COURSE OUTLINE

Course Number	Course Title	Credits
RAD120	**Principles of Imaging Science II**	**3**
Hours: Lecture/Lab/Other 2/2	**Co- or Pre-requisite Pre-requisites: RAD102,RAD119, RAD127 Co-requisites: RAD 128**	**Implementation Semester & Year Spring 2022**

Catalog description:
Radiographic principles of image acquisition and evaluation are examined. Imaging physics principles of electricity, magnetism and x-ray circuitry are presented. The laboratory component is designed to demonstrate the application of image acquisition and evaluation.

General Education Category:
Not GenEd

Course coordinator:
Sandra L. Kerr, 609-570-3337, kerrs@mccc.edu

Required texts/Supplements:

REQUIRED:

Title: Radiologic Science for Technologists Author: S. Bushong
Publisher: Mosby
Edition: 12th

Title: Mosby's Radiography Online:Radiologic Physics Imaging
Author: Mosby
Publisher: Mosby Elsevier
Edition: 2nd

Title: Digital Radiography and Pacs
Author: C.Carter and B.Veale
Publisher: Mosby Elsevier
Edition: 3rd

Mathematical Instrument: Basic Non-Programmable Calculator

Course Student Learning Outcomes (SLO):

Upon completion of this course t*he student will be able to:*

1. Develop an understanding of the purpose, function, types of grids used in diagnostic radiologic imaging. [Supports ILG # 2, 3]
2. Analyze the factors that affect image quality relative to receptor exposure, spatial resolution, and distortion. [Supports ILG # 2, 3]
3. Discuss the variety of digital image receptors, image receptor exposure, and dynamic range, EI and DI indices along with post processing of the digital image. [Supports ILG # 2, 3]
4. Differentiate among the variety of automated exposure systems utilized in diagnostic radiology departments. [Supports ILG # 2, 3]
5. Correlate the principles of electricity, magnetism, and electromagnetism to diagnostic imaging. [Supports ILG # 2, 3]
6. Describe the function of the x-ray circuit components and recognize equipment malfunctions. [Supports ILG # 2, 3]
7. Apply radiologic imaging principles to produce diagnostic quality images in the laboratory; determine and implement corrective action when images are suboptimal. [Supports ILG # 1, 2, 3, 4, 10, 11]

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.
Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of study in detail – Unit Student Learning Outcomes

Unit I**:** Grids [Supports Course SLOs #1, 2, 3}

Learning Objectives:

The student will be able to:

- State the purpose of a grid and compare grid types.
- Select the most appropriate grid for a given clinical situation.
- Interpret grid efficiency in terms of grid ratio and frequency.
- Define grid cutoff and summarize the factors that influence grid cutoff.
- Evaluate grid artifacts in conventional and digital imaging.

Unit II Image Acquisition & Evaluation [Supports Course SLOs #2, 3, 11]

Learning Objectives:

The student will be able to:

- Describe the purpose of radiographic density/ image receptor exposure/ brightness.
- Identify the acceptable range of radiographic density/image receptor exposure/ brightness.

- Calculate mathematical problems using the factors that affect radiographic density/ image receptor exposure/brightness.
- Analyze radiographs for density adequacy using all technique factors.
- Describe the function of radiographic contrast or dynamic range.
- Differentiate between subject contrast and film contrast.
- Analyze radiographs for contrast adequacy using all technique factors.
- Analyze relationships of factors affecting radiographic density or image receptor exposure and contrast or dynamic range.
- Compare digital image characteristics to film screen image quality.

Unit III Automatic Exposure Control, Spatial Resolution, Distortion, and Digital Image Receptors [Supports Course SLOs #2, 3, 4]

Learning Objectives:

The student will be able to:

- Describe the purpose and clinical application of automatic exposure control systems.
- Identify errors associated with exposure control systems.
- Define recorded detail/spatial resolution and its relationship to diagnostic radiography.
- Describe the factors that affect recorded detail or spatial resolution
- Describe methods to minimize patient motion
- Analyze radiographys for adequacy of recorded detail/spatial resolution
- Explain methods to minimize distortion when performing mobile radiographic procedures while ensuring maximum recorded detail/ spatial resolution.
- Discuss the process of formulating imaging standards.
- Identify the imaging standard process and develop an individualized quality standard.
- Compare digital image receptors to film screen cassettes

Unit IV Electricity, Magnetism, Electromagnetism, X-Ray Circuitry [Supports Course SLOs #5, 6]

Learning Objectives:

The student will be able to:

- Differentiate between a series and parallel circuit.
- Apply Ohm's Law to series and parallel circuits.
- Define magnetism and discuss its application to radiography.
- Identify the classifications of magnets.
- State the hand rules of electromagnets.
- State the laws of magnetism.
- Describe electromagnetic induction.
- Differentiate between a motor and generator.
- Differentiate between alternating and direct current motors and generators.
- Describe the function of a transformer and its application to radiography.
- Identify the various types of transformers and discuss their efficiency.
- Calculate transformer law problems.
- Differentiate between single phase and three phase power.
- Compare the types of mobile radiographic units available.
- Identify the components of an x-ray circuit and describe the purpose of each.
- Given a diagram of an x-ray circuit, label the components.

Units of study in detail – Unit Student Learning Outcomes

Upon completion of the weekly laboratory sessions, the student will be able to:
[Supports Course SLO # 7]

- Perform a variety of experiments associated with image acquisition and evaluation
- Correlate theoretical concepts and clinical applications to image acquisition and evaluation.

Evaluation of student learning:

A grade of "C+" (77%) or higher must be achieved in the lecture and laboratory sections of the course to progress to RAD117 and RAD207. The following grading policy will be utilized:

Course Grade	Lecture Grade	Laboratory Grade
Lecture: 100%	Examinations: 50%	Assignments/Attendance: 100%
Lab: Pass/Fail	Final Exam: 25%	
	Project: 25%	