

**SOUTHEAST COMMUNITY COLLEGE
HEALTH SCIENCES DIVISION
RADIOLOGIC TECHNOLOGY
Revision Date: 11/2023**

I. CATALOG DESCRIPTION

Course Number: RADT 1127
Course Title: Radiographic Physics 2
Prerequisite(s): RADT 1117

Catalog Description: Continuation of the study of fundamental physical principles from mechanics to electromagnetism. Application of these principles to the construction and operation of fundamental x-ray and fluoroscopy equipment. Analysis of basic x-ray circuit. Overview of digital imaging systems. Overview of PACS and networking systems.

Credit Hours: 2.5
Class Hours: 38
Lab Hours: 0
Total Contact Hours: 38

II. COURSE OBJECTIVES AND COMPETENCIES: *Course will:*

1. Demonstrate an understanding of selected physical principles and how those principles relate to the operation of x-ray equipment.
2. Describe the correct operation of generators, motors, transformers, rectifiers, x-ray and fluoroscopy, and selected accessories.
3. Identify the components of a basic x-ray circuit.
4. Explain the components, principles and operation of conventional and digital imaging systems found in diagnostic radiology.

Note: Unit objectives are located in the learning management system within each unit of study.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. STUDENT LEARNING OUTCOMES: *Student will be able to:*

1. Understand electrical and magnetic principles as they relate to radiography equipment.
2. Explain how basic circuit components function within the x-ray generator.
3. Describe the purpose of grids and filtration and relate the concepts to patient dose and image quality.
4. Explain how fluoroscopic equipment functions
5. Describe the process of image capture and processing in a digital radiography system
6. Understand image display characteristics and data management in radiology

B. GENERAL EDUCATION LEARNING OUTCOMES

1. GELO 5: Analytical, Quantitative, and Scientific Reasoning

Manipulate formulas, data sets, graphs, tables, etc. in a way to produce a meaningful outcome.

IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

A. ELECTROMAGNETIC PRINCIPLES

1. Understanding Electricity
2. Understanding Magnetism & Electromagnetism

B. X-RAY CIRCUITRY

1. X-ray Circuitry and Components
2. Generators and Motors
3. Generator Efficiency

C. TUBE COMPONENTS AND FILTRATION

1. X-ray Tube Construction
2. Anode Function and Construction
3. Tube Filtration
4. Compensating Filters
5. Protecting the Tube

D. POST PRODUCTION INTERACTION

1. Scatter Prevention
2. Beam Restriction
3. Grid Function and Construction
4. Grid Conversion Factor
5. Formulas and Calculations

E. FLUOROSCOPY

1. History and Evolution
2. Image Intensified Fluoroscopy
3. Brightness Gain
4. Digital Fluoroscopy
5. Conventional and Mobile Fluoroscopy

F. DIGITAL IMAGE ACQUISITION AND PROCESSING

1. Analog vs. Digital Imaging
2. Photostimulable Phosphors (PSP)
3. Direct and Indirect Conversion Digital Imaging
4. Digital Characteristics

G. DIGITAL POST PROCESSING AND DISPLAY

1. Automatic Image Adjustments
2. Image Acquisition Errors
3. Image Display Characteristics
4. Radiologist Preference

H. DATA MANAGEMENT

1. Hospital Information System (HIS)
2. Radiology Information System (RIS)
3. Picture Archival and Communication System (PACS)
4. Digital Imaging and Communication in Medicine (DICOM)
5. Electronic Medical Records

I. IMAGE ANALYSIS AND APPEARANCE CHARACTERISTICS

1. Appearance Standards (Facility Specific)
2. Quality Assurance (QA) standards
3. Radiologist Preference
4. Noise
5. Signal to Noise Ratio (SNR)
6. Contrast to Noise Ratio (CNR)
7. Spatial Resolution
8. Contrast Resolution
9. Distortion and Magnification

V. INSTRUCTIONAL MATERIALS

A. Required Text(s):

Bushong, Stewart C. *Radiologic Science for Technologists*. Mosby, Inc., latest edition.

B. Other Resources:

Carlton, Richard R., Adler, Arlene M. *Principals of Radiographic Imaging, an Art and a Science*. Delmar, Inc., latest edition. **Course Study Guide**

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:

1. Lecture
2. Demonstration
3. Learning Activities

VII. METHODS OF EVALUATION

A. Please see course CID for methods of evaluation.

SCC STANDARD GRADING SCALE POLICY:

A+	95-100	C+	75-79
A	90-94	C	70-74
B+	85-89	D+	65-69
B	80-84	D	60-64
		F	Below 60

VIII. SPECIFIC COURSE REQUIREMENTS

- A. Attendance:** Attendance is crucial to your success in this course. Missed classes could cause you to miss valuable information. Please notify the instructor about late arrivals or absences as soon as possible. Excessive absences could result in a failing grade for the course.
- B. You must achieve a minimum final grade of 75% (C+) to meet program requirements and to progress to the next term.**