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 117

COURSE TITLE: RADIOGRAPHIC IMAGING II

SEMESTER CREDIT HOURS: 3

DEPARTMENT: Radiography

DIVISION: Health Science

PREREQUISITE: RADI 107 - Radiographic Imaging I

REVISION DATE: 01 / 2015

TEXT AND SUPPLEMENTARY MATERIALS USED IN THE COURSE (if any):
e-textbook: Essentials for Radiographic Physics and Imaging, 2011, Johnson & Fauber, Elsevier ISBN: 9780323069748

COURSE DESCRIPTIONS:
Content is designed to establish a knowledge base in factors that govern the image production process. Image quality and technical factors will be discussed in detail.

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

1. Understand the properties of x-rays and the process of image formation.

- Describe the process of radiographic image formation.
- Explain the process of beam attenuation.
- Identify the factors that affect beam attenuation.
- Describe the x-ray interactions termed photoelectric effect and Compton effect.
- Define the term ionization.
- State the composition of exit radiation.
- State the effect of scatter radiation on the radiographic image.
- Explain the process of creating the various shades of image densities and brightness.

- Differentiate among conventional and digital imaging.
- Define fluoroscopy and describe the process of image intensification.

2. Understand imaging characteristics of density, contrast, recorded detail, and distortion.

- Describe the necessary components of radiographic image quality.
- Differentiate between the photographic and geometric properties of a radiograph.
- Explain the importance of radiographic density to image quality.
- Explain the importance of radiographic contrast to image quality.
- Differentiate between high- and low-contrast radiographic images.
- Describe sensitometry and explain the construction of sensitometric curves.
- Differentiate among the film characteristics of speed, contrast, and latitude.
- Compare the characteristics of different sensitometric curves.
- Explain the evaluation of recorded detail in film-screen imaging.
- Differentiate between size and shape distortion.
- Explain the digital image characteristics matrix and pixels.
- Compare the dynamic range between film-screen and digital imaging.
- Discuss bit depth and its effect on digital image quality.
- Compare the digital image characteristics brightness, contrast, and resolution to film- screen image quality.
- Explain how adjusting the window level and window width affects digital image quality.
- Recognize the effect of quantum noise and scatter on digital image quality.
- Discuss the effects of image artifacts on radiographic quality.

3. Understand the selection of exposure factors and their effects on imaging.

- Explain the relationship between milliamperage and exposure time with radiation production and image receptor exposure.
- Calculate changes in milliamperage and exposure time to change or maintain exposure to the image receptor.
- Compare the effect of changes in milliamperage and exposure time on film-screen and digital images.
- Recognize how to correct exposure factors for a density error.
- Explain how kVp affects radiation production and image receptor exposure.
- Calculate changes in kVp to change or maintain exposure to the image receptor.
- Recognize the factors that affect recorded detail and distortion.
- Calculate changes in mAs for changes in source-to-image receptor distance.
- Calculate the magnification factor and determine image and object size.
- Describe the use of grids and beam restriction, and their effect on image receptor exposure and image quality.
- Calculate changes in mAs when adding or removing a grid.
- Recognize patient factors that may affect image receptor exposure.
- Identify the exposure factors that can affect patient radiation exposure.
- Differentiate between the types of exposure technique charts.
- State exposure technique modifications for the following considerations: body habitus, pediatric patients, projections and positions, soft tissue, casts and splints, and pathologic conditions.

4. Explain scatter control and the use of grids.

- State the purpose of beam-restricting devices.
- Describe each of the types of beam-restricting devices.
- State the purpose of automatic collimators or positive beam-limiting devices.
- Describe the purpose of a radiographic grid.
- Describe the construction of grids, including the different types of grid pattern and grid focus.
- Calculate grid ratio.
- List the various types of stationary grids and describe the function and purpose of a moving grid.
- Demonstrate use of the grid conversion formula.
- Describe different types of grid cutoff that can occur and their radiographic appearance.
- Identify the factors to be considered in using a grid.
- Recognize how beam restriction and use of grids affect patient radiation exposure.
- Explain the air gap technique and describe its use.
- Describe the use of shielding accessories to absorb scatter radiation.

5. Understand the various image receptors and their effects on the radiographic image.

- Explain how the latent image is formed.
- Describe film characteristics, including speed, contrast, latitude, and spectral sensitivity.
- Describe the purpose and function of intensifying screens.
- Explain how screens can be characterized based on the type of phosphor, spectralemission, and screen speed.
- Describe factors that affect screen speed.
- State the automatic film processing stages and their function.
- Discuss the purpose of replenishment, recirculation, and temperature control during automatic film processing.
- Identify important quality control measures to ensure good radiographic quality.
- State the importance of and methods for silver recovery.
- Describe the design of cassette-based detectors.
- Describe the design of cassetteless detectors.
- Explain the process of image acquisition using cassette-based detectors.
- Explain the process of image acquisition using the three general types of cassetteless detectors.
- Explain the process of image extraction and processing for cassette-based and cassetteless systems.
- Describe digital image display and postprocessing functions.
- Explain the use of exposure indicators for cassette-based systems and dose-area product for cassetteless systems.
- Correctly identify the role of kVp, mAs, and geometric factors with digital systems.
- Identify quality control tests and test patterns used with digital systems.
- Describe the Picture Archiving and Communication System, including its role, principal systems, and challenges.

6. Understand the operation and use of AEC.

- State the purpose of automatic exposure control (AEC) in radiography.

- Differentiate among the types of radiation detectors used in AEC systems.
- Recognize how the detector size and configuration affect the response of the AEC device.
- Explain how alignment and positioning affect the response of the AEC device.
- Discuss patient and exposure technique factors and their effect on the response of the AEC device.
- Define anatomically programmed radiography (APR).
- Analyze unacceptable images produced using AEC and identify possible causes.
- Recognize the effect of the type of image receptor on AEC calibration, its use, and image quality.
- Describe patient protection issues associated with AEC.
- State the importance of calibration of the AEC system to the type of image receptor used.
- List the quality control tests used to evaluate AEC.