SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: RADG 212 Department: Radiography

Course Title: Equip. Operation & Maint. Semester: Spring Year: 1997

Objectives/Competencies

Course Objective	Competencies
Unit One: The X-ray Tube and Tube Ratings a. Discuss the x-ray tube, its components, and their functions. b. Demonstrate understanding of tube rating and tube cooling charts. c. Compare types of anodes and know advantages of rotating anodes.	1. Name, from a diagram, the components of an x-ray tube. 2. Discuss the characteristics of a rotating anode, cathode, and tube housing in terms of description and function. 3. Determine, given tube rating charts, maximum exposure(s) allowed across the x-ray tube. 4. Use, given simulated exposure factors, an anode cooling chart to determine the anode cooling rate. 5. Given simulated exposures and a housing cooling chart, determine heat units and cooling characteristics of x-ray tube housing. 6. Distinguish between "tube current" and "filament current." 7. Explain the relationship between "tube current" and "filament current." 8. Explain why rotating anode disks are usually better than stationary anodes. 9. Explain why target faces on the anode are slanted.
Unit Two: W-Ray Generators and Circuits	

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a. Discuss details of x-ray generators and distinguish between parts, type and use. b. Discuss mechanics of x-ray production. c. Describe ripple factor. d. Define high and low voltage circuit, tube circuit and filament circuit.	1. Describe the components of a primary and secondary x-ray circuit, and an x-ray filament circuit, and explain the function of each. 2. Label a complete x-ray circuit with names of the parts. 3. Describe types and functions of generators, motors, transformers, rectifiers and coils used in x-ray equipment. 4. Explain the interaction of electric and magnetic fields. 5. Describe the general method by which x-rays are produced in an x-ray machine. 6. Describe in general the functions of the console, the filament circuit, the high-voltage section and the x-ray tube. 7. Identify the two major subcircuits of the x-ray machine and explain their purpose in x-ray production. 8. Indicate factors that affect x-ray tube current. 9. Explain what is meant by "ripple factor."
Unit Three: Transformers and Rectifiers a. Describe types and functions of transformers, rectifiers and timers. b. Distinguish between single, triple phase generators. c. Discuss problems and how to troubleshoot them.	1. Explain the types and kinds of transformers. 2. Describe rectifiers and their purpose in the x-ray circuit. 3. Distinguish between full-wave and self-rectification, impulse and synchronous timer and use a test to check the accuracy of the impulse timer. 4. Distinguish between single phase and three phase circuits. 5. Demonstrate an understanding of the principles of phototiming. 6. Demonstrate the ability to troubleshoot problems with the x-ray generator.

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	7. Demonstrate the ability to systematically eliminate causes of generator problems until the correct cause is identified.
Unit Four: Fluoroscopy and Dynamic Imaging a. Discuss and define fluoroscopy, dynamic imaging, cinefluoroscopy. b. Discuss image intensifier: parts and function. c. Discuss how to troubleshoot image and correct. Calculate flux and brightness gain.	1. Differentiate between fluoroscopy and static radiography. 2. List ancillary equipment in a fluoroscopy suite and working unit (x-ray equipment built into machine). 3. Describe major types of fluoroscopic systems. 4. Identify from a diagram the components of an image intensifier. 5. State the function of each part of an image intensifier. 6. Describe four ways in which information from a fluoroscopic screen may be received. 7. Define flux gain, brightness gain, noise, quantum mottle. 8. Calculate flux gain and total brightness gain. 9. Compare regular fluoroscopy and cinefluoroscopy, and state the advantages and disadvantages of each.
Unit Five: Patient Variables and Exposure Technique a. Discuss the variables of the patient on exposure b. Recognize certain conditions and how they influence technique. c. Discuss body habitus and how the types affect techniques. d. Describe quality film. e. Understand two or more technique formulating methods.	1. Describe the characteristics of a quality film, and discuss how the variables of the patients affects the success of the procedure. 2. Determine the likely causes of light, dark, low, or high contrast or blurred images. 3. Differentiate between underexposure, over-penetration, and be able to utilize trouble-shooting methods of r determining correct exposures. 4. Define three types of technique charts, and formulate charts based on two of the methods during a laboratory

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	exercise. 5. Describe and demonstrate the correct use of calipers. 6. Discuss how changes in the body habitus affects technique. 7. Identify several pathological conditions and describe if they are easy or hard to penetrate. 8. Explain how to remedy the techniques depending on the pathological condition.
Unit Six: Filters and Beam Restricting Devices a. Identify beam restricting devices and know their applications. b. Discuss filters and effects of filtration. c. Discuss effects of beam restricting devices.	1. Explain the purpose of filters on the x-ray beam. 2. Discuss the factors that influence total filtration of the beam. 3. Define half-value layer. 4. Compare and define "quality" and "quantity" or the x-ray beam. 5. Explain how filtration affects the quality of the x-ray beam. 6. Identify beam restricting devices, and their applications. 7. Describe the effect of filtration, cones, collimators, and diaphragms on the film. 8. Explain how KVP and MAS affect the energy of the beam. 9. Compare wedge and trough filters, and explain why they are used. 10. Explain the application of other special filters, such as breast shields and other recently manufactured devices designed to save the patient radiation exposure.
Unit Seven: Special Radiography Applications: Tomography and Magnification	

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a. Discuss these special application radiography techniques: 1. Tomography 2. Stereography 3. Magnification b. Review all math applications.	11. Define positive beam limitation and explain why it is used. 1. List at least three special application radiographic techniques. 2. Discuss the principles of tomography and how they are applied during a radiographic examination using tomography. 3. Discuss and demonstrate the principle of stereography. 4. Define magnification technique and when one might apply it. 5. Demonstrate understanding of the math relationship in KV, MA, MAS, time, FFD, grid factors, and OFD and successfully solve problems using these factors. This is sequential and a continuation of the math principles of AX112.