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):

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, spectral emission, 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.