# LABETTE COMMUNITY COLLEGE BRIEF SYLLABUS

**SPECIAL NOTE**:
This brief syllabus is not intended to be a legal contract. A full syllabus will be distributed to students at the first class session.

**TEXT AND SUPPLEMENTARY MATERIALS USED IN THE COURSE (if any):**

Please check with the LCC bookstore http://www.labette.edu/bookstore for the required texts for this class.

**COURSE NUMBER:** RADI 207

**COURSE TITLE:** RADIOGRAPHIC IMAGING III

**CREDIT HOURS:** 3

**DEPARTMENT:** Radiography

**DIVISION:** Health Science

**PREREQUISITE:** RADI 117 Radiographic Imaging II

**REVISION DATE:** 03/2013

**COURSE DESCRIPTIONS:**
Content is designed to impart an understanding of the components, principles and operation of digital imaging systems found in diagnostic radiography. Factors that impact image acquisition, display, archiving and retrieval are discussed. Guidelines for selecting exposure factors and evaluating images within a digital system assist students to bridge between film-base and digital imaging systems. Principles of digital system quality assurance and maintenance are presented.

**COURSE OUTCOMES & COMPETENCIES:**
**Students who successfully complete this course will without references and with 86% accuracy be able to:**

1. Understand the basic principles of the following: digital radiography and PACS, computer technology, networking and communications.

- Define the term digital imaging.
- Explain latent image formation for conventional radiography.
- Describe the latent image formation process for computed radiography.
- Compare and contrast the latent image formation process for indirect capture digital radiography and direct capture digital radiography.
- Explain what a picture archival and communication system (PACS) is and how it is used.

- Define digital imaging and communications in medicine.
- Describe the major components of a computer.
- Define binary code, bit, and byte, and discuss how they relate to one another.
- List and define the hardware components discussed in this chapter.
- List the three most common types of monitors.
- Explain the measurements used to classify monitors.
- Compare and contrast an operating system and application software.
- Discuss the uses of computers in a radiology department.
- Distinguish between different types of networks (geographic and component roles).
- Identify common network hardware components.
- Describe different types of network cabling and their uses.
- Define network communication protocol.
- Differentiate between the common network topologies.
- Discuss the use of DICOM in medical imaging.
- Define HL-7, and describe its use in health care information systems.

2. Understand the principles of cassette based computed radiography and the reader.

- Describe the basic construction of a computed radiography cassette.
- Describe the construction of a computed radiography imaging plate.
- Identify the various layers of the imaging plate.
- Describe the purpose of each layer of the imaging plate.
- Explain the process of photo stimulation in the imaging plate.
- Describe the process of laser beam formation.
- Explain the process of reading the imaging plate.
- Compare conventional radiographic screen and film speed to computed radiography systems.
- Discuss how an image is erased from the imaging plate.

3. Understand cassette based image acquisition.

- Discuss the importance of matching the body part being examined to the examination menu.
- Discuss the selection of technical factors for density, contrast, and penetration.
- Relate imaging plate size selection to radiographic examinations.
- Describe the grid selection process.
- Discuss the importance of preprocessing collimation.
- Discuss the importance of patient side markers.
- Compare exposure indicators for the major computed radiography manufacturers and vendors.

4. Understand the principles of cassetteless digital equipment and image acquisition.

- Describe the construction of direct and indirect cassetteless systems.
- Differentiate between direct and indirect image capture.
- List the steps for x-ray to digital conversion with amorphous silicon detectors.
- Discuss the function of a charge-coupled device.
- Compare detector detective quantum efficiency to cassette-based systems.
- Explain the importance of detector size and orientation.
- Discuss factors that affect spatial resolution in cassetteless systems.

5. Understand the digital radiographic image processing and manipulation.

- Describe the formation of an image histogram.
- Discuss automatic rescaling.
- Compare image latitude in digital imaging with film/screen radiography.
- List the functions of contrast enhancement parameters.
- State the Nyquist theorem.
- Describe the effects of improper algorithm application.
- Explain modulation transfer function.
- Discuss the purpose and function of image manipulation factors.
- Describe the major factors in image management.

6. Understand the fundamentals of PACS and PACS archiving.

- Define picture archiving and communication system (PACS).
- Compare and contrast the various types of PACS display workstations.
- Differentiate among the different types of digital imaging workflow.
- Define system architecture, and recognize the three major models.
- Summarize the common functions found on a PACS workstation.
- Describe the situations and users that may require advanced PACS workstation functions.
- Describe the use of an image archive.
- Explain the function of the image manager.
- Discuss the uses of short-term archive storage.
- Describe the levels 0, 1, 3, and 5 of redundant array of independent disks.
- Compare and contrast the various long-term archive technologies used in current picture archival and communication systems.
- Define the concept of an application service provider.

7. Understand total quality management of CR and CR systems as well as ensuring quality in PACS.

- Describe the differences between quality control (QC) and quality assurance activities.
- Define continuous quality improvement and its uses in a radiology department.
- Describe the daily and monthly/quarterly monitor QC activities.
- Discuss the process of daily/weekly QC on laser imagers.
- State the common QC activities used to measure system speed and data integrity.
- Describe several quality assurance activities used in a digital radiology department.
- Discuss total quality management (QM) and its uses in digital imaging.
- Describe the daily, weekly, and monthly quality control (QC) activities assigned to a radiologic technologist.
- Explain the importance of establishing a repeat analysis database with digital imaging.
- State the common QC activities performed by a service engineer on digital radiographic equipment.
- Become familiar with problem-reporting responsibilities.
- Recognize the QM/QC activities to be performed by the radiation physicist.
- Acknowledge personal responsibilities for correctly marking images, maintaining personal repeat rates, and preventing artifacts.