

RAD 105
Radiographic Physics and Imaging Equipment
3-2-2

COURSE DESCRIPTION: This course is designed to establish a basic knowledge of atomic structure and terminology. The nature and characteristic of radiation, x-ray production and the fundamentals of photon interactions with matter are included. Students will establish a knowledge base in radiographic, fluoroscopic, and mobile requirements along with design. Basic quality control measures to imaging equipment and accessories will also be discussed. Demonstrations and student experimentation will be included in the application of the theory.

This course is subject to a course fee. Refer to <http://mc3.edu/adm-fin-aid/paying/tuition/course-fees> for current rates.

REQUISITES:

Previous Course Requirements

- RAD 100 - Introduction to Radiography and Patient Care
- RAD 106 – Radiographic Image Production and Analysis
- RAD 104 - Clinical Education I
- RAD 111 - Radiographic Procedures I

Previous or Concurrent Course Requirements

- RAD 121 -Radiographic Procedures II. May be taken prior or during course.
- RAD 114 - Clinical Education II. May be taken prior or during course.

COURSE COMMENT(S):

NONE

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Differentiate between ionizing and nonionizing radiation.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion
2. Describe the electromagnetic spectrum, the x-ray emission spectra and relationships of wavelength/frequency	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion

to the various characteristics of the beam.		
---	--	--

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Define and describe the relationship of energy, wavelength and frequency and how they are related to velocity.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion
4. Identify the properties of x-rays and principles of x-ray production.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion
5. Discuss various photon interactions with matter in terms of description of the interaction, relation to atomic number, photon energy and part density, and their applications in diagnostic radiology.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion Group Projects
6. Diagram the elements of the x-ray circuit and x-ray tube.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion Group Projects
7. Compare and contrast generators in terms of radiation production and efficiency and units of radiation detection and measurement.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion
8. Explain the elements and operation of fluoroscopy systems.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion
9. Discuss the proper test equipment/procedures for evaluating the operation of an x-ray generator.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings Quality Control Experiments with Documentation	Exam Questions Class Discussion Quality Control Labs
10. Discuss the storing and handling of the image receptor that reduces the possibility of artifact	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings	Exam Questions Class Discussion Lab Assignment

production.	Lab Experiment with Documentation	
11. Describe the components of various radiographic units to include the image receptor.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings Lab Experiment with Documentation Group Project	Exam Questions Class Discussion Lab Assignment
12. Recognize the need for periodic maintenance and evaluation of radiographic equipment affecting image quality and radiation safety (shielding, image display monitor, light field, central ray detector calibration etc.)	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings Quality Control Experiments with Documentation Quality Management Paper	Exam Questions Class Discussion Quality Control Labs Group Projects Quality Management Paper Rubric
13. Perform routine maintenance on digital equipment.	Lecture/Discussion Demonstration/Practice Student Presentation Assigned Readings Quality Control Experiments with Documentation	Exam Questions Class Discussion Quality Control Labs

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Director of Educational Effectiveness. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria.*

SEQUENCE OF TOPICS:

1. Course Introduction
2. Structure of the Atom
3. Nature of Radiation
4. X-ray Production
5. Photon Interactions with Matter
6. X-Ray Circuit
7. Radiographic Equipment
8. Diagnostic X-ray Tubes
9. Fluoroscopy
10. Quality Control of Imaging Equipment and Accessories

LEARNING MATERIALS:

Carroll, Quinn, B. (2018). *Radiography in the Digital Age* (3rd Edition). Springfield, IL: Charles C. Thomas Publisher

Carroll, Quinn, B. (2018). *Student Workbook for Radiography in the Digital Age* (3rd Edition). Springfield, IL: Charles C. Thomas Publisher

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by: Debra Poelhuis, R.T., M.S.	Date: 5/2004
Revised by: Debra Poelhuis, R.T., M.S.	Date: 1/2009
VPAA/Provost Compliance Verification: Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by: Debra Poelhuis, R.T., M.S.	Date: 10/26/2012
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 10/26/2012
Revised by: Cheryl L. DiLanzo, M.S., R.T.	Date: 10/28/2016
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 11/5/2016
Revised by: Dana Smith	Date: 10/2022
VPAA or designee Compliance Verification:	Date: 11/29/2022



This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.