

COURSE SYLLABUS

Department: Radiologic Technology

Course Title: RADR 1266

Section Name: Practicum I - Medical Radiologic Technologist/Technician

Start Date: 08/22/2011

End Date: 12/09/2011

Modality: CLINICAL PRACTICUM (Lab)

Credits: 2

Instructor Information

Name: Carolyn S. Leach

OC Email: sleach@odessa.edu

OC Phone #: 432-335-6449

Course Description

A study of the equipment and physics of x-ray production, basic x-ray circuits, and the relationship of equipment components to the imaging process. The student will describe the equipment and physics of x-ray production; describe basic x-ray circuits; and relate equipment components to the imaging process. Includes radiographic/fluoroscopic equipment and an introduction to computed and digital radiography.

Prerequisites/Corequisites

Prerequisite: RADR 1311. Corequisites: RADR 1301, RADR 1303, RADR 2301 and RADR 2309

SCANS

1,4,5,6,7,8,9,10,11

Course Objectives

LEARNING OUTCOMES:

As outlined in the learning plan, the student will:

- A. apply the theory, concepts, and skills involving specialized materials, tools, equipment, procedures, regulations, laws, and interactions within and among political, economic, environmental, social, and legal systems associated with the occupation and the business/industry
- B. demonstrate legal and ethical behavior, safety practices, interpersonal and teamwork skills, and appropriate written and verbal communication skills using the terminology of the occupation and the business/industry.
- C. apply the knowledge of anatomy, physiology, positioning, and radiographic techniques to accurately demonstrate anatomical structures on a radiograph or other imaging receptor with direct supervision pre-competency and indirect supervision post-competency (where allowed).

- D. determine exposure factors with assistance when required to achieve optimum radiographic images with minimum radiation exposure to the patient.
- E. evaluate radiographic images for appropriate positioning and image quality.
- F. apply the principles of radiation protection to the patient, self and others.
- G. provide patient care and comfort.
- H. recognize emergency patient conditions and initiate lifesaving first aid and basic life support procedures.
- I. detect equipment malfunctions, report same to the proper authority and know the safe limits of equipment operation.
- J. exercise independent judgment and discretion in the technical performance of medical imaging procedures.
- K. participate in radiologic quality assurance program.
- L. provide patient/public education related to radiologic procedures and radiation protection/safety.
- M. producing quality radiographs of the chest, abdomen, spine, upper extremities and lower extremities on patients with direct supervision.
- N. identifying the procedures generally performed during the evening shift.
- O. assisting in the production of radiographs with mobile radiographic equipment.
- P. assisting with all departmental data entry and storage.
- Q. transporting patients.

COURSE COMPETENCIES

1XRA.01.00 KNOW/ADHERE TO THE RULES AND REGULATIONS OF THE EDUCATIONAL PROGRAM

- 1XRA.01.01 State/adhere to the rules and regulations of the educational program regarding attendance, grading, vacation/sick leave, and the appeals procedure.
- 1XRA.01.02 Define/abide by the Essentials and guidelines of an Accredited Educational Program for the Radiographer and state its purpose.
- 1XRA.01.03 Discuss/adhere to the departmental and hospital rules and regulations which directly or indirectly affect students.
- 1XRA.01.04 List/perform the major duties and responsibilities of a radiography student.
- 1XRA.01.05 Identify/employ basic radiation safety procedures for staff and patients.
- 1XRA.01.06 State/monitor the procedure for monitoring of occupational exposed individuals.
- 1XRA.01.07 State/adhere to the policies concerning communicable disease and pregnancy for students enrolled in the program.

1XRA.02.00 IDENTIFY/DISCUSS/WORK WITH OTHER HEALTH SCIENCE PROFESSIONALS TO INCLUDE NECESSARY INTERACTIONS WITH OTHER DEPARTMENTS.

- 1XRA.02.01 Identify/work with individuals in other health science professions which impact on the health care provided to patients seen in radiology.
- 1XRA.02.02 Describe the relationship of these health care workers to the integrated care of patients .

1XRA.03.00 UNDERSTAND/DISCUSS HOSPITAL ORGANIZATION

- 1XRA.03.01 Discuss the philosophy and mission of the hospital.
- 1XRA.03.02 Identify key administrative personnel and discuss their relationship with the radiology department.
- 1XRA.03.03 Describe relationships and inter dependencies of departments within the hospital.

1XRA.04.00 UNDERSTAND/DISCUSS RADIOLOGY ORGANIZATION

- 1XRA.04.01 Identify key personnel and discuss their function in the radiology department.
- 1XRA.04.02 Explain patient services available in the radiology department.
- 1XRA.04.03 Discuss the educational programs in the radiology department.

1XRA.10.00 IDENTIFY/EMPLOY THE ELEMENTS OF ETHICAL BEHAVIOR

- 1XRA.10.01 Be sensitized to the central role of ethical behavior in health care delivery.
- 1XRA.10.02 Be sensitized to the development of moral reasoning, current theories of same in a psychological/educational context, and explore their personal stage of development.
- 1XRA.10.03 Differentiate between empathetic rapport and sympathetic involvement in relationships with patients and relate these to ethical conduct.

- 1XRA.10.04 Identify and rationalize concepts of personal honesty, integrity, accountability, competence and compassion as ethical imperatives in health care.
- 1XRA.10.05 Identify legal/professional standards and their relationship to practice in health professions.
- 1XRA.10.06 Identify/describe accepted codes/guidelines for professional ethics & those elements similar to other health professions & those unique to their respective discipline(s).

1XRA.11.00 DISCUSS/EMPLOY ETHICAL ISSUES AND DILEMMAS IN HEALTH CARE AND EMPLOY CRITICAL THINKING SKILLS FOR SOLUTIONS

- 1XRA.11.01 Recognize and identify those situations and conditions which give rise to ethical dilemmas in health care.
- 1XRA.11.02 Identify and employ a basic system of examination, clarification, determination of alternatives and decision making in ethical questions.
- 1XRA.11.03 Identify, discuss and define the concepts embodied in principles of patient's rights; the doctrine of informed (patient) consent; and other issues related to patient's rights.
- 1XRA.11.04 Identify/discuss/define legal implications of professional liability; malpractice; professional negligence/carelessness; legal doctrines applicable to professional practice.
- 1XRA.11.05 Identify, discuss and appreciate the significance of accurate, complete, correct methods of medical record keeping as a legal/ethical imperative.
- 1XRA.11.06 In groups, & individually, explore, discuss and articulate responses to theoretical situations and questions relating to the ethics of care and health care delivery.

1XRA.15.00 DISCUSS/PRACTICE THE WORD BUILDING PROCESS

- 1XRA.15.05 Translate medical terms into common language a patient could understand.
- 1XRA.15.06 Correctly pronounce medical terms.

1XRA.16.00 EMPLOY MEDICAL ABBREVIATIONS AND SYMBOLS

- 1XRA.16.01 Given abbreviations, provide definitions for each.
- 1XRA.16.02 Given symbols, provide definitions for each.
- 1XRA.16.03 Given medical orders which include abbreviations and symbols, translate into non-medical language.

1XRA.17.00 UNDERSTAND ORDERS, REQUESTS, AND DIAGNOSTIC REPORTS

- 1XRA.17.01 Given radiographic orders, describe the procedures to be performed.
- 1XRA.17.02 Given diagnostic reports, translate into a language the patient can understand.
- 1XRA.17.03 Given a request for diagnostic imaging consult/services, describe procedures and processes necessary to respond to requested service(s).

1XRA.18.00 IDENTIFY/DEFINE RADIATION SCIENCE TERMS

- 1XRA.18.01 Given specific diagnosis imaging terms/procedures, define the terms/procedures.
- 1XRA.18.02 Given specific diagnosis imaging terms, identify/locate the places where procedures are performed.

1XRA.21.00 DISCUSS/PUT INTO PRACTICE APPROPRIATE ATTITUDES AND COMMUNICATION IN PATIENT CARE

- 1XRA.21.01 Discuss the perceptions of death and dying from patient and technologist viewpoints.
- 1XRA.21.02 Discuss ethical, emotional, personal, and physical aspects of death.
- 1XRA.21.03 List the stages of dying and describe the characteristics of each stage.
- 1XRA.21.04 Identify the support mechanisms available to the terminally ill.

1XRA.22.00 DISCUSS/EMPLOY PROFESSIONAL PATIENT/TECHNOLOGIST INTERACTIONS

- 1XRA.22.01 Describe methods of determining the proper patient identification.
- 1XRA.22.02 Explain the use of audio and visual communication systems.
- 1XRA.22.03 Explain the use of immobilization devices
- 1XRA.22.04 Explain the use of machine type.
- 1XRA.22.05 Explain the use of axillary equipment.
- 1XRA.22.06 Alleviate fears by explaining positioning for examination.
- 1XRA.22.07 Alleviate fears by explaining length of procedure.
- 1XRA.22.08 Alleviate fears by explaining room noise.
- 1XRA.22.09 Alleviate fears by explaining machine movement.
- 1XRA.22.10 Alleviate fears by explaining machine/patient contact.
- 1XRA.22.11 Given case studies, interact with patient family members and/or friends.

1XRA.23.00 SAFELY TRANSFER AND POSITION PATIENT

- 1XRA.23.01 Describe and demonstrate good principles of body mechanics applicable to patient care.
- 1XRA.23.02 Demonstrate techniques for various types of patient transfer.
- 1XRA.23.03 Describe and demonstrate the procedures for turning patients with various conditions.

- 1XRA.23.04 Describe and demonstrate restraint techniques for various types of procedures and patient conditions.
- 1XRA.23.05 Describe the aspects of patient comfort and discuss the importance of each to the care and safety of the patient.
- 1XRA.23.06 Given specific patient considerations and conditions, discuss various aspects of general patient care.
- 1XRA.23.07 Discuss procedures for assuring security of property of inpatients and outpatients.

1XRA.24.00 EVALUATE THE PATIENTS PHYSICAL NEEDS

- 1XRA.24.01 Describe the methods for evaluation of patient status.
- 1XRA.24.02 Identify the information to be collected prior to patient examination.
- 1XRA.24.03 Describe vital signs to be used to assess patient condition.
- 1XRA.24.04 Convert a Fahrenheit measurement to a Celsius.
- 1XRA.24.05 State the normal temperature values for the oral and rectal methods of measurement for temperature.
- 1XRA.24.06 Describe the method of monitoring respirations and state the normal values expected.
- 1XRA.24.07 List the equipment necessary for acquisition of the blood pressure on a patient.
- 1XRA.24.08 Identify the normal values for blood pressure for males and females.
- 1XRA.24.09 Identify the seven major sites for monitoring the pulse and indicate the normal values.
- 1XRA.24.10 Demonstrate the assessment of vital signs.

1XRA.25.00 CONTROL INFECTIONS EMPLOYING UNIVERSAL PRECAUTIONS

- 1XRA.25.01 Define infectious pathogens.
- 1XRA.25.02 Define communicable diseases.
- 1XRA.25.03 Define nosocomial infections.
- 1XRA.25.04 Define Centers for Disease Control and Prevention (CDC).
- 1XRA.25.05 Define Human Immunodeficiency Virus (HIV).
- 1XRA.25.06 Define Hepatitis B Virus (HBV).
- 1XRA.25.07 Describe the utilization of Universal Precautions and Isolation Procedures.
- 1XRA.25.08 Describe sources and modes of transmission of infections and diseases.
- 1XRA.25.09 Describe institutional/departmental procedures for infection control through Universal Precautions.
- 1XRA.25.10 Discuss psychological considerations for the management of patients utilizing Universal Precautions.

1XRA.26.00 IDENTIFY/DISCUSS/MANAGE MEDICAL EMERGENCIES

- 1XRA.26.01 Identify symptoms which manifest cardiac arrest.
- 1XRA.26.02 Identify symptoms which manifest shock.
- 1XRA.26.03 Identify symptoms which manifest convulsion/seizure.
- 1XRA.26.04 Identify symptoms which manifest hemorrhage.
- 1XRA.26.05 Identify symptoms which manifest apnea.
- 1XRA.26.06 Identify symptoms which manifest vomiting.
- 1XRA.26.07 Identify symptoms which manifest aspiration.
- 1XRA.26.08 Identify symptoms which manifest suspected or confirmed fractures.
- 1XRA.26.09 Identify symptoms which manifest diabetic coma/insulin shock.
- 1XRA.26.10 Describe the emergency medical code system for the institution and discuss the role of the student in this procedure.
- 1XRA.26.11 Given a CPR mannequin, demonstrate CPR competency.
- 1XRA.26.12 Discuss acute care procedures for cardiac arrest.
- 1XRA.26.13 Discuss acute care procedures for shock.
- 1XRA.26.14 Discuss acute care procedures for convulsion/seizure.
- 1XRA.26.15 Discuss acute care procedures for hemorrhage.
- 1XRA.26.16 Discuss acute care procedures for apnea.
- 1XRA.26.17 Discuss acute care procedures for vomiting.
- 1XRA.26.18 Discuss acute care procedures for aspiration.
- 1XRA.26.19 Discuss acute care procedures for suspected or confirmed fractures.
- 1XRA.26.20 Discuss acute care procedures for diabetic coma/insulin shock.
- 1XRA.26.21 Discuss the use of medical emergency equipment and supplies.
- 1XRA.26.22 Given simulations, demonstrate the use of oxygen and suction equipment.
- 1XRA.26.23 Given simulations, demonstrate basic first aide techniques.

1XRA.27.00 DEAL WITH ACUTE PATIENT CARE SITUATIONS

- 1XRA.27.01 List the special considerations necessary when performing radiographic procedures on an infant or a child.
- 1XRA.27.02 List the special considerations necessary when performing radiographic procedures on a geriatric patient.
- 1XRA.27.03 List the symptoms of a patient with a head injury.
- 1XRA.27.04 List the precautions to be taken when working with a patient with a head injury.
- 1XRA.27.05 List the symptoms of a patient with a spinal injury.

- 1XRA.27.06 List the precautions to be taken when working with a patient with a spinal injury.
- 1XRA.27.07 List the symptoms of a patient with an upper and/or lower extremity fracture.
- 1XRA.27.08 List the precautions to be taken when working with a patient with an upper and/or lower extremity fracture.
- 1XRA.27.09 List the symptoms of a patient with massive wounds.
- 1XRA.27.10 List the precautions to be taken when working with a patient with massive wounds.
- 1XRA.27.11 List the symptoms of a patient with burns.
- 1XRA.27.12 List the precautions to be taken when working with a patient with burns.
- 1XRA.27.13 List the signs and symptoms of a patient having a reaction to contrast media.
- 1XRA.27.14 Describe the medical intervention for a patient having a reaction to contrast media.

1XRA.29.00 CARE FOR PATIENTS WITH TUBES

- 1XRA.29.01 Given specific tube management situations, explain the indication and procedure.
- 1XRA.29.02 Given specific tube management situations, identify the precautions involved.
- 1XRA.29.03 Identify the steps in the operation and maintenance of suction equipment.

1XRA.30.00 CARE FOR PATIENTS DURING SPECIAL PROCEDURES

- 1XRA.30.01 Given an EKG strip, determine a normal pattern from an abnormal pattern.
- 1XRA.30.02 Identify the patient education, patient care, Intrathecal drug administration and special precautions for a patient undergoing Myelography.
- 1XRA.30.03 Identify the patient education, patient care, drug administration and special precautions for a patient undergoing Computerized Tomography.
- 1XRA.30.04 Identify the patient education, patient care, drug administration and special precautions for a patient undergoing Urography.
- 1XRA.30.05 Identify the patient education, patient care, drug administration and special precautions for a patient undergoing Cardiovascular-Interventional Procedures.
- 1XRA.30.06 Demonstrate knowledge of Cardiac Monitoring to include preparation for and recognition of EKG rhythms.
- 1XRA.30.07 Consider patient care in regards to adverse reactions to contrast media and other medical conditions.
- 1XRA.30.08 Identify the patient education, patient care, drug administration and special precautions for a patient undergoing Magnetic Resonance Imaging.
- 1XRA.30.09 Identify the patient education, patient care, drug administration and special precautions for a patient undergoing Ultrasound

1XRA.31.00 CARE FOR PATIENTS DURING BEDSIDE RADIOGRAPHY

- 1XRA.31.01 Demonstrate the appropriate procedure for gathering information prior to performing a bedside radiographic examination.
- 1XRA.31.02 List three situations in which bedside radiography may be preferable to examination in the radiology department.
- 1XRA.31.03 List four important factors to be noted during initial survey prior to radiography in the intensive care unit.
- 1XRA.31.04 Describe the initial steps in performing a bedside radiograph.
- 1XRA.31.05 Describe the especial precautions to be used when performing a radiograph on a premature infant.
- 1XRA.31.06 Explain the procedure for placing a cassette under a patient in an orthopedic bed frame.
- 1XRA.31.07 Describe the special problems faced in performing radiographs on patient with tracheostomy.
- 1XRA.31.08 Describe the special problems faced in performing radiographs on patient with nasogastric tubes.
- 1XRA.31.09 Describe the special problems faced in performing radiographs on patient with chest drainage tubes.
- 1XRA.31.10 Describe the special problems faced in performing radiographs on patient with Swan-Ganz catheters.
- 1XRA.31.11 Describe the procedure for taking radiographs in the surgical suite.
- 1XRA.31.12 Discuss the appropriate radiation protection required when doing bedside/surgical radiography.

1XRA.32.00 EDUCATE PATIENTS

- 1XRA.32.01 Define communication.
- 1XRA.32.02 Identify methods of communication and discuss how each can be utilized in patient education.
- 1XRA.32.03 Identify patient communication problems and discuss how each can be overcome to provide patient education.
- 1XRA.32.04 Given clinical simulations, demonstrate explanations of radiographic examinations.
- 1XRA.32.05 Given clinical simulations, demonstrate explanations for patients with various communication problems.
- 1XRA.32.06 Discuss radiation safety and protection questions patients might ask in connection with radiologic examinations and the radiographer's response to each.
- 1XRA.32.07 Given specific patient conditions and profiles, analyze the moods, expectations, and perceptions of the technologist-patient relationship.

1XRA.33.00 PROMOTE HEALTH

- 1XRA.33.01 Define tertiary disease prevention.
- 1XRA.33.02 Describe available sources for patient education material.

- 1XRA.33.03 Define secondary disease prevention.
- 1XRA.33.04 State the importance of breast self-exam.
- 1XRA.33.05 State the importance of testicular self-exam.
- 1XRA.33.06 State the importance of skin self-exam.
- 1XRA.33.07 State the importance of mammography.
- 1XRA.33.08 State the importance of physical examinations.
- 1XRA.33.09 State the importance of pelvic examinations.
- 1XRA.33.10 State the importance of colorectal examinations.
- 1XRA.33.11 Describe the correlation of family history to breast cancer.
- 1XRA.33.12 Describe the correlation of family history to testicular cancer.
- 1XRA.33.13 Describe the correlation of family history to colorectal cancer.

1XRA.34.00 MANAGE SUBSTANCE ABUSE PATIENTS

- 1XRA.34.01 Define chemical dependence and differentiate among terms used to describe aspects of this illness.
- 1XRA.34.02 Discuss specific signs and symptoms of those suffering from chemical dependence and identify specific strategies used in treating this illness.

1XRA.40.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE SKELETAL SYSTEM

- 1XRA.40.01 Given radiographs, diagrams and skeletal parts, identify and locate the bones of the axial skeleton.
- 1XRA.40.02 Describe processes and depressions found on bones of the axial skeleton.
- 1XRA.40.03 Describe articulations of the axial skeleton.
- 1XRA.40.04 Describe articulations of the appendicular skeleton.
- 1XRA.40.05 Given radiographs, diagrams and skeleton, locate and identify structures of the skull.
- 1XRA.40.06 Given radiographs, diagrams and skeleton, identify and discuss primary and secondary curves of the spine.
- 1XRA.40.07 Given radiographs, diagrams and skeletal parts, identify and locate the bones of the appendicular skeleton.
- 1XRA.40.08 Given radiographs, diagrams and skeletal parts, describe projections and depressions found on bones of the appendicular skeleton.
- 1XRA.40.09 Describe sesamoid bones and locate examples on radiographs.
- 1XRA.40.10 Discuss the functions of the skeletal system.
- 1XRA.40.11 Define articulation.
- 1XRA.40.12 Given diagrams, locate and label the different types of articulations.
- 1XRA.40.13 Discuss each type of articulation, including a definition of the type of comparison with other types, locations and movement(s) permitted.

1XRA.42.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE NERVOUS SYSTEM

- 1XRA.42.01 Describe the structure of the different types of nerve cells.
- 1XRA.42.02 State the function of the different types of nerve cells.
- 1XRA.42.03 Describe the structure of the brain and the relationship of its component parts.
- 1XRA.42.04 Describe the brain functions.
- 1XRA.42.05 List the meninges, describe and discuss the function of each.
- 1XRA.42.06 Discuss the formation, circulation, and function of cerebrospinal fluid.
- 1XRA.42.07 Describe the structure and discuss the function of the spinal cord.
- 1XRA.42.08 Discuss the distribution and function of cranial nerves.
- 1XRA.42.09 Discuss the distribution and function of spinal nerves.
- 1XRA.42.10 Discuss the structure and function of components of the autonomic nervous system.

1XRA.43.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE SENSORY SYSTEM

- 1XRA.43.01 Describe the structure of the eye.
- 1XRA.43.02 Describe the structure of the components of the ear.
- 1XRA.43.03 Given diagrams, identify and locate components of the external ear.
- 1XRA.43.04 Given diagrams, identify and locate components of the middle ear.
- 1XRA.43.05 Given diagrams, identify and locate components of the inner ear.
- 1XRA.43.06 Given diagrams, identify and locate components of the eustachian tubes.
- 1XRA.43.70 Describe the components of body parts involved in the sense of smell.
- 1XRA.43.08 Describe the components and structure of body parts involved in the sense of taste.
- 1XRA.43.09 List the somatic senses.

1XRA.44.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE ENDOCRINE SYSTEM

- 1XRA.44.01 Define endocrine.
- 1XRA.44.02 Describe the characteristics and function of the endocrine system.
- 1XRA.44.03 Identify the location and describe the structure of each component of the endocrine system.
- 1XRA.44.04 Identify the major hormone(s) secreted by each component of the endocrine system.
- 1XRA.44.05 Explain the function of each component of the endocrine system.

1XRA.45.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE DIGESTIVE SYSTEM

- 1XRA.45.01 Describe the hard and soft palates.
- 1XRA.45.02 Discuss deciduous and permanent teeth in terms of age for eruption and number.
- 1XRA.45.03 Discuss types of teeth in terms of number, location within the jaws, and function.
- 1XRA.45.04 Given cross-sectional diagrams of teeth, label the component parts.
- 1XRA.45.05 Describe the tongue in terms of structure and function.
- 1XRA.45.06 Describe the salivary glands in terms of structure, function and location.
- 1XRA.45.07 List the primary organs of the digestive system.
- 1XRA.45.08 Given diagrams and radiographs of primary organs comprising the digestive system, label the parts.
- 1XRA.45.09 Describe the layers of tissue that comprise the esophagus, stomach, small intestine, large intestine and rectum.
- 1XRA.45.10 Explain the functions of each primary organ of the digestive system.
- 1XRA.45.11 Differentiate between peritoneum, omentum, and mesentery.
- 1XRA.45.12 List the accessory organs of the digestive system.
- 1XRA.45.13 Given diagrams and radiographs of accessory organs of the digestive system, label the parts.
- 1XRA.45.14 Discuss the secretions of accessory organs of the digestive system and the function of each.
- 1XRA.45.15 Discuss the functions of the accessory organs of the digestive system.
- 1XRA.45.16 Describe the purpose of digestion.
- 1XRA.45.17 Discuss types of digestive changes that occur in the body.
- 1XRA.45.18 Describe the process of absorption.

1XRA.46.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE CARDIOVASCULAR SYSTEM

- 1XRA.46.01 describe the composition and functions of blood.
- 1XRA.46.02 list the types of blood cells and state their functions.
- 1XRA.46.03 Differentiate between blood plasma and serum.
- 1XRA.46.04 Explain the clotting mechanism.
- 1XRA.46.05 List the blood types.
- 1XRA.46.06 Explain the term Rh factor.
- 1XRA.46.07 Explain the antigen/antibody relationship and its use in blood typing.
- 1XRA.46.08 Given diagrams of the heart, label the parts.
- 1XRA.46.09 Trace the flow of blood through the body, and identify the main vessels.
- 1XRA.46.10 Describe the structure and function of arteries, veins and capillaries.
- 1XRA.46.11 Differentiate between arterial blood in systematic circulation and arterial blood in pulmonary circulation.

1XRA.47.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE LYMPHATIC SYSTEM AND UNDERSTAND IMMUNITY

- 1XRA.47.01 List the components of the lymphatic system and explain their function.
- 1XRA.47.02 Given diagrams, label major pathways of lymphatic circulation.
- 1XRA.47.03 Given diagrams, locate the major lymph node clusters.
- 1XRA.47.04 Explain the difference between nonspecific defenses and specific immunity.
- 1XRA.47.05 Explain antibody production and function.
- 1XRA.47.06 List the different types of T-cells and explain their function.
- 1XRA.47.07 Discuss the chemical mediation of the immune response.

1XRA.48.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE RESPIRATORY SYSTEM

- 1XRA.48.01 Given diagrams and radiographs of components of the respiratory system, label the parts.
- 1XRA.48.02 Describe the mechanics of respiration.
- 1XRA.48.03 Explain pulmonary ventilation.
- 1XRA.48.04 Discuss alveolar exchange.
- 1XRA.48.05 Describe the transport of blood gases.
- 1XRA.48.06 Explain tissue gas exchange.
- 1XRA.48.07 Describe how respiration is regulated.

1XRA.49.00 KNOW/DISCUSS/DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE URINARY

SYSTEM

- 1XRA.49.01 Given diagrams and radiographs, label the parts of the kidneys, ureters, bladder, and urethra.
- 1XRA.49.02 Explain the function of each organ of the urinary system.
- 1XRA.49.03 Describe the composition of urine.
- 1XRA.49.04 Discuss how urine is formed.
- 1XRA.49.05 Explain micturition.

1XRA.50.00 KNOW/DISCUSS DEMONSTRATE THE STRUCTURE AND FUNCTION OF THE REPRODUCTIVE SYSTEM

- 1XRA.50.01 Name the male reproductive organs.
- 1XRA.50.02 Given diagrams, label the parts of the male reproductive organs.
- 1XRA.50.03 Explain the functions of each of the male reproductive organs.
- 1XRA.50.04 Trace the flow of seminal fluid.
- 1XRA.50.05 Name the female reproductive organs.
- 1XRA.50.06 Given diagrams, label the parts of the female reproductive organs.
- 1XRA.50.07 Explain the functions of each of the female reproductive organs.
- 1XRA.50.08 Locate and explain the functions of the mammary glands.
- 1XRA.50.09 Describe the hormonal control of breast development.
- 1XRA.50.10 Explain the human reproductive process.
- 1XRA.50.11 Explain the ovarian and menstrual cycles.
- 1XRA.50.12 Describe menopause.

1XRA.51.00 IDENTIFY/EMPLOY TOPOGRAPHY WHEN PERFORMING RADIOGRAPHIC EXAMINATIONS

- 1XRA.51.02 Given a phantom, identify topographical landmarks for the neck.
- 1XRA.51.03 Given a phantom, identify topographical landmarks for the spine.
- 1XRA.51.04 Given a phantom, identify topographical landmarks for the thorax.
- 1XRA.51.05 Given a phantom, identify topographical landmarks for the abdomen.
- 1XRA.51.06 Given a phantom, identify topographical landmarks for the pelvis.
- 1XRA.51.07 Given a phantom, identify topographical landmarks for the extremities.

1XRA.53.00 EMPLOY STANDARD TERMINOLOGY, POSITIONING AIDS AND ACCESSORY EQUIPMENT TO PRODUCE RADIOGRAPHS

- 1XRA.53.01 Describe standard positioning terms.
- 1XRA.53.02 Describe positioning aids used in radiology.
- 1XRA.53.03 Describe accessory equipment and discuss each in terms of appropriate usage.

1XRA.54.00 DEMONSTRATE/DISCUSS GENERAL RADIOGRAPHIC PROCEDURAL CONSIDERATIONS

- 1XRA.54.01 Discuss general procedural considerations for radiographic examinations.
- 1XRA.54.02 Given simulated clinical situations, explain the specific considerations that would be involved.
- 1XRA.54.03 Through role-playing, demonstrate the ability to use the appropriate general considerations in various radiographic procedures with various patient types.

1XRA.55.00 DISCUSS POSITIONING CONSIDERATIONS FOR ROUTINE RADIOGRAPHIC PROCEDURES

- 1XRA.55.01 Describe the process for routine and special views for the hands.
- 1XRA.55.02 Describe the process for routine and special views for the wrist.
- 1XRA.55.03 Describe the process for routine and special views for the forearm (radius/ulna).
- 1XRA.55.04 Describe the process for routine and special views for the elbow.
- 1XRA.55.05 Describe the process for routine and special views for the humerus.
- 1XRA.55.06 Describe the process for routine and special views for the shoulder.
- 1XRA.55.07 Describe the process for routine and special views for the scapula.
- 1XRA.55.08 Describe the process for routine and special views for the clavicle.
- 1XRA.55.09 Describe the process for routine and special views for the acromioclavicular articulations.
- 1XRA.55.10 Describe the process for routine and special views for the foot.
- 1XRA.55.11 Describe the process for routine and special views for the calcaneus or os calcis.
- 1XRA.55.12 Describe the process for routine and special views for the ankle.
- 1XRA.55.13 Describe the process for routine and special views for the leg (tibia/fibula).
- 1XRA.55.14 Describe the process for routine and special views for the knee.
- 1XRA.55.15 Describe the process for routine and special views for the femur.
- 1XRA.55.16 Describe the process for routine and special views for the pelvis.
- 1XRA.55.17 Describe the process for routine and special views for the unilateral hip.
- 1XRA.55.18 Describe the process for routine and special views for the bilateral hip.
- 1XRA.55.19 Describe the process for routine and special views for the cervical spine.

- 1XRA.55.20 Describe the process for routine and special views for the thoracic spine.
- 1XRA.55.21 Describe the process for routine and special views for the lumbar spine.
- 1XRA.55.22 Describe the process for routine and special views for the sacrum and coccyx.
- 1XRA.55.23 Describe the process for routine and special views for the sacroiliac articulations.
- 1XRA.55.24 Describe the process for routine and special views for the ribs.
- 1XRA.55.25 Describe the process for routine and special views for the sternum.
- 1XRA.55.26 Describe the process for routine and special views for the sternoclavicular articulations.
- 1XRA.55.39 Describe the process for routine and special views for the respiratory system.
- 1XRA.55.40 Describe the process for routine and special views for the intravenous pyelogram.
- 1XRA.55.41 Describe the process for routine and special views for the retrograde pyelogram.
- 1XRA.55.42 Describe the process for routine and special views for the retrograde cystogram.
- 1XRA.55.43 Describe the process for routine and special views for the voiding cystourethrogram.
- 1XRA.55.44 Describe the process for routine and special views for the esophagus.
- 1XRA.55.45 Describe the process for routine and special views for the upper G.I.
- 1XRA.55.46 Describe the process for routine and special views for the small bowel series.
- 1XRA.55.47 Describe the process for routine and special views for the barium enema.
- 1XRA.55.48 Describe the process for routine and special views for the oral cholecystogram.
- 1XRA.55.49 Describe the process for routine and special views for the T-tube cholangiogram.
- 1XRA.55.50 Describe the process for routine and special views for the operative cholangiogram.
- 1XRA.55.55 Given the names of various procedures, explain what structures and/or functions are demonstrated.
- 1XRA.55.56 In a laboratory setting, simulate the radiographic procedure on a person or full body phantom.
- 1XRA.55.57 Given radiographs of the upper extremity, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.58 Given radiographs of the shoulder girdle, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.59 Given radiographs of the lower extremity, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.60 Given radiographs of the pelvic girdle, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.61 Given radiographs of the spine, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.62 Given radiographs of the bony thorax, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.64 Given radiographs of the respiratory system, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.65 Given radiographs of the digestive system, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.55.67 Given radiographs, identify relevant anatomy.

1XRA.56.00 PRODUCE RADIOGRAPHS

- 1XRA.56.01 Produce radiographs of the hand (with appropriate supervision).
- 1XRA.56.02 Produce radiographs of the wrist (with appropriate supervision).
- 1XRA.56.03 Produce radiographs of the forearm (with appropriate supervision).
- 1XRA.56.04 Produce radiographs of the elbow (with appropriate supervision).
- 1XRA.56.05 Produce radiographs of the humerus (with appropriate supervision).
- 1XRA.56.06 Produce radiographs of the shoulder (with appropriate supervision).
- 1XRA.56.07 Produce radiographs of the scapula (with appropriate supervision).
- 1XRA.56.08 Produce radiographs of the clavicle (with appropriate supervision).
- 1XRA.56.09 Produce radiographs of the acromioclavicular articulations (with appropriate supervision).
- 1XRA.56.10 Produce radiographs of the foot (with appropriate supervision).
- 1XRA.56.11 Produce radiographs of the calcaneus or os calcis (with appropriate supervision).
- 1XRA.56.12 Produce radiographs of the ankle (with appropriate supervision).
- 1XRA.56.13 Produce radiographs of the leg (tibia/fibula) (with appropriate supervision).
- 1XRA.56.14 Produce radiographs of the knee (with appropriate supervision).
- 1XRA.56.15 Produce radiographs of the femur (with appropriate supervision).
- 1XRA.56.16 Produce radiographs of the pelvis (with appropriate supervision).
- 1XRA.56.17 Produce radiographs of the unilateral hip (with appropriate supervision).
- 1XRA.56.18 Produce radiographs of the bilateral hip (with appropriate supervision).
- 1XRA.56.19 Produce radiographs of the cervical spine (with appropriate supervision).
- 1XRA.56.20 Produce radiographs of the thoracic spine (with appropriate supervision).
- 1XRA.56.21 Produce radiographs of the lumbar spine (with appropriate supervision).
- 1XRA.56.22 Produce radiographs of the sacrum and coccyx (with appropriate supervision).
- 1XRA.56.23 Produce radiographs of the sacroiliac articulations (with appropriate supervision).
- 1XRA.56.24 Produce radiographs of the ribs (with appropriate supervision).
- 1XRA.56.25 Produce radiographs of the sternum (with appropriate supervision).

- 1XRA.56.26 Produce radiographs of the sternoclavicular articulations (with appropriate supervision).
- 1XRA.56.39 Produce radiographs of the respiratory system (with appropriate supervision).
- 1XRA.56.40 Produce radiographs of the intravenous pyelogram (with appropriate supervision).
- 1XRA.56.41 Produce radiographs of the retrograde pyelogram (with appropriate supervision).
- 1XRA.56.42 Produce radiographs of the retrograde pyelogram (with appropriate supervision).
- 1XRA.56.43 Produce radiographs of the voiding cystourethrogram (with appropriate supervision).
- 1XRA.56.44 Produce radiographs of the esophagus (with appropriate supervision).
- 1XRA.56.45 Produce radiographs of the upper G.I. (with appropriate supervision).
- 1XRA.56.46 Produce radiographs of the small bowel series (with appropriate supervision).
- 1XRA.56.47 Produce radiographs of the barium enema (with appropriate supervision).
- 1XRA.56.48 Produce radiographs of the oral cholecystogram (with appropriate supervision).
- 1XRA.56.49 Produce radiographs of the T-tube cholangiogram (with appropriate supervision).
- 1XRA.56.50 Produce radiographs of the operative cholangiogram (with appropriate supervision).
- 1XRA.56.51 Produce radiographs of the endoscopic retrograde cholangiographic pancreatography (ERCP) (with appropriate supervision).

1XRA.57.00 DISCUSS/DEMONSTRATE POSITIONING CONSIDERATIONS FOR ROUTINE CONTRAST STUDIES

- 1XRA.57.01 Discuss equipment and supplies necessary for radiographs of the esophagus.
- 1XRA.57.02 Discuss equipment and supplies necessary for radiographs of the upper G.I.
- 1XRA.57.03 Discuss equipment and supplies necessary for radiographs of the small bowel series.
- 1XRA.57.04 Discuss equipment and supplies necessary for radiographs of the barium enema.
- 1XRA.57.05 Discuss equipment and supplies necessary for radiographs of the oral cholangiogram.
- 1XRA.57.06 Discuss equipment and supplies necessary for radiographs of the T-tube cholangiogram.
- 1XRA.57.07 Discuss equipment and supplies necessary for radiographs of the operative cholangiogram.
- 1XRA.57.08 Discuss equipment and supplies necessary for radiographs of the endoscopic retrograde cholangiogram pancreatography (ERCP).
- 1XRA.57.09 Discuss equipment and supplies necessary for radiographs of the intravenous pyelogram.
- 1XRA.57.10 Discuss equipment and supplies necessary for radiographs of the retrograde pyelogram.
- 1XRA.57.11 Discuss equipment and supplies necessary for radiographs of the retrograde cystogram.
- 1XRA.57.12 Discuss equipment and supplies necessary for radiographs of the voiding cystourethrogram.
- 1XRA.57.13 Describe the patient preparation necessary for radiographs of the esophagus.
- 1XRA.57.14 Describe the patient preparation necessary for radiographs of the upper G.I.
- 1XRA.57.15 Describe the patient preparation necessary for radiographs of the small bowel series.
- 1XRA.57.16 Describe the patient preparation necessary for radiographs of the barium enema.
- 1XRA.57.17 Describe the patient preparation necessary for radiographs of the oral cholecystogram.
- 1XRA.57.18 Describe the patient preparation necessary for radiographs of the T-tube cholangiogram.
- 1XRA.57.19 Describe the patient preparation necessary for radiographs of the operative cholangiogram.
- 1XRA.57.20 Describe the patient preparation necessary for radiographs of the endoscopic retrograde cholangiographic pancreatography (ERCP).
- 1XRA.57.21 Describe the patient preparation necessary for radiographs of the intravenous pyelogram.
- 1XRA.57.22 Describe the patient preparation necessary for radiographs of the retrograde pyelogram.
- 1XRA.57.23 Describe the patient preparation necessary for radiographs of the retrograde cystogram.
- 1XRA.57.24 Describe the patient preparation necessary for radiographs of the voiding cystourethrogram.
- 1XRA.57.25 Describe the general procedure for radiographs of the esophagus.
- 1XRA.57.26 Describe the general procedure for radiographs of the upper G.I.
- 1XRA.57.27 Describe the general procedure for radiographs of the small bowel series.
- 1XRA.57.28 Describe the general procedure for radiographs of the barium enema.
- 1XRA.57.29 Describe the general procedure for radiographs of the oral cholecystogram.
- 1XRA.57.30 Describe the general procedure for radiographs of the T-tube cholangiogram.
- 1XRA.57.31 Describe the general procedure for radiographs of the operative cholangiogram.
- 1XRA.57.32 Describe the general procedure for radiographs of the endoscopic retrograde cholangiographic pancreatography (ERCP).
- 1XRA.57.33 Describe the general procedure for radiographs of the intravenous pyelogram.
- 1XRA.57.34 Describe the general procedure for radiographs of the retrograde pyelogram.
- 1XRA.57.35 Describe the general procedure for radiographs of the retrograde cystogram.
- 1XRA.57.36 Describe the general procedure for radiographs of the voiding cystourethrogram.
- 1XRA.57.37 Describe the process for routine and special views of the esophagus.
- 1XRA.57.38 Describe the process for routine and special views of the upper G.I.
- 1XRA.57.39 Describe the process for routine and special views of the small bowel series.
- 1XRA.57.40 Describe the process for routine and special views of the barium enema.
- 1XRA.57.41 Describe the process for routine and special views of the oral cholecystogram.

- 1XRA.57.42 Describe the process for routine and special views of the T-tube cholangiogram.
- 1XRA.57.43 Describe the process for routine and special views of the operative cholangiogram.
- 1XRA.57.44 Describe the process for routine and special views of the endoscopic retrograde cholangiographic pancreatography (ERCP).
- 1XRA.57.45 Describe the process for routine and special views of the intravenous pyelogram.
- 1XRA.57.46 Describe the process for routine and special views of the retrograde pyelogram.
- 1XRA.57.47 Describe the process for routine and special views of the retrograde cystogram.
- 1XRA.57.48 Describe the process for routine and special views of the voiding cystourethrographic.
- 1XRA.57.49 Given the names of various contrast studies, indicate the contrast media typically used, the usual dosage and route of administration.
- 1XRA.57.50 In a laboratory setting, simulate the radiographic procedure on a person or full body phantom.
- 1XRA.57.51 Given radiographs of the esophagus, explain what structures and/or functions are demonstrated.
- 1XRA.57.52 Given radiographs of the upper G.I., explain what structures and/or functions are demonstrated.
- 1XRA.57.53 Given radiographs of the small bowel series, explain what structures and/or functions are demonstrated.
- 1XRA.57.54 Given radiographs of the barium enema, explain what structures and/or functions are demonstrated.
- 1XRA.57.55 Given radiographs of the oral cholecystogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.56 Given radiographs of the T-tube cholangiogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.57 Given radiographs of the operative cholangiogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.58 Given radiographs of the endoscopic retrograde cholangiographic pancreatography (ERCP), explain what structures and/or functions are demonstrated.
- 1XRA.57.59 Given radiographs of the intravenous pyelogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.60 Given radiographs of the retrograde pyelogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.61 Given radiographs of the retrograde cystogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.62 Given radiographs of the voiding cystourethrogram, explain what structures and/or functions are demonstrated.
- 1XRA.57.63 Given radiographs of the esophagus, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.64 Given radiographs of the upper G.I., evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.65 Given radiographs of the small bowel series, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.66 Given radiographs of the barium enema, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.67 Given radiographs of the oral cholecystogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.68 Given radiographs of the T-tube cholangiogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.69 Given radiographs of the operative cholangiogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.70 Given radiographs of the endoscopic retrograde cholangiographic pancreatography (ERCP), evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.71 Given radiographs of the intravenous pyelogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.72 Given radiographs of the retrograde pyelogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.73 Given radiographs of the retrograde cystogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.74 Given radiographs of the voiding cystourethrogram, evaluate in terms of: positioning, centering, and overall image quality.
- 1XRA.57.75 Given radiographs, identify relevant anatomy.
- 1XRA.57.76 With appropriate supervision, perform the esophagus radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.77 With appropriate supervision, perform the upper G.I. radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.78 With appropriate supervision, perform the small bowel series radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.79 With appropriate supervision, perform the barium enema radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.80 With appropriate supervision, perform the oral cholecystogram radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.81 With appropriate supervision, perform the T-tube cholangiogram radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.82 With appropriate supervision, perform the operative cholangiogram radiographic procedure to include positioning, technique and film critique.

- 1XRA.57.83 With appropriate supervision, perform the endoscopic retrograde cholangiographic pancreatography (ERCP) to include positioning, technique and film critique.
- 1XRA.57.84 With appropriate supervision, perform the intravenous pyelogram radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.85 With appropriate supervision, perform the retrograde pyelogram radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.86 With appropriate supervision, perform the retrograde cytogram radiographic procedure to include positioning, technique and film critique.
- 1XRA.57.87 With appropriate supervision, perform the voiding cystourethrogram radiographic procedure to include positioning, technique and film critique.

1XRA.59.00 DISCUSS/PRACTICE ACCEPTABLE IMAGING STANDARDS

- 1XRA.59.01 Discuss practical considerations in setting imaging standards.
- 1XRA.59.02 Discuss acceptance limits.

1XRA.60.00 COMPETENTLY DISCUSS/MANIPULATE RADIOGRAPHIC DENSITY

- 1XRA.60.01 Define radiographic density.
- 1XRA.60.02 Identify the acceptable range of radiographic density.
- 1XRA.60.03 Analyze relationships of factors affecting radiographic density.

1XRA.61.00 COMPETENTLY DISCUSS/MANIPULATE RADIOGRAPHIC CONTRAST

- 1XRA.61.01 Define radiographic contrast.
- 1XRA.61.02 Differentiate between subject contrast and film contrast.
- 1XRA.61.03 Analyze relationships of factors affecting radiographic contrast.

1XRA.62.00 COMPETENTLY DISCUSS/MANIPULATE RECORDED DETAIL

- 1XRA.62.01 Define recorded detail.
- 1XRA.62.02 Differentiate between umbra and penumbra.
- 1XRA.62.03 Analyze relationships of factors affecting recorded detail.

1XRA.63.00 CONTROL DISTORTION

- 1XRA.63.01 Define distortion.
- 1XRA.63.02 Differentiate between shape distortion and size distortion.
- 1XRA.63.03 Analyze relationships of factors affecting distortion.

1XRA.64.00 EXPLAIN/MANIPULATE EXPOSURE LATITUDE

- 1XRA.64.01 Define exposure latitude.
- 1XRA.64.02 Analyze relationships of factors affecting exposure latitude.

1XRA.65.00 DISCUSS/USE BEAM LIMITING DEVICES

- 1XRA.65.01 List the types of beam limiting devices and describe the operation and applications for each.
- 1XRA.65.02 Explain purposes of beam limiting devices in terms of patient dosage, scattered radiation production, radiographic density and contrast.

1XRA.66.00 DISCUSS/EMPLOY BEAM FILTRATION

- 1XRA.66.01 Define beam filtration.
- 1XRA.66.02 Explain purposes of beam filtration in terms of patient dosage, scattered radiation production, radiographic density, and contrast.

1XRA.67.00 DISCUSS/CONTROL SCATTERED AND SECONDARY RADIATION

- 1XRA.67.01 Define scattered and secondary radiation.
- 1XRA.67.02 Describe interactions of x-rays with matter which produce scattered and secondary radiation.
- 1XRA.67.03 Analyze relationships of factors affecting scattered and secondary radiation.
- 1XRA.67.04 Discuss effects of scattered and secondary radiation in terms of patient dosage, image quality, and occupational exposure.

1XRA.68.00 DISCUSS/CONTROL EXIT RADIATION

- 1XRA.68.01 Explain the relationship between kVp and scattered and secondary radiation.
- 1XRA.68.02 Describe a grid in terms of its purpose, components, and construction.
- 1XRA.68.03 Differentiate among types of grids.
- 1XRA.68.04 Analyze grid efficiency in terms of grid ratio and frequency.
- 1XRA.68.05 Given technical information, select an appropriate grid.

- 1XRA.68.06 Define grid cut off.
- 1XRA.68.07 Describe factors influencing grid cut off.
- 1XRA.68.08 Describe various grid artifacts.
- 1XRA.68.09 Explain the relationship between beam limitation and scattered/secondary radiation.

1XRA.69.00 EXPLAIN/DEMONSTRATE/USE EXPOSURE SYSTEMS

- 1XRA.69.01 Explain the purpose of an exposure system in terms of standardization of exposure and image consistency.
- 1XRA.69.02 Discuss considerations involved in exposure selection.
- 1XRA.69.03 Distinguish among various types of exposure systems.
- 1XRA.69.04 Given clinical simulations, demonstrate patient measurement and exposure selection.

1XRA.70.00 CALCULATE EXPOSURES

- 1XRA.70.01 Analyze relationships of exposure factors and their effects on exposure calculations.
- 1XRA.70.02 Given exposure factors, calculate the photographic effect.
- 1XRA.70.03 Given exposure problems, calculate penumbra, magnification factor, and percent magnification.
- 1XRA.70.04 Apply mAs reciprocity in clinical simulations.

1XRA.71.00 DISCUSS/EXPLAIN PROCESSING AREA CONSIDERATIONS

- 1XRA.71.01 Discuss aspects of processing area location, construction, and function.
- 1XRA.71.02 Explain safe light illumination in terms of definition, filters, bulb size/color, and testing for both blue and green sensitive film emulsions.
- 1XRA.71.03 Describe the operation and utilization of day light processing.
- 1XRA.71.04 Discuss processing area ventilation including considerations of temperature control and light proofing.
- 1XRA.71.05 Discuss the location, purpose and function/operation of each piece of processing area equipment/furnishings.

1XRA.72.00 HANDLE AND STORE FILM CORRECTLY

- 1XRA.72.01 Analyze the effects of processing considerations on film quality.
- 1XRA.72.02 Analyze the effects of storage considerations on film quality.

1XRA.74.00 DISCUSS/EMPLOY FILM HOLDERS AND INTENSIFYING SCREENS

- 1XRA.74.01 Discuss various film holders in terms of purpose, construction, application, patient dosage, loading/unloading and maintenance.
- 1XRA.74.02 Explain the construction and purpose of intensifying screens.
- 1XRA.74.03 Describe the principles and function of intensifying screens.
- 1XRA.74.04 Explain classifications of intensifying screens and the application of each.
- 1XRA.74.05 Discuss the maintenance of intensifying screens in terms of handling, cleaning, testing and evaluation.

1XRA.75.00 EXPLAIN/EMPLOY AN AUTOMATIC PROCESSOR

- 1XRA.75.01 Discuss the purpose of an automatic processor.
- 1XRA.75.02 Given cross-sectional diagrams of automatic processors, label the components and explain the function of each.
- 1XRA.75.03 Describe systems of the automatic processor and functions of each.
- 1XRA.75.04 Given various types and sizes of film, demonstrate how each is fed into the processor.
- 1XRA.75.05 Explain the components of the processing cycle providing the specific action and duration of time for each component.
- 1XRA.75.06 Discuss daily and periodic aspects of processor maintenance and cleaning.
- 1XRA.75.07 Describe the types of artifacts including the cause and effect on a radiograph and methods of preventing each.
- 1XRA.75.08 Given radiographs containing artifacts, identify the type, cause and methods of preventing each.

1XRA.76.00 DESCRIBE/IDENTIFY ARTIFACTS

- 1XRA.76.01 Define the term artifact.
- 1XRA.76.02 Describe types of artifacts including the cause and effect on a radiograph and method of prevention for each.
- 1XRA.76.03 Given radiographs containing artifacts, identify the type, cause and methods of prevention for each.

2XRA.01.00 DISCUSS/OPERATE RADIOGRAPHIC EQUIPMENT

- 2XRA.01.02 Demonstrate operation of various types of permanently installed radiographic equipment.
- 2XRA.01.04 Demonstrate operation of various types of mobile unit radiographic equipment.

2XRA.05.00 DISCUSS/IMPLEMENT IMAGING STANDARDS

- 2XRA.05.01 Discuss the elements of a diagnostic image as related to film critique.
- 2XRA.05.02 Identify the steps in the decision making process.
- 2XRA.05.03 Describe an effective film critique method.

2XRA.05.04 Describe the role of the radiographer in film critiquing.

2XRA.06.00 EXPLAIN/DEMONSTRATE MANIPULATION OF TECHNICAL FACTORS

2XRA.06.01 Explain the process for evaluating radiographs for adequate density, contrast and scale of contrast.

2XRA.06.02 Explain how the radiographer determines if adequate penetration is present along with subject contrast.

2XRA.06.03 List the parameters for evaluating visibility of detail on radiographs.

2XRA.06.04 Describe how the degree of image distortion may be evaluated.

2XRA.06.05 Explain possible causes for image distortion.

2XRA.07.00 DISCUSS PROCEDURAL FACTORS

2XRA.07.01 Describe the importance of proper positioning.

2XRA.07.02 Describe how properly preparing a patient affects the quality of the image.

2XRA.07.03 Describe/demonstrate the method for assessing beam restriction.

2XRA.08.00 DESCRIBE/DIFFERENTIATE COMMON EQUIPMENT MALFUNCTIONS AND THE CORRECTIVE ACTIONS REQUIRED

2XRA.08.01 Describe common equipment malfunctions which affect image quality.

2XRA.08.02 Describe the corrective actions necessary for common equipment malfunctions.

2XRA.08.03 Explain the differences between technical factor problems, procedural factor problems and equipment malfunctions.

2XRA.22.00 DISCUSS/IDENTIFY THE NEED FOR RADIATION PROTECTION

2XRA.22.01 Identify and justify the need to minimize unproductive radiation exposure of humans.

2XRA.25.00 DESCRIBE/EMPLOY PERSONNEL MONITORING AND IDENTIFY OCCUPATIONAL EXPOSURES

2XRA.25.01 Identify the need and importance of personnel monitoring for radiation workers.

2XRA.25.02 Identify and describe the following monitoring devices:

2XRA.25.03 List applications, advantages and limitations for each device in 25.02.

2XRA.25.04 Interpret personnel monitoring reports.

2XRA.25.05 List values for maximum permissible dose equivalent limits for occupational radiation exposures (annual and lifetime).

2XRA.25.06 Identify those structures which are considered critical for potential late effects for whole body irradiation exposure.

2XRA.25.07 Identify dose equivalent limits for embryo and fetus in occupationally exposed women.

2XRA.25.08 State the age proration formula for the determination of a maximum accumulated dose equivalent.

2XRA.26.00 DISCUSS THE NEED FOR/PROMOTE PATIENT PROTECTION

2XRA.26.05 Explain the ten day rule and its application to female patients of childbearing age.

2XRA.26.06 Explain the relationship of exposure factors to patient dosage.

2XRA.26.07 Given various radiographic procedures, state the desired film/screen combination that will result in an optimum diagnostic image with the minimum radiation exposure.

2XRA.26.08 Discuss methods to avoid repeat radiographs.

2XRA.26.09 Discuss the importance of clear, concise instructions (effective communication skills) as a method of radiation protection.

2XRA.26.10 Discuss the effect(s) of immobilization techniques to eliminate voluntary motion.

2XRA.26.12 Discuss safety factors for the patient (and other patients) in the room during mobile radiographic procedures.

2XRA.27.00 DESCRIBE/EMPLOY PRACTICAL RADIATION PROTECTION MEASURES

2XRA.27.01 Identify barrier materials and their use in specific x-ray installations.

2XRA.27.02 Distinguish between primary and secondary barriers.

2XRA.27.03 Describe how Use (U) influences the design of x-ray installations.

2XRA.27.04 Describe how Workload (W) influences the design of x-ray installations.

2XRA.27.05 Describe how Occupancy (T) influences the design of x-ray installations.

2XRA.27.06 Describe how Distance (T) influences the design of x-ray installations.

2XRA.27.07 Describe how Material influences the design of x-ray installations.

2XRA.27.08 Describe how the operation of various ancillary equipment influences radiation safety and describe the potential consequences of failure of this equipment.

2XRA.27.09 Describe how the operation of various x-ray equipment influences radiation safety and describe the potential consequences of failure of this equipment.

2XRA.27.10 Identify who should evaluate ancillary/x-ray equipment; frequency evaluations should be made; how is this related to the Quality Assurance Program for radiation safety.

- 2XRA.27.11 Demonstrate how time, distance and shielding can be manipulated to keep radiation exposures to a minimum.
- 2XRA.27.12 Perform calculations of exposure with varying time, distance and shielding.
- 2XRA.27.13 Discuss the relationship between half-value layer and shielding design.
- 2XRA.27.14 Identify emergency procedures to be followed during failures of x-ray mechanisms.

2XRA.30.00 DESCRIBE/MINIMIZE RADIATION EFFECTS

- 2XRA.30.07 Identify methods to measure radiation response.

2XRA.36.00 DISCUSS QUALITY IMPROVEMENT CONCEPTS AND PARTICIPATE IN TQM ACTIVITIES

- 2XRA.36.01 Define quality improvement, quality assurance and quality control.
- 2XRA.36.02 Discuss the benefits of a quality improvement program to the patient and to the department.
- 2XRA.36.03 List elements of a quality improvement program and discuss how each is related to the quality improvement program.
- 2XRA.36.04 Discuss the importance of continuing education in regards to the rapid advancement of technology.
- 2XRA.36.05 Identify and describe each of the steps used in JCAHO 10-step model as applied to quality improvement.

2XRA.38.00 DISCUSS/PARTICIPATE IN EQUIPMENT QUALITY CONTROL PROCEDURES

- 2XRA.38.01 List categories of departmental personnel involved in a quality improvement program and discuss the responsibilities of each to the effective operation of the program.
- 2XRA.38.02 List components of the radiographic system.
- 2XRA.38.03 Describe test material/equipment, test procedures and evaluation/interpretation relating to quality improvement for components of the radiographic system.
- 2XRA.38.04 Discuss aspects of preventive and corrective maintenance for components of the radiographic system.
- 2XRA.38.05 Define reject analysis and describe objectives of a reject analysis program.
- 2XRA.38.06 Explain the procedure, evaluation and follow-up for a retake analysis program.
- 2XRA.38.07 Identify the necessary equipment to perform quality control tests.

2XRA.43.00 IDENTIFY/EMPLOY COMPUTER APPLICATIONS IN RADIOLOGY

- 2XRA.43.01 Identify various types of computer imaging in radiology (these techniques are fully described under Imaging Equipment of specialized curricular areas).

2XRA.44.00 PARTICIPATE IN CLINICAL PRACTICUM PERFORMING ASSIGNED DUTIES WITH PROPER SUPERVISION

2XRA.46.00 IDENTIFY/DISCUSS DIAGNOSTIC CONTRAST AGENTS

- 2XRA.46.03 Describe methods and techniques for the administration of various types of contrast agents.

2XRA.47.00 DISCUSS/OBSERVE DRUG ADMINISTRATION

- 2XRA.47.01 Identify and describe the routes of drug administration.
- 2XRA.47.02 Discuss the purposes and advantages of intravenous drug administration over other routes.
- 2XRA.47.03 Differentiate between the two major sites of intravenous drug administration.
- 2XRA.47.04 Identify, describe and document complications associated with intravenous drug therapy and appropriate actions to resolve these complications.
- 2XRA.47.05 Discuss the various elements of initiating and discontinuing intravenous drug therapy.
- 2XRA.47.06 Differentiate and document dose calculations for adult and pediatric patients.
- 2XRA.47.07 Prepare for injection, contrast agents/intravenous medications , utilizing aseptic technique.

2XRA.48.00 DISCUSS LEGAL AND ETHICAL ISSUES OF MEDICATION ADMINISTRATION

- 2XRA.48.01 Discuss the current legal and ethical status of the radiographer's role in drug administration.
- 2XRA.48.02 Discuss a radiographer's professional liability concerning drug administration.

Required Readings/Materials

You must purchase the following required readings/materials:

- Program Student Handbook; Program faculty
- The Radiography Procedure and Competency Manual, Biedrzycki

COURSE REQUIREMENTS

- A. The student must be able to accomplish the required published objectives in the Program Student Handbook for the following rotations:
 - Room 6: p. 41

- QA: p. 69
- Emergency Room: p. 50
- Transport: p. 11
- B. Performance Evaluations: The student should be able to accomplish the required objectives as found in the “The Radiography Procedure and Competency Manual by Anita Biedrzycki or supplement by the Radiologic Technology Program as follows:
 - Chest: p. 37
 - Wheelchair Chest P. 53
 - Stretcher Chest P. 57
 - Portable Erect Chest: p. 357
 - Decubitus Chest: p. 45
 - Lordotic Chest: p. 41
 - Abdomen: p. 7
 - Portable Abdomen: p. 361
 - Abdominal Series: p. 23
 - Decubitus Abdomen: p. 15
 - Finger/Thumb: p. 67
 - Hand: p. 71
 - Wrist: p. 79
 - Navicular Series: p. 91
 - Forearm: p. 95
 - Elbow: p. 99
 - Humerus: p. 115
 - Shoulder: p. 119
 - Acromioclavicular Joints p. 147
 - Clavicle: p. 143
 - Scapula: p. 139
- C. Completion of weekly evaluation forms ALL require rotations.
- D. Students must maintain a grade of “C” or better during their supervised practicum, by attitude observed and graded by their supervisors at the clinical sites and by maintenance of the requirements set forth in the course outline.

METHOD OF EVALUATION

Weekly supervisory technologist evaluations, competency & critique forms, performance evaluations, semester clinical instructor evaluations and film critique tests.

Weight of Course Requirements:

- A. Rotation grade determination
 - 30% - Competency and Critique forms
 - 35% - Objective Checklist
 - 35% - Evaluations - Rotation Supervisor (Tech)
- B. Semester grade determination
 - 50% - Rotation grade average
 - 30% - Miscellaneous (performance evaluations, projects, etc)
 - 20% - Evaluations - Clinical Supervisors, Instructors
- C. Exceptions for Rotational Grade Determination (SEE “SEMESTER CLINICAL GRADE DETERMINATION” SECTION OF PROGRAM STUDENT HANDBOOK, p. 34)

ATTENDANCE POLICY

Student attendance at every class, lab and clinical practicum is expected. Students shall be prompt to class and clinical practicums. Points will be deducted from a student's final course grade for absences. (1-2 abs = .5 pt. ea.; 3-5 abs = .75 pt. ea.; 6-7 abs = 1 pt. ea.) A student is considered absent if more than 30 minutes late to lecture or lab or more than 2 hours late for clinical practicums. Four (4) or more absences will constitute an administrative drop.

ACADEMIC ETHICS:

You are expected to complete your own assignments and take tests without notes or other outside assistance. ALL WORK IS EXPECTED TO BE YOUR OWN. If unethical behavior is detected, ALL parties involved will be denied points for that project or exam. The questioned material and a report of the ethics violation will be submitted to the department chair for further action as deemed necessary by the department chair. Unethical behavior including dishonesty (cheating) on any work can be reason for dismissal from the class and ultimately the Program.

Statement of Academic Dishonesty

Ethics, Cheating and Plagiarism

“Using someone else's ideas or phrasing and representing those ideas of phrasing as our own, either on purpose or through carelessness, is a serious offense known as plagiarism. “Ideas or phrasing” includes written or spoken material, of course, from whole papers and paragraphs to sentences, and indeed, phrases. But it also includes statistics, lab results, art work, etc. “Someone else” can mean a professional source, such as a published writer or critic in a book, magazine, encyclopedia, or journal; an electronic resource such as material we discover on the World Wide Web; another students at our school or anywhere else; a paperwriting “service” (online or otherwise), which offers to sell written papers for a fee.” (statement taken from <http://webster.comnet.edu/mla/plagiarism.shtml>)

STUDENT ASSISTANCE:

The following resources are available to assist you in successful completion of this course:

- A. In the LRC - Audiovisual materials from LRC presented during course.
- B. **Smarthinking** (<http://Smarthinking.com>)
Smarthinking Provides live, online, on-demand tutoring and writing assistance to Odessa College students in **Mathematics (Basic Skills - Calculus II), Writing, General Chemistry, Organic Chemistry, Physics, Biology, Introduction to Human Anatomy and Physiology, Accounting, Economics, Introductory Finance, Spanish and Statistics.** Keep in mind that the Success Center still has 7 outstanding tutors for in-house face-to-face tutoring sessions.
- C. Instructor Assistance - Instructor office hours are posted on their office doors. Instructors are available during these hours to assist students. Some office hours are at the college while others are at clinical affiliates.

SPECIAL NEEDS STATEMENT

Special Needs: Odessa College complies with Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. If you have any special needs or issues pertaining to your access to and participation in this or any other class at Odessa College, please contact Becky Rivera-Weiss in the Office of Disability Services at 432-335-6861 to request assistance and accommodations.

IMPORTANT NOTES

Students MUST review rotational paperwork “prior” to entering a rotation and ensure preparedness by attainment of required prerequisite knowledge and skills.

WORK ETHICS:

You are expected to:

- Conduct yourself in a professional manner, respond to patient needs and support colleagues and associates in providing quality care.
- Advance the principle objective of the profession to provide services to humanity with full respect for the dignity of mankind.
- Deliver patient care and service unrestricted by the concerns of personal attributes or the nature of the disease or illness, and without discrimination regardless of sex, race, creed, religion or socioeconomic status.
- Practice technology founded upon theoretical knowledge and concepts, utilize equipment and accessories consistent with the purposes for which they have been designed, and employ procedures and techniques appropriately.
- Assess situations, exercise care, discretion and judgment, assume responsibility for professional decisions, and act in the best interest of the patient.
- Act as an agent through observation and communication to obtain pertinent information for the physician to aide in the diagnosis and treatment management of the patient, and recognize that interpretation and diagnosis are outside the scope of practice for the profession.
- Utilize equipment and accessories, employ techniques and procedures, perform services in accordance with an accepted standard of practice, and demonstrate expertise in limiting the radiation exposure to the patient, self and other members of the health care team.
- Practice ethical conduct appropriate to the profession and protect the patient’s right to quality radiologic technology care.
- Respect confidences entrusted in the course of professional practice, respect the patient’s right to privacy, and reveal confidential information only as required by law or to protect the welfare of the individual or the community.
- Continually strive to improve knowledge and skills by participating in educational and professional activities, sharing knowledge with colleagues and investigating new and innovative aspects of professional practice.

MISSED EXAMINATIONS

Students will be allowed to make up tests; however, 10 points will be deducted for each class day a student fails to schedule and complete the examination. It is the student’s responsibility to schedule the retake with regards to the instructor’s schedule.

SUMMARY OF ASSIGNMENTS & ACTIVITIES

Item (Name)	Type	Description
Requirements for each rotation	Paperwork	Clinical
Requirements for semester	Paperwork	Clinical