in the lab.
2. Required texts, radiography notebook and power-point materials.
3. Initial markers must be ordered for hospital and lab use (2 sets required).
4. A dosimeter will be provided for both lab and clinical experience. The students are required to hand them in to the clinical education coordinator when requested.
5. Students are expected to bring their textbook and workbooks to each lecture and lab session.

F. Required Course Textbook

Title: Textbook of Radiographic Positioning and Related Anatomy
(Plus Bontrager Workbook)

Author: Bontrager, Mosby Systems

Edition: 8th edition

G. Teaching Methodologies

- Formal lectures and Discussion. Laboratory group and individual radiographic positioning
- Power-point lecture materials. Image review in the lab and Oral presentations of radiographs in the lab
- Labeling of all anatomical structures and Completion of all related modules. Review of all procedures in the competency manual. Other hand-out materials and instructor generated assignments.

H. Determination of Final Course Grades and Related Policies

| | |
|-----------------------------|-----|
| Test # 1 | 15% |
| Test # 2 | 15% |
| Midterm Exam | 20% |
| Final Exam | 30% |
| Lab Activities/Medical term | 10% |
| Attendance/ involvement | 10% |

- The instructor may do a general review of assessments during class time; however, Students may review their individual assessments, by appointment, during office hours with the instructor.
- If done on paper Examinations cannot leave the testing area.
- Students may review all assessments prior to the final examination, by making an appointment with the instructor during office hours.
- There will be a 2 point deduction, from the final course grade for late events and early unexcused departures.
- There will be a 3 point deduction, from the final course grade, for each unexcused absence.
- If the student feels they have grounds for an excused late, or absence event then they may provide the course instructor with documentation for review. The course instructor makes the final determination.

- **Grading System:** The program uses the grading system below.

| GRADES: | POINT VALUE: |
|----------------|---|
| A | 92-100 |
| B+ | 89-91.9% |
| B | 83-88.9% |
| C+ | 80-82.9% |
| C | 77-79.9% |
| D | 70 - 76.9 not recognized by the program |
| F | 69.9 and below failure |

I. **Subject Matter**

- Medical terminology (questions will be included on all assessments)
- Patient care practices Patient transportation Positioning of the chest, abdomen, upper extremities
- Overview of radiographic anatomy & physiology
- Radiographic quality and Basic principles of radiographic exposure and radiation protection
- Basic imaging equipment and x-ray production and Technical factors manipulation
- Introduction to digital and computed radiography

J. **Weekly Lecture Content**

- Week 1: 1- Orientation to course and program Explanation of the syllabus and course requirements.
2- Introduction to radiation safety practices and principles
- Week 2 1- Radiation safety practices and principles continued
2- Terminology associated with radiographic imaging body positions, projections and planes.
- Week 3 - 1- Introduction to the x-ray tube, Basic x-ray production, Parts and functions
2- Anatomy of the chest and mediastinum and Chest radiography basic positions
- Week 4 TEST #1
- Week 5 1- Positions, projections, planes and terms related to patient positioning
2- Chest radiography alternate projections/methods
- Week 6 1-Anatomy and positioning of the abdominal patient (3-way).
2-Basic technique principles. Introduction to functions.
3-Introduction to basic technique manipulation; mA, exposure time, kV, SID, screens
4-Determination of technical factors based on part measurement.
- Week 7 Midterm Exam
- Week 8 1-Anatomy of the fingers, hand and wrist.
2-Radiography of the fingers, hand and wrist; routine and alternative projections.

- Week 9 1-Anatomy of the forearm and elbow
2-Routine, alternative and trauma projections for the forearm and elbow.
3-Introduction to conventional imaging systems; screens and film
4-Inverse Square Law and the mAs distance formulas.
- Week 10 Test #2
- Week 11 1-Anatomy of the humerus and shoulder girdle.
2-Routine, alternative and trauma projections, for the humerus and shoulder.
3-Anatomy and positioning of the clavicle and scapula.
4-Grids their composition, use, technical conversions and Immobilization devices and technical considerations.
- Week 12 1-Anatomy of the rib cage and sternum
2-Routine and trauma projections and positions for the ribs and breast bone.
3-Technique manipulation; functions varied to mA, exposure time, kVp, screens and distance.
- Week 13 1-Introduction to digital radiography, computed radiography and picture archive communications systems. Components of each imaging system and Basic functions
- Week 14 Final examination.
- Week 15 Course wrap up

1. Laboratory Experience Outline In order to maximize the laboratory experience, students must review and study the lecture content before each laboratory session. Please bring the textbook, notebook and supplemental materials to each laboratory session. LABORATORY EXPERIENCES WILL FOLLOW THE BASIC LECTURE OUTLINE. The order is subject to change depending upon how students are progressing.

2. Unit Objectives Unit 1: TOPICS: Orientation to radiography, ethics, basic position and medical terminology, lab equipment, anatomy and positioning of the finger, hand and wrist, basic radiographic technique, basic protection and Radiologic terminology.

UPON COMPLETION OF THIS UNIT, THE STUDENTS WILL BE ABLE TO:

- Discuss terminology prefix and suffixes and positioning planes
- Accurately position the finger, hand, and wrist along with the anatomy of the finger, hand & wrist.
- Set standard exposure factors on the control panel.
- Understand the functioning of the collimator, bucky tray, tube locks, cassettes, calipers, density, mAs, kVp, FFD, SID, TFD, OFD, T.T., CM contrast, soft rays, and scatter radiation.
- Calculate the greatest density problems involving mAs and kVp, screens and CM measurement.
- Demonstrate central ray locations for the finger, hand and wrist.
- Outline the steps required to perform a routine diagnostic procedure.
- Practice basic darkroom theory. Define basic tube terminology.
- Organize a system for positioning when following the criteria for general positioning.
- Understand the function of the film receptor. Operate technical modifications for soft tissue.
- Conduct methods of protection for the patient and operator.
- Develop films with the automatic processor and reload cassettes.
- Properly prepare the patient for upper extremity radiography.

- Effectively answer questions regarding an x-ray procedure of the finger, hand, and wrist.
- Understand professionalism, ethics, and legal aspects. Practice basic concepts of body mechanics.

Unit 2: TOPICS: X-ray production, anatomy and positioning of the forearm and elbow (proximal humerus), basic technique conversions, anatomy and positioning of the humerus, shoulder, clavicle and scapula, anatomy and positioning of the chest, basic radiation protections, x-ray film and cassettes, Inverse Square law. and mAs distance formula.

UPON COMPLETION OF THIS UNIT, THE STUDENTS WILL BE ABLE TO:

- Position accurately and explain the anatomy of the forearm, elbow, humerus, shoulder, clavicle scapula, rib cage and sternum. Position explain the anatomy of the chest on radiographs.
- Apply basic principles for converting exposure factors. Explain MPD levels of exposure.
- Know steps for protection of the patient and operator. Know basic radiation biology concepts.
- Effectively critique radiographs of the upper extremity and chest.
- Explain basic tube components and the process of x-ray production. Apply formulas for density, dosage and distance. Manipulate basic technique functions, mAs, 15%, cassettes and patient thickness.
- Discuss air gap and grid techniques for chest radiography. Describe various respiratory pathologies.
- Explain methods to control scattered radiation. Understand how distance relates to film density.
- Explain respiratory anatomy. Detect motion on a radiograph. Identify major thoracic structures.

Unit 3: Topics: X-ray tube and generating components, anatomy and positioning of the abdomen, basic radiographic technique and radiation protection for abdominal studies, basic grid function, filters, collimators, anatomy in the four quadrants and nine sections of the body, positioning landmarks for abdominal films.

UPON COMPLETION OF THIS UNIT THE STUDENTS WILL BE ABLE TO:

- Position accurately and explain the anatomy contained within the abdomen.
- Apply proper technical factors for adequate density and reasonable contrast. Without motion
- Discuss basic radiation protection principles in abdomen radiography.
- Effectively critique radiographs of the abdomen and label important structures.
- Explain x-ray production and the steps involved in generating x-rays.
- List the basic components of the x-ray tube.
- Recognize anatomical structures found within the sections and quadrants of the abdomen.
- Demonstrate methods of controlling secondary radiation.
- Compare the grid cassette and its basic function to the bucky.
- Explain rotating and stationary anode tubes and the cathode.
- Discuss leakage, primary, remnant secondary and scatter radiations.
Calculation of heat units, the anode cooling and tube rating charts. Differentiate between inherent, added and total filtration concepts.
- Manipulate technical factors to adjust density and contrast of the radiograph.
- Formulate phototiming and conventional technical factors for abdominal studies.

Bergen Community College

Radiography Program

RAD 181 Fall 2016

I, _____ do hereby attest to the fact that I have read this syllabus
(Please print) and understand what objectives are necessary for
successful completion of this course.

- A. _____ I further realize that when the midterm and final examination are averaged, the grade must be 77% or higher. If, when averaged, they do not meet the 77% mark, the final course grade would be an F.
- B. _____ When the average of the midterm and final examinations equal 77% or higher than all the other graded components of the course will be factored into a final course grade. The minimum passing grade for this course is an overall 77% which is in alignment with the American Registry of Radiologic Technologists' certification examination.
(After smoothing)
- C. _____ There will be a 2 point deduction, from the final course grade for late events and early unexcused departures.
- D. _____ There will be a 3 point deduction, from the final course grade, for each unexcused absence.
- E. _____ If a student feels they have grounds for an excused late, or absence event then they may provide the course instructor with documentation for review. The course instructor makes the final determination.
- F. _____ I also realize that the policies contained within this syllabus are subject to change at any time and I will be notified electronically of any changes.
- G. _____ The instructor reserves the right to change the order of the subject matter and the week/day course material is presented.

My signature below indicates that I have read, understand and will abide by all policies contained within this Syllabus.

Student signature: _____

Date: _____

**Please initial after each letter, then sign and date the bottom