SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: RADG 112 Department: Radiography

Course Title: Image Production & Eval. Semester: Spring Year: 1997

Objectives/Competencies

Course Objective	Competencies
Unit One: Introduction to Image Production and Radiography a. Discuss the uses of radiography in medicine. b. Discuss and demonstrate use of laboratory radiography equipment. c. Discuss the profession of radiography. d. Demonstrate calculations used to formulate radiographic technique.	1. Identify numerous creative uses of radiography in medicine, technology and art. 2. Apply the concept of three-dimensional thinking to clinical practice. 3. Describe role of Radiography department in hospital team. 4. List typical types of equipment found in Radiography departments. 5. Describe a broad historical overview of history of radiography. 6. Indicate the master switch on the wall and the line switch on the control panel. 7. Set several exposures on the control panel. 8. Demonstrate the movements of the x-ray tube, the x-ray table, and the Potter Bucky, and use the appropriate locks. 9. Make several exposures to familiarize his/herself with the rotor/exposure switch. 10. Explain the relationships between milliamperage (mA), exposure time, MAS and x-ray emission.

Course Objective	Competencies
	11. State the reciprocity law. 12. Calculate mAs when given mA and exposure time, mA when given mAs and exposure time, and exposure time when given mAs and mA.
Unit Two: Radiographic Film, Latent Image Formation, Film Processing a. Discuss image formation on radiographic film. b. Discuss recording systems in radiography. c. Discuss darkroom layout and physical plant consideration. d. Discuss film processing, handling, and troubleshooting.	1. Describe the components of radiographic film. 2. Explain the production of silver halide crystals. 3. State the purpose of various additives to radiographic film. 4. Explain production of latent image. 5. Explain process for making latent image visible. 6. Explain how speed and latitude can be measured. 7. Describe purpose of H & D curves, (D Log E curves). 8. Demonstrate ability to read H & D curve graphs. 9. From two characteristic curves (H & D curves), identify in each case the one with the highest density, the one that is faster, the one with the highest contract, and the one with the highest fog level. 10. Discuss the differences between direct exposure film, screen film and films for various special applications. 11. Explain the fundamentals of proper film storage and handling. 12. Discuss automated and daylight loading film systems. 13. Explain the responsibilities involved in proper radiograph identification. 14. List the precautions to be taken the storage of x-ray film. 15. Name the instrument used to measure density and will

Course Objective	Competencies
	measure at least three densities with it. 16. Measure the highest and lowest densities on a radiograph and calculate the contrast range, (density range). 17. State the three principles involved by means of which an automatic processor is able to process a film in about two minutes as opposed to manual processing which takes much longer, (about two hours). 18. Define processing. 19. Identify at least four of the chemical used in the developer of an automatic processor, and at lest two of the components of the fixer. 20. Identify the hardener used the developer of an automatic processor. 21. Describe the test used to ascertain whether or not the safelight is safe. 22. Suggest a suitable color for the inside of the darkroom bearing in mind the color of the safelight. 23. Suggest the most likely reason for films to emerge from the processor feeling slightly tacky or damp after the processor has been working well for quite some time. 24. Given a centigrade (Celsius) temperature convert it to Fahrenheit and vice versa.
Unit Three Improving Image Quality a. Define and demonstrate radiographic image quality. b. Define terminology related to image quality. c. Discuss and demonstrate elements of radiographic critique.	1. Define a cassette and identify the parts indicated by the instructor. 2. Name and describe each layer of an intensifying screen from a diagram and name the fluorescing agents used

Course Objective	Competencies
d. Discuss how to evaluate an image and decide how to improve it. e. Define illuminating screens and discuss and demonstrate how radiographic screens contribute to image quality. f. Define and discuss grids and their relation to image quality. Discuss and demonstrate calculations depending on screen speed and grid factors.	today including the rare earths. 3. Identify the screens used at the hospital and state their needs. 4. Explain the purpose of radiographic intensifying screens. 5. Describe the function of each layer of an intensifying screen. 6. Describe luminescence. 7. Analyze the effect of phosphor crystal size, layer thickness and concentration on intensifying screen resolution. 8. Explain the effect of film/screen contact on resolution. 9. Classify intensifying screens according to intensification factor, descriptive rating and relative speed number. 10. Explain radiographic film/screen combination relative speed numbering systems. 11. Calculate relative speed conversions from one film/screen combination to another. 12. Determine appropriate film/screen combinations for various clinical situations. 13. Describe the purpose of the grid. 14. Explain the construction of a grid, including grid materials, grid ratio, grid frequency and lead content. 15. Describe the various grid patterns. 16. Differentiate between parallel and focused grids. 17. Differentiate between the uses of a stationary and a moving grid. 18. Explain the process of grid selection for specific

Course Objective	Competencies
	radiographic procedures. 19. Explain the relationship of grid selection to patient dose and radiographic density. 20. Calculate changes in technical factors of compensate for changes in grid selection.
Unit Four: Production of Image: a. Discuss production of the x-ray image. b. Define and discuss prime radiographic technique factors and how they relate to film quality and production.	1. Apply the four steps of the diagnostic process to a clinical imaging problem. 2. Will calculate the new exposure factors required when going from one SID (FFD) to another. 3. When given several grid exposures convert those exposures to suitable exposures for use with different radio grids or no grid at all so as to maintain the original density. 4. Identify density as a prime component of the photographic properties controlling visibility of detail of radiographic image quality. 5. Define density. 6. Assess radiographic density on various radiographic images. 7. Describe the effects of density changes on image appearance. 8. Describe the process of evaluating image density. 9. Explain why mA and time are the controlling factors of density. 10. Explain how each influencing factor affects image density.

Course Objective	Competencies
	11. Assess radiographic density on various radiographic images. 12. Recommend appropriate adjustments to compensate for variation in the controlling and influencing factors that affect image density. 13. Explain the various terms used to describe contrast. 14. Define radiographic contrast and the factors that affect it. 15. Describe the factors that affect image receptor (film) contrast. 16. Describe the factors that affect subject contrast. 17. Describe the effects of contrast changes on image appearance. 18. Recommend appropriate adjustments to improve contrast under various conditions. 19. Explain why kilovoltage peak is the controlling factor of contrast. 20. Explain how each influencing factor affects image contrast. 21. Define recorded detail, including synonymous terms and derived units. 22. Explain the effect of various distances on recorded detail. 23. Describe the effect of film/screen combinations on the resolution of recorded detail. 24. Describe appropriate techniques to prevent patient motion. 25. Recommend techniques for reducing motion, including immobilization devices.

Course Objective	Competencies
	26. State the number of line pairs per millimeter discernible under optimum viewing conditions. 27. List the three categories of unsharpness on a radiograph and state how each may be minimized. 28. Will identify the most serious of these and name two ways in which it may be reduced or eliminated.
Unit Five: Geometric Factors and Image Quality a. Discuss geometric factors and quality image techniques. b. Define all terms related to geometric factors. c. Discuss inverse square law.	29. From diagrams showing geometric unsharpness, identify the one that gives the most unsharpness and suggest a remedy. 1. Define size and shape of distortion. 2. Explain the effects of SID and OID on image distortion. 3. Discuss various methods of minimizing distortion through variation of SID and OID. 4. Explain why elongation and foreshortening are relational definitions. 5. Calculate the magnification factor when given SID and SOD.
Unit Six: Film Critique and Quality Control a. Discuss problem solving steps when there is an unacceptable image. b. Discuss how to distinguish between technical errors and mechanical errors. c. Discuss the process of troubleshooting for equipment failure. d. Discuss and demonstrate , using laboratory, hands-on experiences, quality control tests for image quality,	6. Calculate the actual size of an object when given the projected size, SID and OID. 1. Discuss the elements of a diagnostic image as they relate to the art of film critique. 2. Identify the steps of the decision making process. 3. Describe an effective film critique method. 4. Explain the difference between technical factor problems, procedural factor problems and equipment malfunctions.

Course Objective	Competencies
"grid wash-out," "grid cut-off."	5. Define quality assurance and control and discuss their relationship to excellence in radiography. 6. Describe the objectives and responsibilities of monitoring equipment performance. 7. Discuss primary automatic film processor quality control monitoring and maintenance procedures. 8. Discuss primary quality control tests for external radiation beam monitoring of diagnostic radiographic systems, fluoroscopic systems, tomographic systems, and automatic exposure controls. 9. List primary quality control tests for miscellaneous ancillary equipment, including cassettes and view boxes.