

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>CONTACT HOURS: Didactic and Practical: 56.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994. 2. INTRODUCTION TO MEDICAL RADIOGRAPHIC IMAGING, Bob Pizzutiello and John Cullinan, © 1994. 3. AUTOMATIC FILM PROCESSING IN MEDICAL IMAGING: SYSTEMS DESIGN CONSIDERATIONS, Eastman Kodak Company, © 1991. 4. IDENTIFYING AND CORRECTING PROCESSING ARTIFACTS, Eastman Kodak Company, © 1994. 5. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) 6. STRUCTURAL SHIELDING DESIGN AND EVALUATION FOR MEDICAL USE OF X RAYS AND GAMMA RAYS OF ENERGIES UP TO 10 MeV, NCRP Report No. 49, Issued September 15, 1976. 7. MEDICAL X-RAY ELECTRON BEAM AND GAMMA-RAY PROTECTION FOR ENERGIES UP TO 50 MeV (EQUIPMENT DESIGN, PERFORMANCE AND USE), NCRP Report No. 102 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of diagnostic radiologic image devices and the appropriate performance evaluations.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define the essential elements of the basic science of diagnostic imaging. 2. Define the necessary testing equipment and reporting requirements for Level II radiological system performance evaluations. 3. Demonstrate the ability to perform Intermediate Radiological Systems (Level II) evaluations, including: general radiographic units, dental radiographic units, general fluoroscopic units, film processor and darkroom quality control programs, fluoroscopic c-arm units, urologic units, linear tomographic units, computed tomographic (CT) units, ultrasound scanners, nuclear medicine imaging systems, and establishment of quality control programs.

INSTRUCTIONAL TRAINING AIDS:

1. Student Guides.
2. Overhead Transparencies.
3. Test Equipment.
4. Evaluation Film Sets.

ASSIGNMENTS:

1. Review Student Guide.

EVALUATION:

1. Written and Practical Examination.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Radiology</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <p>1. Daffner, R H. Musculoskeletal Imaging. In Daffner R H, ed. Clinical Radiology - The Essentials, Second Edition © 1999. pp. 405-493, 537-575.</p> <p>INSTRUCTIONAL TRAINING AIDS:</p> <p>1. Student Guides. 2. Overhead Transparencies.</p> <p>ASSIGNMENTS:</p> <p>1. Review Student Guide.</p> <p>EVALUATION:</p> <p>1. Test.</p>	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of the types of imaging modalities that the radiologist utilizes.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <p>1. To learn the essential principles of interpretation of radiographic imaging.</p> <p>2. To define the roles of the different imaging modalities (radiography, fluoroscopy, bone scans, sonography, CT, and MRI) for evaluating abnormalities.</p>

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to X-ray Physics and Circuits</p> <p>CONTACT HOURS: Didactic 3.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapters 2 & 4. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of Photon Interaction with Matter and Generation and Control of X-rays.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define electromagnetic radiation interactions, including: Rayleigh scattering, Compton scattering, photoelectric absorption and pair production. 2. Define attenuation of electromagnetic radiation, including: linear attenuation coefficients, mass attenuation coefficient, and half value layer. 3. Define radiation quantities and units, including: radiation exposure, absorbed dose, Kerma, integral dose, equivalent dose, and effective dose. 4. Define Production of X-rays, including: bremsstrahlung and characteristic x-ray production. 5. Describe an x-ray tube, including: cathode, anode, tube insert, tube housing, filtration and collimators. 6. Describe an X-ray Generator, including: X-ray generator components, x-ray generator types, timers, phototimer switches, and factors affecting x-ray emission. 7. Describe X-ray tube rating charts, including: units for heat loading, power rating of generators and x-ray tubes, single exposure rating chart, anode heat input and cooling chart, housing cooling chart, and multiple exposure rating charts.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Film Processing and Dark Room Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. INTRODUCTION TO MEDICAL RADIOGRAPHIC IMAGING, Bob Pizzutiello and John Cullinan, © 1994. 2. AUTOMATIC FILM PROCESSING IN MEDICAL IMAGING: SYSTEMS DESIGN CONSIDERATIONS, Eastman Kodak Company, © 1991. 3. IDENTIFYING AND CORRECTING PROCESSING ARTIFACTS, Eastman Kodak Company, © 1994. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of film processor system components and Quality Control associated with film processors and darkrooms.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the system components of film processor. 2. State the parameters for evaluating darkroom conditions, including: darkroom fog. 3. State the parameters for evaluating a film processor, including: sensitometer strip, fixer retention, and STEP.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Image Quality</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapter 5. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of image quality as it applies to all type of image, regardless of their origin.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define the principle of image quality which effect: contrast, noise, and spatial resolution. 2. Define modulation transfer function.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Systems Overview for Radiographic Equipment</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapter 6. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of radiographic image generation and the performance evaluation test utilized to evaluate a general radiographic and dental x-ray unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the generation of a radiographic image and the medium in which the image is displayed, including: x-ray intensifying screens, radiographic film, screen-film systems, photostimulable phosphor systems, and digital radiography. 2. Describe methods to reduce scatter radiation, including: stationary grids, moving grids, and air gaps. 3. Define a system performance evaluation for a general radiographic and dental unit. 4. List the periodicity requirements for completing a general radiographic and dental system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Radiographic Laboratory</p> <p>CONTACT HOURS: Didactic 3.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> Student Guides. Test Equipment. Evaluation Film Sets <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> Practical Examination. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a general radiographic and dental x-ray unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> Demonstrate the proper test equipment setups to complete a system performance evaluation for a general radiographic and dental x-ray unit. State the purpose for performing an exposure reproducibility test. Using the given equation, solve for the coefficient of variation using data obtained from the exposure reproducibility test. State the purpose of the timer accuracy and linearity test. State the purpose of measuring the beam quality and solve for the half-value layer using data obtained from measuring the beam quality. State the required half-value layer at 90 kVp. State the purpose of the kilovoltage accuracy test. Using the given equation, determine the focal spot size.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Shielding Design</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapter 18. 2. STRUCTURAL SHIELDING DESIGN AND EVALUATION FOR MEDICAL USE OF X RAYS AND GAMMA RAYS OF ENERGIES UP TO 10 MeV, NCRP Report No. 49, Issued September 15, 1976. 3. MEDICAL X-RAY ELECTRON BEAM AND GAMMA-RAY PROTECTION FOR ENERGIES UP TO 50 MeV (EQUIPMENT DESIGN, PERFORMANCE AND USE), NCRP Report No. 102 <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of techniques utilized to reduce exposure to patients, staff, and the public from x- and gamma-ray produced by diagnostic radiology and nuclear medicine equipment.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. State the lead equivalency requirement for protective apparel in Radiology. 2. Define the sources of exposure, including: primary radiation, scattered radiation, and leakage radiation. 3. Define the factors affecting protective barrier specifications, including: workload, radiation exposure level, use factor, occupancy factor, and distance. 4. Describe the type of shielding required in Nuclear Medicine.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Fluoroscopy</p> <p>CONTACT HOURS: Didactic 3.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapter 7. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of fluoroscopy image generation and the performance evaluation tests utilized to evaluate a fluoroscopy unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the generation of a fluoroscopy image, including the characteristics of an image intensifier, TV system, and Automatic Brightness Control. 2. Define a system performance evaluation for a fluoroscopic x-ray unit. 3. List the periodicity requirements for completing a fluoroscopic system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Fluoroscopy Laboratory</p> <p>CONTACT HOURS: Didactic 3.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Practical Examination. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a fluoroscopic x-ray unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a fluoroscopic x-ray unit. 2. State the purpose of determining the maximum entrance exposure rate. 3. State the requirements for maximum entrance exposure rate. 4. Determine the focal spot location. 5. State the purpose of evaluating the distortion, low contrast resolution, and spatial resolution.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Digital Subtraction Angiography and Cardiac Catherization Laboratory</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall be familiar with the typical equipment found in an Angiography and Cardiac Catherization Suite.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the type of equipment typically found in a Angiography and Cardiac Catherization Suite. 2. Define a system performance evaluation for a Angiography and Cardiac Catherization x-ray unit. 3. List the periodicity requirements for completing a Angiography and Cardiac Catherization system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Risk</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994, chapter 19. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of the personnel risks associated with occupational exposure to ionizing radiation.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Discuss exposure reduction techniques utilized in diagnostic radiology. 2. Discuss radiation safety concerns in nuclear medicine. 3. State the annual dose limits for personnel exposed occupationally. 4. State the principle of ALARA.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Dose Estimates</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994, chapter 19. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of calculations required to determine a dose estimate.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the procedure for measuring entrance skin dose. 2. Demonstrate the ability to calculate a fetal dose estimate.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Tomography Systems and Measurements</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, Chapters 8. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of tomographic image generation and the performance evaluation tests utilized to evaluate a tomography unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Describe the generation of a tomography image, including: the acquisition technique, slice thickness, focal plane, and dose considerations. 2. Define a system performance evaluation for a tomographic x-ray unit. 3. List the periodicity requirements for completing a tomographic system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Tomography Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a tomographic x-ray unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a tomographic x-ray unit. 2. Define the purpose of evaluating the tomographic cut level indicator, exposure angle, cut thickness, and uniformity of the tomographic exposure.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Urology Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a urology x-ray unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a urology x-ray unit.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Ultrasound</p> <p>CONTACT HOURS: Didactic 1.5</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, chapter 12. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of ultrasound image generation and the performance evaluation tests utilized to evaluate an ultrasound unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define the characteristics of sound, including: the propagation of mechanical energy, wavelength, frequency, and speed of sound, and pressure, intensity and the dB scale. 2. Describe the production of a ultrasound, including: the transducer and the characteristic of the ultrasound beam. 3. Define the interactions of ultrasound with matter, including: reflection, refraction, and attenuation. 4. Describe the generation of a ultrasound image, including: A-Mode, M-Mode, and B-Mode. 5. Define image quality, including: axial resolution, lateral resolution, contrast sensitivity and noise, and image artifacts. 6. Define doppler ultrasound, including: doppler frequency shift, continuous and pulsed doppler operation, duplex scanning, and color flow imaging. 7. Define biological mechanisms and effects for ultrasound. 8. Define a system performance evaluation for an ultrasound unit. 9. List the periodicity requirements for completing an ultrasound system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Nuclear Medicine</p> <p>CONTACT HOURS: Didactic 1.5</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, chapter 17. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of nuclear medicine imaging devices.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define the basic construction and principles of operation of a nuclear medicine gamma camera, including: detector and electronics, collimators, and principles of image formation. 2. Discuss the measures of performance of a gamma camera, including: uniformity, spatial resolution, system spatial resolution, collimator resolution, intrinsic resolution, and spatial linearity. 3. Define a quality control program for a gamma camera.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Ultrasound Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, chapter 12. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a ultrasound unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a ultrasound unit. 2. Define the term “dead zone.” 3. Define the purpose of measuring high contrast resolution, focal depth, and low contrast spatial resolution.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Gamma Camera Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994, chapter 17. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a gamma camera system.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a gamma camera system.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Musculoskeletal Radiology</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <p>1. Daffner, R H. Musculoskeletal Imaging. In Daffner R H, ed. Clinical Radiology - The Essentials, Second Edition © 1999. pp. 405-493, 537-575.</p> <p>INSTRUCTIONAL TRAINING AIDS:</p> <p>1. Student Guides. 2. Overhead Transparencies.</p> <p>ASSIGNMENTS:</p> <p>1. Review Student Guide.</p> <p>EVALUATION:</p> <p>1. Test.</p>	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of musculoskeletal disease through imaging.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <p>1. To learn the essential principles of interpretation of musculoskeletal imaging.</p> <p>2. To define the roles of the different imaging modalities (radiography, bone scans, sonography, CT, and MRI) for evaluating musculoskeletal abnormalities.</p> <p>3. To demonstrate various musculoskeletal abnormalities on different imaging modalities.</p>

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Computed Tomography</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, chapter 10. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of computed tomography units.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define the basic principles of image acquisition for computed tomography, including: reconstruction techniques, CT numbers and Hounsfield Units, CT “generations”, and helical scanners. 2. Discuss the parameters of slice thickness, signal to noise, spatial and low contrast resolution and radiation dose. 3. Define the types of artifacts in x-ray computed tomography. 4. Define a system performance evaluation for a computed tomography unit. 5. List the periodicity requirements for completing a computed tomography system performance evaluation.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Development of QC Program in Radiology</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994, chapter 13. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall with supervision, using a prepared checklist review a quality control program for Radiology.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. State the goals of a quality assurance/quality control program in Radiology.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Repeat Analysis</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams &Wilkins, Baltimore, © 1994, chapter 13. 2. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall with supervision, using a prepared checklist conduct a repeat rate analysis for a specified period of time for Radiology.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. State the goals of conducting repeat rate analysis. 2. Define the causes for fluctuation of repeat rate. 3. Define the advantages of controlling the repeat rate to less than 10% or as low as possible.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Computed Tomography Laboratory</p> <p>CONTACT HOURS: Didactic 2.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. NAVY RADIOLOGICAL SYSTEMS PERFORMANCE EVALUATION MANUAL, Technical Manual NEHC - TM 6470.98-1 (March 1998) <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Test Equipment. 3. Evaluation Film Sets. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an ability to complete a system performance evaluation on a computed tomography unit.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Demonstrate the proper test equipment setups to complete a system performance evaluation for a computed tomography unit. 2. Define the purpose of evaluating image noise, field uniformity, linearity, low contrast sensitivity, and high contrast resolution. 3. Define multiple scan average dose (MSAD) and state typical head and body doses.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Introduction to Computers</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. THE ESSENTIAL PHYSICS OF MEDICAL IMAGING, Jerrold T. Bushberg, Williams & Wilkins, Baltimore, © 1994, chapter 3. <p>INSTRUCTIONAL TRAINING AIDS:</p> <ol style="list-style-type: none"> 1. Student Guides. 2. Overhead Transparencies. <p>ASSIGNMENTS:</p> <ol style="list-style-type: none"> 1. Review Student Guide. <p>EVALUATION:</p> <ol style="list-style-type: none"> 1. Test. 	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of computers in medical imaging.</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <ol style="list-style-type: none"> 1. Define storage and transfer of data in computers. 2. Discuss the components and operation of computers, including: main memory, central processing units, and mass storage devices. 3. Discuss the storage, acquisition, processing, and display of digital images.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
<p>COURSE TITLE: Radiological Systems Performance Evaluation Course</p> <p>LESSON TOPIC: Digital Imaging</p> <p>CONTACT HOURS: Didactic 1.0</p> <p>INSTRUCTION MATERIALS:</p> <p>REFERENCES:</p> <p>1.</p> <p>INSTRUCTIONAL TRAINING AIDS:</p> <p>1. Student Guides. 2. Overhead Transparencies.</p> <p>ASSIGNMENTS:</p> <p>1. Review Student Guide.</p> <p>EVALUATION:</p> <p>1. Test.</p>	<p>TERMINAL OBJECTIVE: Upon completion of this topic, the student shall, demonstrate an understanding of</p> <p>ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.</p> <p>1.</p>