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ABSTRACT

This document, which is intended for use by community and junior colleges throughout Mississippi, contains curriculum frameworks for the course sequences in the radiologic technology program. Presented in the introductory section are a description of the program and suggested course sequence. Section I lists baseline competencies for the program, and section II consists of outlines for each of the following courses in the sequence: clinical education I; fundamentals of radiography; principles of radiation protection; radiation exposure I; radiographic procedures I-II; clinical education II; radiation physics; radiation exposure II; clinical education III-IV; clinical imaging; radiographic procedures III; clinical education V; radiation biology; radiographic pathology; radiographic procedures IV; certification fundamentals; clinical education VI; and related academic courses in anatomy and physiology I and II. Each course outline contains some/all of the following: course name and abbreviation; course classification; course description; prerequisites; and competencies and suggested objectives. Recommended tools and equipment are listed in section III. Appended are lists of related academic topics and workplace skills for the 21st century and student competency profiles for both courses. (KC)

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Mississippi Curriculum Framework for

Medical Radiologic Technology

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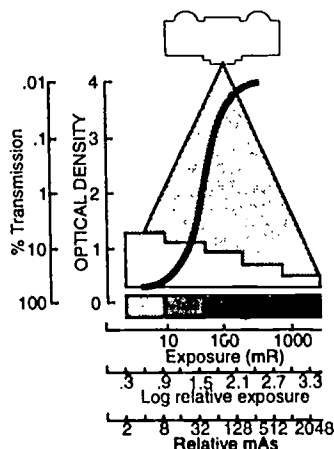
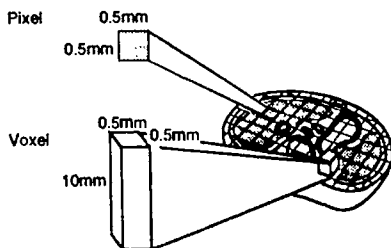
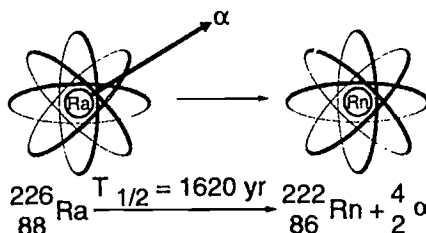
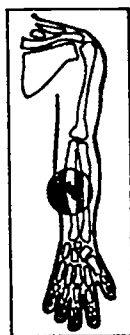
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MISSISSIPPI
CURRICULUM FRAMEWORK
FOR
MEDICAL RADIOLOGIC TECHNOLOGY
(Radiography)
(CIP: 51.0907 - Medical Radiologic Technology)

Direct inquiries to:

State Supervisor
Allied Health and Related Technology
Office of Vocational and Technical Education
P.O. Box 771
Jackson, MS 39205
(601) 359-3461

For copies of this publication, contact:

Research and Curriculum Unit
P.O. Drawer DX
Mississippi State, MS 39762
(601) 325-2510

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FOREWORD

In order to survive in today's global economy, businesses and industries have had to adopt new practices and procedures. Total quality management, statistical process control, participatory management, and other concepts of high performance work organizations are practices by which successful companies survive. Employers now expect their employees to be able to read, write, and communicate effectively; solve problems and make decisions; and interact with the technologies that are prevalent in today's workplace. Vocational-technical education programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflect these changes in the workplace and a number of other factors that impact on local vocational-technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U. S. Departments of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses which focus on the development of occupational competencies. Each vocational-technical course in this sequence has been written using a common format which includes the following components:

- Course Name - A common name that will be used by all community/junior colleges in reporting students.
- Course Abbreviation - A common abbreviation that will be used by all community/junior colleges in reporting students.
- Classification - Courses may be classified as:
 - Vocational-technical core - A required vocational-technical course for all students.
 - Vocational-technical elective - An elective vocational-technical course.
 - Related academic course - An academic course which provides academic skills and knowledge directly related to the program area.
 - Academic core - An academic course which is required as part of the requirements for an Associate degree.
- Description - A short narrative which includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester.

- o Prerequisites - A listing of any prerequisite courses that must be taken prior to or on enrollment in the course.
- o Competencies and Suggested Objectives - A listing of the competencies (major concepts and performances) and of the suggested student objectives that will enable students to demonstrate mastery of these competencies.

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- o The content of the courses in this document reflects approximately 75 percent of the time allocated to each course. For example, in a four semester hour course consisting of 30 hours lecture and 120 hours of laboratory activities, approximately 22 hours of lecture and 90 hours of lab should be taken by the competencies and suggested objectives identified in the course framework. The remaining 25 percent of each course should be developed at the local district level and may reflect:
 - Additional competencies and objectives within the course related to topics not found in the State framework, including activities related to specific needs of industries in the community college district.
 - Activities which develop a higher level of mastery on the existing competencies and suggested objectives.
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed/revised.
 - Activities which implement components of the Mississippi Tech Prep initiative, including integration of academic and vocational-technical skills and coursework, school-to-work transition activities, and articulation of secondary and postsecondary vocational-technical programs.
 - Individualized learning activities, including worksite learning activities, to better prepare individuals in the courses for their chosen occupational area.
- o Sequencing of the course within a program is left to the discretion of the local district. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.
- o Programs that offer an Associate of Applied Science degree must include a minimum 15 semester credit hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:

- 3 semester credit hours Math/Science Elective
- 3 semester credit hours Written Communications Elective
- 3 semester credit hours Oral Communications Elective
- 3 semester credit hours Humanities/Fine Arts Elective
- 3 semester credit hours Social/Behavioral Science Elective

It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and vocational-technical courses each semester. Each community/junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- In instances where secondary programs are directly related to community and junior college programs, competencies and suggested objectives from the high school programs are listed as Baseline Competencies. These competencies and objectives reflect skills and knowledge that are directly related to the community and junior college vocational-technical program. In adopting the curriculum framework, each community and junior college is asked to give assurances that:
 - students who can demonstrate mastery of the Baseline Competencies do not receive duplicate instruction, and
 - students who cannot demonstrate mastery of this content will be given the opportunity to do so.
- The roles of the Baseline Competencies are to:
 - Assist community/junior college personnel in developing articulation agreements with high schools, and
 - Ensure that all community and junior college courses provide a higher level of instruction than their secondary counterparts
- The Baseline Competencies may be taught as special "Introduction" courses for 3-6 semester hours of institutional credit which will not count toward Associate degree requirements. Community and junior colleges may choose to integrate the Baseline Competencies into ongoing courses in lieu of offering the "Introduction" courses or may offer the competencies through special projects or individualized instruction methods.
- Technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

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Review Team

Sandy Cochran, Jones County Junior College
William May, Itawamba Community College, Fulton
Alice Pyles, MS Delta Community College
Mary Trichell, Mississippi Gulf Coast Community College, Gautier
Laura Williams, Copiah-Lincoln Community College, Wesson
Darlene Withers, Meridian Community College, Meridian
Richard Simms, Jones County Junior College

RCU Staff

Darla Haines, Ph.D., Research and Curriculum Specialist

MDE Staff

Sandra Bates, R.N., State Supervisor, Allied Health and Related Technology

Reviewers

Educators:

Alice Pyles
Bill Mory
Rita Fraser
Nancy A. Adams
Laura C. Williams

Verma McFadden
Judy S. Lewis
Mary E. Trichell
Timothy Cockran

Donna Dyker
Arthur Beasley
Susan Brown
Darlene Withers

Practitioners:

Delna Ann Davegent
Carlion Meliorn
Laura Jennings
Guy M. Gussion
Kathy M. Smith
Brent Albritton
Billie Faye Sartie

Zandra S. Walker
Gary Lunsford
John Gardner
Cleve Roberts
James Smith
Kerry Huddleston
William Stegall

Pamela Sanford
Troy Gore
Kenny Byers
Elaine B. Nelson
Kay Bucks
Judy Davidson
James Smith

Technical Committee

Judy Stanford
June Cotton
Sarah C. Sawyer
Monica Stennis
Barbara Hayman

Lynette Miller
Sharon BurchMike
Higginbotham
Jim Tesar

Rebecca Champion
Linda Barrett
Sandra Freeman
Deborah Rogers

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MEDICAL RADIOLOGIC TECHNOLOGY (RADIOGRAPHY)

PROGRAM DESCRIPTION

Radiographers perform imaging examinations and accompanying responsibilities at the request of physicians qualified to prescribe and/or perform radiologic procedures. They utilize equipment emitting ionizing radiation, sound waves, or magnetic resonance images to produce radiographic images of the internal structures of human anatomy. These radiographic images are utilized by the physician to diagnose disease processes. The radiographer is responsible for all functions in the Radiology Department to insure consistent radiographic images and provide for personal and patient safety from radiation hazards. In addition to producing diagnostic images and primary patient care, other responsibilities may include administrative and educational functions.

Graduates of this program will be awarded an Associate of Applied Science Degree in Radiologic Technology and are eligible to make application to the American Registry of Radiologic Technology in order to become a Registered Radiographer.

MEDICAL RADIOLOGIC TECHNOLOGY (RADIOGRAPHY)

SUGGESTED COURSE SEQUENCE *

Baseline Competencies for Medical Radiologic Technology **

FIRST YEAR

3 sch Math/Natural Science Elective	3 sch Written Communications Elective
3 sch Anatomy and Physiology (BIO 1513)	3 sch Anatomy and Physiology (BIO 1523)
2 sch Clinical Education I (RGT 1112)	3 sch Radiographic Procedures II (RGT 1523)
3 sch Fundamentals of Radiography (RGT 1213)	3 sch Clinical Education II (RGT 1123)
2 sch Principles of Radiation Protection (RGT 1312)	2 sch Radiation Physics (RGT 1612)
3 sch Radiation Exposure I (RGT 1413)	4 sch Radiation Exposure II (RGT 1424)
3 sch Radiographic Procedures I (RGT 1513)	
<hr/>	<hr/>
19 sch	18 sch

SUMMER TERM (10-week)

9 sch Clinical Education III (RGT 1139)

SECOND YEAR

3 sch Social/Behavioral Science Elective	3 sch Oral Communications Elective
7 sch Clinical Education IV (RGT 2147)	7 sch Clinical Education V (RGT 2157)
3 sch Humanities/Fine Arts Elective	2 sch Radiation Biology (RGT 2912)
3 sch Clinical Imaging (RGT 2813)	2 sch Radiographic Pathology (RGT 2922)
3 sch Radiographic Procedures III (RGT 2533)	2 sch Radiographic Procedures IV (RGT 2542)
<hr/>	2 sch Certification Fundamentals (RGT 2932)
19 sch	<hr/>
	18 sch

SUMMER TERM (5-week)

5 sch Clinical Education VI (RGT 2165)

- * Students who lack entry level skills in math, English, science, etc., will be provided related studies.
- ** Baseline competencies are taken from the high school Allied Health program. Students who can document mastery of these competencies should not receive duplicated instruction. Students who cannot demonstrate mastery will be required to do so.

SECTION I:
BASELINE COMPETENCIES

BASELINE COMPETENCIES FOR POSTSECONDARY MEDICAL RADIOLOGIC TECHNOLOGY PROGRAMS

The following competencies and suggested objectives are taken from the publication *Mississippi Curriculum Framework for Secondary Allied Health*. These competencies and objectives represent the baseline for entrance into postsecondary Medical Radiologic Technology courses. Students enrolled in postsecondary courses should either (1) have documented mastery of these competencies, or (2) be provided with these competencies before studying the advanced competencies in the Medical Radiologic Technology program.

Baseline competencies may be integrated into existing courses in the curriculum or taught as special "Introduction" courses. The "Introduction" courses may be taught for up to six semester hours of institutional credit and may be divided into two courses. If the Baseline Competencies are to be taught as "Introduction" courses, each course should be at least 3 credit hours. The following course number(s) and description should be used:

Course Name(s): Introduction to Medical Radiologic Technology, Introduction to Medical Radiologic Technology I, or Introduction to Medical Radiologic Technology II

Course Abbreviation(s): RTG 100(3-6), RTG 1013, RTG 1023

Classification: Vocational-Technical Core

Description: These courses contain the baseline competencies and suggested objectives from the high school Allied Health curriculum which directly relate to the community college Medical Radiologic Technology program. The courses are designed for students entering the community college who have had no previous training or documented experience in the field. (3-6 semester hours based upon existing skills for each student. May be divided into 2 courses for a maximum total of 6 hours of institutional credit.)

Competencies and Suggested Objectives:

1. Review material related to course and professional organizations.
 - a. Identify student and course expectations.
 - b. Demonstrate effective teamwork skills.

Related Academic Topics (See Appendix A): C1, C6

Workplace Skills (See Appendix B): WP2

2. Apply communications in health care.
 - a. Utilize effective communication skills.
Related Academic Topics (See Appendix A): C1, C6
Workplace Skills (See Appendix B): WP2, WP3
3. Develop individual career awareness in the health care industry.
 - a. Describe careers in health care administration
 - b. Describe careers in the therapeutic area.
Related Academic Topics (See Appendix A): C1, C6
Workplace Skills (See Appendix B): WP2
4. Explain professional ethics and legal responsibility.
 - a. Explain professional ethics and legal responsibility including negligence, malpractice, and health occupation code of conduct.
 - b. Define confidentiality.
Related Academic Topics (See Appendix A): C1, C4, C6
Workplace Skills (See Appendix B): WP2, WP3
5. Explain client's rights.
 - a. Identify ways to promote client's rights and privacy.
 - b. Respect client.
Related Academic Topics (See Appendix A): C1, C6
Workplace Skills (See Appendix B): WP3
6. Utilize universal precautions.
 - a. Explain importance of universal precautions in life practices and health care.
 - b. Explain the state and federal government's role in universal precautions.
 - c. Relate universal precautions to the transmission of infectious diseases including HIV, AIDS, and HBV, and TB.
 - d. Demonstrate hand-washing technique.
 - e. Demonstrate donning and removing clean gloves.
Related Academic Topics (See Appendix A): C1, C4, C6, S8
Workplace Skills (See Appendix B): WP2
7. Recognize safety procedures and policies.
 - a. Describe basic safety procedures.
 - b. Describe accident prevention methods and disaster plans.
 - c. Follow facility policies.
Related Academic Topics (See Appendix A): C1, C4, C6, S8
Workplace Skills (See Appendix B): WP2
8. Perform basic safety procedures.
 - a. Assist with basic emergency procedures to include falls, seizures, and fainting.
 - b. Attain Class C certification in cardiopulmonary resuscitation.
 - c. Demonstrate body mechanics.
Related Academic Topics (See Appendix A): C1, C4, C6, S8
Workplace Skills (See Appendix B): WP2, WP6

9. Recognize and use medical terminology.
- Demonstrate the use of medical references to spell medical terms correctly.
 - Spell designated medical terms correctly.
 - Define and divide medical terms into root words, prefixes, and suffixes.
 - Interpret the common medical abbreviations and symbols including meanings and uses.
 - Demonstrate the use of medical terms and abbreviations in reading, speaking, interpreting, and writing simulated medical records.
- Related Academic Topics (See Appendix A): C1, C4, C5, C6, S1, S8*
Workplace Skills (See Appendix B): WP2, WP4
10. Recognize the structure and functions of each organ system and apply related basic skills.
- Interpret the basic organization of the body.
 - Interpret the basic structures and functions of the integumentary system.
 - Interpret the basic structures and functions of the musculoskeletal system.
 - Interpret the basic structures and functions of the circulatory system.
 - Interpret the basic structures and functions of the respiratory system.
 - Interpret the basic structures and functions of the digestive system.
 - Interpret the basic structures and functions of the urinary system.
 - Interpret the basic structures and functions of the nervous system.
 - Interpret the basic structures and functions of the sensory system.
 - Interpret the basic structures and functions of the reproductive system.
 - Interpret the basic structures and functions of the endocrine system.
- Related Academic Topics (See Appendix A): C1, C2, C5, C6, M4, S1, S8*
Workplace Skills (See Appendix B): WP2, WP3, WP4
11. Develop patient contact care skills by utilizing medical terminology and basic skills in a health care setting.
- Demonstrate how to don and remove sterile gloves using sterile technique.
 - Demonstrate how to open sterile packages without contaminating contents using sterile technique.
 - Demonstrate donning and removing isolation mask, eye shields, cap, gown, goggles, and cover shoes according to health care facility policy.
 - Demonstrate double bagging technique and isolation technique according to health care facility policy.
 - Define three general principles of isolation, three purposes of isolation, and five types of isolation according to CDC/OSHA guidelines.
- Related Academic Topics (See Appendix A): C1, C2, C4, C6, M4, S1, S8*
Workplace Skills (See Appendix B): WP2, WP3, WP6

12. Assess diagnostic and laboratory health careers by utilizing medical terminology and basic skills in exploring specific diagnostic and laboratory health careers.
- a. Describe careers available in the radiologic technology field including personal qualities, education requirements, responsibilities, and credentials.
 - b. Identify radiologic equipment including fluoroscopic, computerized, and radiographic apparatus.
 - c. Interpret radiation safety knowledge and techniques according to health facility guidelines.
 - d. Identify radiographs found in radiology departments.

Related Academic Topics (See Appendix A): C1, C4, C6, M1, M4, S1, S8
Workplace Skills (See Appendix B): WP2, WP3, WP6

13. Demonstrate job seeking and job keeping skills.
- a. Prepare a resume containing essential information.
 - b. Complete a job application form.
 - c. Explain procedures for job interviews.
 - d. Demonstrate the role of an applicant in a job interview.
 - e. Describe job interview etiquette.
 - f. Maintain positive relations with clients and peers.
 - g. Demonstrate job keeping skills.

Related Academic Topics (See Appendix A): C1, C4, C6
Workplace Skills (See Appendix B): WP2, WP3

SECTION II:
CURRICULUM GUIDE
FOR
MEDICAL RADIOLOGIC TECHNOLOGY

MEDICAL RADIOLOGIC TECHNOLOGY COURSES

Course Name: Clinical Education I

Course Abbreviation: RGT 1112

Classification: Vocational-Technical Core

Description: This course includes clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (2 sch: 6 hr. clinical)

Prerequisites: All core courses as scheduled. CPR-C must be completed before Clinical I experience begins.

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program levels.
 - a. Provide for basic patient care and comfort and anticipate the patient's needs.
 - b. Provide appropriate patient education.
 - c. Apply radiation protection principles.
 - d. Discuss basic x-ray production and interactions.
 - e. Operate medical imaging equipment and accessory devices.
 - f. Position the patient and medical imaging system to perform examinations and procedures.
 - g. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.
 - h. Apply knowledge of human structure, function, and pathology.
 - i. Apply knowledge and skills relating to quality assurance activities.
 - j. Evaluate the performance of medical imaging systems.
 - k. Evaluate medical images for technical quality.
 - l. Apply knowledge and skills relating to recording medical image processing.
 - m. Operate equipment within safety limits.
 - n. Recognize equipment malfunctions and report them to the proper authority.
 - o. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - p. Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - q. Practice universal precautions at all times.

Related Academic Topics (See Appendix A): C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

2. Perform clinical application skills for radiographic procedures.
 - a. Practice routine radiographic procedures including:
 - (1) Chest
 - (2) Abdomen
 - (3) Upper extremities to include shoulder girdle
 - (4) Digestive system
 - (5) Urinary system

Related Academic Topics (See Appendix A): C6, S1, S8

Workplace Skills (See Appendix B): WP3, WP6

3. Demonstrate tasks associated with radiographic procedures.
 - a. Evaluate physician's orders and radiography requests.
 - b. Verify patient identification.
 - c. Prepare radiographic room.
 - d. Manipulate radiographic equipment.
 - e. Demonstrate patient transport techniques.
 - f. Identify accessory equipment.
 - g. Process radiographs.
 - h. Follow line structure organization within departments/institutions.
 - i. Apply basic radiation protection.
 - j. Demonstrate effective communication skills.

Related Academic Topics (See Appendix A): C3, C4, C5

Workplace Skills (See Appendix B): WP3, WP6

Course Name: Fundamentals of Radiography

Course Abbreviation: RGT 1213

Classification: Vocational-Technical Core

Description: This course is an introduction to Radiologic Technology including professional, departmental, and historical aspects. Included are terminology, medical ethics, and legal concerns. Patient care procedures related to radiographic exams, body mechanics, emergency procedures for drug reactions and injured and critical care patients, and basic CPR techniques are also covered. (3 sch: 3 hr. lecture)

Prerequisites: None

Competencies and Suggested Objectives:

1. Describe the role, organization, and structure of the program, radiology department, hospital, and profession.
 - a. State the rules and regulations of the educational program regarding class attendance, grading, vacation/sick leave, and the appeals procedure.
 - b. Define the Essentials and Guidelines of an Accredited Educational Program for the Radiographer and state its purpose.
 - c. Discuss the departmental and hospital rules and regulations which directly and indirectly affect students.
 - d. List the major duties and responsibilities of a radiography student.
 - e. Identify basic radiation safety procedures for staff and patients.
 - f. State the procedure for monitoring occupational exposed individuals.
 - g. State the policies concerning communicable disease and pregnancy for enrolled students.
 - h. Identify other health science professions which impact on the total health care provided to radiology patients.
 - i. Describe the relationship of these health care workers to the integrated care of patients.
 - j. Discuss the philosophy and mission of the hospital.
 - k. Identify key administrative personnel and discuss their relationship with the radiology department.
 - l. Describe relationships and interdependencies of departments within the hospital.
 - m. Identify key personnel and discuss their function in the radiology department.
 - n. Explain patient services available in the radiology department.
 - o. Discuss the educational programs in the radiology department.

- p. Define accreditation, credentialing, certification, licensure, and regulations.
- q. Describe how the JRCERT Essentials and Guidelines of an Accredited Educational Program for the Radiographer relate to the educational program.
- r. Explain the difference between the accreditation and credentialing processes, and identify agencies involved in each process.
- s. Describe purposes, functions, and activities of professional organizations.
- t. Identify international, national, state, and local organizations for the radiographer.
- u. Discuss the general employment outlook and economic return for the graduate radiographer.
- v. Discuss career advancement and opportunities for the radiographer.
- w. Identify the benefits of continuing education as related to improved patient care and professional enhancement.

Related Academic Topics (See Appendix A): C1
Workplace Skills (See Appendix B): WP2

- 2. Assess and resolve ethical issues and dilemmas in health care.
 - a. Identify and appreciate specialized standards of behavior for the healing arts as a continuum, with historical and philosophical roots in the earliest periods of human history.
 - b. Define and describe the major milestones in the development of codes of behavior and ethical standards in the healing arts.
 - c. Identify and appreciate the significance of health professions.
 - d. Recognize identifying features of various health disciplines.
 - e. Reflect upon and reinforce the personal choice of a health profession career by contact with peers and mentors during this course.
 - f. Recognize ethics as a branch of philosophy, and the moral, social, and cultural basis of the development of an ethic.
 - g. Discuss medical/professional ethics in the context of a broader societal ethic.
 - h. Explore, reflect upon, and appreciate ethics as a "search for ideal behavior" as a dynamic process and an ongoing perfection of behavior; not a fixed set of rules.
 - i. Subscribe to the central role of ethical behavior in health care delivery.
 - j. Advocate the development of moral reasoning, current theories of same in a psychological/educational context, and explore their personal stage of development in this regard.
 - k. Differentiate between empathetic rapport and sympathetic involvement in relationships with patients and relate these to ethical conduct.
 - l. Identify and rationalize concepts of personal honesty, integrity, accountability, competence, and compassion as ethical imperatives in health care.

- m. Identify legal/professional standards and their relationship to practice in health professions.
- n. Identify and describe accepted "codes" or "guidelines" for professional ethics in a chosen health profession, and those elements therein that are similar to other health professions, and those unique to their respective disciplines.
- o. Recognize and identify situations and conditions which give rise to ethical dilemmas in health care.
- p. Identify and employ a basic system of examination, clarification, determination of alternatives, and decision making in ethical questions.
- q. 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 rights.
- r. Identify, discuss, and define the legal implications of professional liability, malpractice, professional negligence/carelessness, and other legal doctrines applicable to professional practice.
- s. Identify, discuss, and appreciate the significance of accurate, complete, and correct methods of medical record-keeping as a legal/ethical imperative.
- t. In groups and individually, explore, discuss, and articulate responses to theoretical situations and questions relating to the ethics of care and health care delivery.

Related Academic Topics (See Appendix A): C1, C3, C5

Workplace Skills (See Appendix B): WP2

- 3. Identify legal responsibilities as they relate to the appropriate scope of practice.
 - a. Define the following terms:
 - (1) Direct professional liability
 - (2) Indirect professional liability
 - (3) Gross negligence
 - (4) Contributory negligence
 - (5) Standard of care
 - (6) Negligence
 - b. Define the following terms:
 - (1) Libel/slander
 - (2) Assault/battery
 - (3) False imprisonment
 - (4) Invasion of privacy
 - (5) Breach of confidentiality
 - c. Discuss the elements necessary for valid malpractice claim.
 - d. Define and discuss the doctrines of:
 - (1) Vicarious liability
 - (2) Borrowed servant

- (3) Respondeat superior
 - (4) Res ipsa loquitur
 - e. Discuss the ASRT Scope of Practice for the radiographer and describe the elements that comprise it.
 - f. Discuss the limits of responsibility for the radiographer as defined by the Scope of Practice.
 - g. Differentiate between professional and legal standards and describe how each relates to radiography practice.
 - h. Discuss institutional and professional liability protection typically available to the radiographer.
 - i. Define informed consent.
 - j. Describe the elements necessary for informed consent.
 - k. Discuss standards for disclosure relative to informed consent.
 - l. Describe how consent forms are utilized in relation to specific radiographic procedures.
 - m. Discuss how consent forms are used in legal action.
- Related Academic Topics (See Appendix A): C1, C6*
Workplace Skills (See Appendix B): WP2, WP3
4. Define, spell, and pronounce medical terms.
- a. List the primary and secondary language sources from which medical terms are derived.
 - b. Give examples of medical terms from both the primary and secondary sources.
 - c. Operate and define medical terms according to basic elements.
 - d. Change medical terms given in noun and verb forms to adjective and/or adverb forms.
 - e. Analyze medical terms that combine prefixes and suffixes with other work elements.
 - f. Select medical terms used in radiology from a given list.
 - g. Translate medical terms into a language the patient can understand.
 - h. Correctly pronounce medical terms.
 - i. State definitions for each abbreviation from a given list.
 - j. State definitions for each symbol from a given list.
 - k. Translate medical orders which include abbreviations and symbols into non-medical language.
 - l. Describe the procedures to be performed using radiographic orders.
 - m. Translate diagnostic reports into a language the patient can understand.
 - n. Describe procedures and processes necessary to respond to requested services using a request for diagnostic imaging consult/services.
 - o. Define the term/procedure given specific diagnostic imaging terms/procedures.
 - p. Identify and locate the places where procedures are performed when given specific diagnostic imaging terms.
 - q. Define the term of abbreviation using operational and management terms.

- r. Describe the implications for effective provision of radiological services when given example scenarios utilizing operation and management terms and abbreviations.
- s. Relate operational and management terminology to customers/client/patient satisfaction.

Related Academic Topics (See Appendix A): C1, C6, S1
Workplace Skills (See Appendix B): WP2, WP3

- 5. Employ interpersonal skills to alleviate patient fears and promote a professional environment.
 - a. Discuss the responsibilities of the health care facility.
 - b. Discuss the responsibilities of the radiographer.
 - c. Discuss the Scope of Practice for the radiographer.
 - d. Discuss the perceptions of death and dying from patient and technologist viewpoints.
 - e. Discuss ethical, emotional, personal, and physical aspects of death.
 - f. List the stages of dying and describe the characteristics of each stage.
 - g. Identify the support mechanisms available to the terminally ill.
 - h. Describe methods of determining the proper patient identification.
 - i. Explain the use of:
 - (1) Audio and visual communication systems
 - (2) Immobilization devices
 - (3) Machine type
 - (4) Auxiliary equipment
 - j. Alleviate fears by explaining:
 - (1) Positioning for examination
 - (2) Length of procedure
 - (3) Room noises
 - (4) Machine movement
 - (5) Machine/patient contact
 - k. Interact with patient family members and/or friends using case studies.

Related Academic Topics (See Appendix A): C3, C6
Workplace Skills (See Appendix B): WP2, WP3

- 6. Employ patient transfer skills.
 - a. Describe and demonstrate good principles of body mechanics applicable to patient care.
 - b. Demonstrate techniques for various types of patient transfer.
 - c. Describe and demonstrate the procedures for turning patients with various conditions.
 - d. Describe and demonstrate restraint techniques for various types of procedures and patient conditions.
 - e. Describe the aspect of patient comfort, and discuss the importance of each to the care and safety of the patient.
 - f. Discuss various aspects of general patient care given specific patient considerations and conditions.

- g. Discuss procedures for assuring security of property of inpatients and outpatients.

Related Academic Topics (See Appendix A): C4, C6, S8

Workplace Skills (See Appendix B): WP3

7. Evaluate physical needs.

- a. Describe methods for evaluation of patient status.
- b. Identify the information to be collected prior to patient examination.
- c. Describe vital signs used to assess patient condition.
- d. Convert a Fahrenheit measurement to a Celsius measurement.
- e. State the normal temperature values for the oral and rectal methods of measurement for temperature.
- f. Describe the method of monitoring respirations and state the normal values expected.
- g. List the equipment necessary for acquisition of the blood pressure on a patient.
- h. Identify the normal values for blood pressure for males and females.
- i. Identify the seven major sites for monitoring the pulse and indicate the normal values.
- j. Demonstrate the assessment of vital signs.

Related Academic Topics (See Appendix A): C1, C6, M4

Workplace Skills (See Appendix B): WP2

8. Describe infection control precautions.

- a. Define each of the following:
 - (1) Infectious pathogens
 - (2) Communicable diseases
 - (3) Nosocomial infections
 - (4) Centers for Disease Control and Prevention (CDC)
 - (5) Human Immunodeficiency Virus (HIV)
 - (6) Hepatitis B Virus (HBV)
- b. Describe the utilization of Universal Precautions and Isolation Procedures.
- c. Describe sources and modes of transmission of infections and diseases.
- d. Describe institutional/departmental procedures for infection control through Universal Precautions.
- e. Discuss psychological considerations for the management of patients utilizing Universal Precautions.

Related Academic Topics (See Appendix A): C1, S2

Workplace Skills (See Appendix B): WP2, WP3

9. Recognize and employ appropriate responses to acute situations and medical emergencies.

- a. Identify symptoms which manifest the following emergencies:
 - (1) Cardiac arrest
 - (2) Shock
 - (3) Convulsion/seizure
 - (4) Hemorrhage

- (5) Apnea
- (6) Vomiting
- (7) Aspiration
- (8) Suspected/confirmed fractures
- (9) Diabetic coma/insulin shock
- b. Describe the emergency medical code system for the institution and discuss the role of the student in this procedure.
- c. Demonstrate CPR competency on a CPR mannequin.
- d. Discuss acute care procedures for the above emergencies.
- e. Discuss the use of medical emergency equipment and supplies.
- f. Demonstrate the use of oxygen and suction equipment using simulations.
- g. Demonstrate basic first aid techniques using simulations.
- h. List the special considerations necessary when performing radiologic procedures on an infant or a child.
- i. List the special considerations necessary when performing radiographic procedures on a geriatric patient.
- j. List the symptoms of a patient with a head injury.
- k. List the precautions to be taken when working with a patient with a head injury.
- l. List the symptoms of a patient with a spinal injury.
- m. List the precautions to be taken when working with a patient with a spinal injury.
- n. List the symptoms of a patient with an upper and/or lower extremity fracture.
- o. List the precautions to be taken when working with a patient with an upper and/or lower extremity fracture.
- p. List the symptoms of a patient with massive wounds.
- q. List the precautions to be taken when working with a patient with massive wounds.
- r. List the symptoms of a patient with burns.
- s. List the precautions to be taken when working with a patient with burns.
- t. List the signs and symptoms of a patient having a reaction to contrast media.
- u. Describe the medical intervention for a patient having a reaction to contrast media.

Related Academic Topics (See Appendix A): C1, C3, S1, S8

Workplace Skills (See Appendix B): WP3

10. Respond to patient needs in special situations.
- a. Explain the role of the technologist in patient education.
 - b. Describe the different types of patient preparation for barium studies.
 - c. Describe the procedure to properly prepare a patient for a barium study.
 - d. Describe the purpose for using contrast agents.
 - e. Differentiate between positive and negative contrast agents.

- f. Describe the purpose of performing an upper and lower gastrointestinal study.
- g. Describe the post-examination care required for patients who have undergone an upper or lower gastrointestinal study.
- h. Explain the indication and procedure when given specific tube management situations (nasogastric, suction, tracheostomy, chest tube, tissue drains, oxygen administration, urinary collection, and other ostomies).
- i. Identify the precautions involved when given specific tube management situations (nasogastric, suction, tracheostomy, chest tube, tissue drains, oxygen administration, urinary collection, and other ostomies).
- j. Identify the steps in the operation and maintenance of suction equipment.
- k. Determine a normal EKG pattern from an abnormal pattern, given an EKG strip.
- l. Identify the patient education, patient care, drug administration, and special precautions for a patient undergoing:
 - (1) Myelography
 - (2) Computerized tomography
 - (3) Urography
 - (4) Cardiovascular-interventional procedures
 - (5) Magnetic resonance imaging
 - (6) Ultrasound
- m. Demonstrate the appropriate procedure for gathering information prior to performing a bedside radiographic examination.
- n. List three situations in which bedside radiography may be preferable to examination in the radiology department.
- o. List four important factors to be noted during initial survey prior to radiography in the intensive care unit.
- p. Describe the initial steps in performing a bedside radiograph.
- q. Describe the special precautions to be used when performing a radiograph on a premature infant.
- r. Explain the procedure for placing a cassette under a patient in an orthopedic bed frame.
- s. Describe the special problems faced in performing radiographs on patients with:
 - (1) Tracheostomy
 - (2) Nasogastric tubes
 - (3) Chest drainage tubes
 - (4) Swan-Ganz catheters
- t. Describe the procedure for taking radiographs in the surgical suite.
- u. Discuss the appropriate radiation protection required when doing bedside/surgical radiography.

Related Academic Topics (See Appendix A): C3, C6, S8

Workplace Skills (See Appendix B): WP3, WP6

11. Formulate methods for patient education and health promotion.
 - a. Define communication.
 - b. Identify methods of communication and discuss how each can be utilized in patient education.
 - c. Identify patient communication problems and discuss how each can be overcome to provide patient education.
 - d. Demonstrate explanations of radiographic examinations when given clinical simulations (i.e., chest, UGI, extremity, etc.).
 - e. Demonstrate explanations for patients with various communication problems (hearing, vision and speech problems, impaired mental function, altered states of consciousness, cultural diversity, patients who do not speak English, etc.) using clinical simulations.
 - f. Discuss radiation safety and protection questions patients might ask in connection with radiologic examinations, and discuss the radiographer's response to each.
 - g. Analyze the moods, expectations, and perceptions of the technologist-patient relationship when given specific patient conditions and profiles.
 - h. Define tertiary disease prevention.
 - i. Describe available sources for patient education materials.
 - j. Define secondary disease prevention.
 - k. State the importance of the following:
 - (1) Breast self-exam
 - (2) Testicular self-exam
 - (3) Skin self-exam
 - (4) Mammography
 - (5) Physical examinations
 - (6) Pelvic examinations
 - (7) Colorectal examinations
 - l. Describe the correlation of family history to:
 - (1) Breast cancer
 - (2) Testicular cancer
 - (3) Colorectal cancer

Related Academic Topics (See Appendix A): C3, C5, S8

Workplace Skills (See Appendix B): WP6

12. Recognize substance abuse.
 - a. Define chemical dependence and differentiate among terms used to describe aspects of this illness.
 - b. Discuss specific signs and symptoms of those suffering from chemical dependence and identify specific strategies used in treating this illness.

Related Academic Topics (See Appendix A): C3, C4

Workplace Skills (See Appendix B): WP6

Course Name: Principles of Radiation Protection

Course Abbreviation: RGT 1312

Classification: Vocational-Technical Core

Description: This course is a study of the effects of ionizing radiation, principles of patient and personnel protection, and personnel monitoring. (2 sch: 2 hr. lecture)

Prerequisite: None

Competencies and Suggested Objectives:

1. Examine concepts involved in an effective radiation protection program.
 - a. Identify and justify the need to minimize unproductive radiation exposure of humans.
 - b. Define and distinguish between somatic and genetic radiation effects (immediate and latent) and provide examples of each.
 - c. Differentiate between the stochastic and non-stochastic effects of radiation exposure and provide examples of each.
 - d. List the objectives of a radiation protection program and demonstrate the ability to document the same.
 - e. Identify effective dose equivalent limits for occupational and nonoccupational radiation exposure.
 - f. Identify the acronym "ALARA" and describe the concept (optimization).
 - g. Identify the basis for occupational exposure limits: comparable risk.
 - h. Describe the concept of negligible individual risk level (NIRL).
 - i. Identify ionizing radiations from natural and man-made sources and list their approximate dose equivalent contribution.
 - j. Identify legal and ethical radiation protection responsibilities of radiation workers.

Related Academic Topics (See Appendix A): C1, S8

Workplace Skills (See Appendix B): WP3, WP6

2. Discuss the methods of detection and measurement of ionizing radiation.
 - a. Identify and define units of radiation for exposure, absorbed dose, dose equivalent, and radioactivity.
 - b. Define and describe the interrelationship between relative biological effectiveness and quality factors.
 - c. Describe how the quality factor is used to determine dose equivalent.
 - d. State why the Sievert is the appropriate unit for radiation protection work.
 - e. Describe the theory and operation of the following radiation detection devices: (1) ion-chambers, (2) proportional counters, and (3) thermoluminescent dosimeters (TLD's).

- f. List appropriate applications and limitations for each radiation detection device above.
- g. Define units of radiation measurement and provide an example of radiology application.

Related Academic Topics (See Appendix A): C1, M3, M6

Workplace Skills (See Appendix B): WP2

- 3. Review radiation surveys and regulatory agency regulations.
 - a. State when a radiation protection survey should be conducted.
 - b. Identify who should conduct the survey.
 - c. Describe the conditions under which radiation protection surveys of equipment are made.
 - d. Identify various performance standards for beam directing, beam defining and beam limiting devices which are evaluated in a radiation protection equipment survey of the following:
 - (1) radiographic equipment
 - (2) fluoroscopic equipment
 - e. Describe procedures used to verify performance standards for equipment in objective #3d.
 - f. Describe the operation of various interlocking systems for equipment in objective #3d, and indicate potential consequences of interlock system failure.
 - g. List conditions and locations evaluated in an area survey for radiation protection.
 - h. Distinguish between controlled and non-controlled areas and list acceptable exposure levels.
 - i. Describe "RADIATION AREA" signs and identify appropriate placement sites.
 - j. Identify the functions of the following agencies:
 - (1) International Council on Radiation Protection and Measurements (ICRP)
 - (2) National Council on Radiation Protection and Measurements (NCRP)
 - (3) Nuclear Regulatory Commission (NRC)
 - k. Discuss the Consumer-Patient Radiation Health and Safety Act of 1981.
 - l. Describe the function of various state and local regulations governing radiation protection practices.
 - m. Describe the requirements and responsibilities for a radiation protection officer.

Related Academic Topics (See Appendix A): C1, C2, C6

Workplace Skills (See Appendix B): WP2

- 4. Identify occupational exposure limits and methods of personnel monitoring.
 - a. Identify the need and importance of personnel monitoring for radiation workers.

- b. Identify and describe the following monitoring devices:
 - (1) Body badge, ring badge
 - (2) Thermoluminescent dosimeters (TLD's)
 - (3) Pocket ionization chambers
- c. List applications, advantages, and limitations for each device in objective #4b.
- d. Interpret personnel monitoring reports.
- e. List values for maximum permissible dose equivalent limits for occupational radiation exposures (annual and lifetime).
- f. Identify those structures which are considered critical for potential late effects for whole body irradiation exposure.
- g. Identify dose equivalent limits for embryo and fetus in occupationally exposed women.
- h. State the age proration formula for the determination of a maximum accumulated dose equivalent.

Related Academic Topics (See Appendix A): C1, S8

Workplace Skills (See Appendix B): WP2

5. Analyze components of an effective patient protection program.
 - a. Explain the relationship of beam limiting devices to patient radiation protection.
 - b. Discuss added and inherent filtration in terms of the effect on patient dosage.
 - c. Explain the purpose and importance of patient shielding.
 - d. Correlate the method of shielding to the radiographic procedure using a list of patient shielding devices and radiographic procedures.
 - e. Explain the ten day rule and its application to female patients of childbearing age.
 - f. Explain the relationship of exposure factors to patient dosage.
 - g. Discuss various photon interactions in terms of description of interaction, relation to atomic number, and applications.
 - h. Define photodisintegration.
 - i. State the desired film/screen combination that will result in an optimum diagnostic image with the minimum radiation exposure to the patient using a list of various radiographic procedures.
 - j. Discuss methods to avoid repeat radiographs.
 - k. Discuss the importance of clear, concise instructions (effective communication skills) as a method of radiation protection.
 - l. Discuss the effect(s) of immobilization techniques to eliminate voluntary motion.
 - m. Describe the minimum source-to-tabletop distances for fixed and mobile fluoroscopes.

- n. Discuss safety factors for the patient (and other patients) in the room during mobile radiographic procedures.

Related Academic Topics (See Appendix A): C1, C6, M6

Workplace Skills (See Appendix B): WP2

- 6. Utilize concepts of practical radiation protection.
 - a. Identify barrier materials and their use in specific x-ray installations.
 - b. Distinguish between primary and secondary barriers.
 - c. Describe how the following factors influence the design of x-ray installations:
 - (1) Use (U)
 - (2) Workload (W)
 - (3) Occupancy (T)
 - (4) Distance (d)
 - (5) Material
 - d. Describe how the operation of various ancillary equipment influences radiation safety and describe the potential consequences of failure of this equipment.
 - e. Describe how the operation of various x-ray equipment influences radiation safety and describe the potential of failure of th's equipment.
 - f. Identify who should evaluate the ancillary and x-ray equipment, indicate the frequency with which these evaluations should be made, and indicate how this is related to the Q.A. Program for radiation safety.
 - g. Demonstrate how time, distance, and shielding can be manipulated to keep radiation exposure to a minimum.
 - h. Perform calculations of exposure with varying time, distance, and shielding.
 - i. Discuss the relationship between half-value layer and shielding design.
 - j. Identify emergency procedures to be followed during failures of x-ray mechanisms.

Related Academic Topics (See Appendix A): C1, M3, S8

Workplace Skills (See Appendix B): WP2

Course Name: Radiation Exposure I

Course Abbreviation: RGT 1413

Classification: Vocational-Technical Core

Description: This course is a study of the principles involving manipulation of factors controlling and influencing exposure and radiographic quality. Included are the prime factors of radiographic exposure. Basic technical conversions, problem solving procedures, and the production and nature of x-rays are addressed. (3 sch: 2 hr. lecture, 2 hr. lab)

Pre/Corequisite: Math/Natural Science Elective

Competencies and Suggested Objectives:

1. Describe x-ray production and identify properties of x-rays as related to exposure and measurement of radiation.
 - a. State the principles of x-ray production.
 - b. Compare the production of bremsstrahlung with the production of characteristic radiations.
 - c. Describe the conditions necessary to produce x-radiation.
 - d. Describe the nature of light.
 - e. Define and describe wavelength and frequency, and how they are related to velocity.
 - f. Describe the electromagnetic spectrum.
 - g. Explain the relationship of energy and frequency to Planck's Constant.

Related Academic Topics (See Appendix A): C1, S6
Workplace Skills (See Appendix B): WP2
2. Analyze exposure factors to achieve optimum radiographic quality.
 - a. Discuss practical considerations in setting imaging standards.
 - b. Discuss acceptance limits.

Related Academic Topics (See Appendix A): C1, M3
Workplace Skills (See Appendix B): WP2
3. Determine exposure factors to achieve optimum radiographic density with a minimum radiation exposure to the patient.
 - a. Define radiographic density.
 - b. Identify the acceptable range of radiographic density.
 - c. Analyze relationships of factors affecting radiographic density.

Related Academic Topics (See Appendix A): C1, M4
Workplace Skills (See Appendix B): WP2

4. Determine exposure factors to achieve optimum radiographic contrast with a minimum radiation exposure to the patient.
 - a. Define radiographic contrast.
 - b. Differentiate between subject contrast and film contrast.
 - c. Analyze relationships of factors affecting radiographic contrast.

Related Academic Topics (See Appendix A): C1, C4
Workplace Skills (See Appendix B): WP2
5. Determine exposure factors to achieve optimum radiographic detail with a minimum radiation exposure to the patient.
 - a. Define recorded detail.
 - b. Differentiate between umbra and penumbra.
 - c. Analyze relationships of factors affecting recorded detail.

Related Academic Topics (See Appendix A): C1, M3
Workplace Skills (See Appendix B): WP2
6. Determine exposure factors to achieve appropriate radiographic distortion with a minimum radiation exposure to the patient.
 - a. Define distortion.
 - b. Differentiate between shape distortion and size distortion.
 - c. Analyze relationships of factors affecting distortion.

Related Academic Topics (See Appendix A): C1, M4
Workplace Skills (See Appendix B): WP2
7. Determine exposure factors to achieve optimum exposure latitude with a minimum of radiation exposure to the patient.
 - a. Define exposure latitude.
 - b. Analyze relationships of factors affecting exposure latitude.

Related Academic Topics (See Appendix A): C1, C2, M4
Workplace Skills (See Appendix B): WP2

Course Name: Radiographic Procedures I

Course Abbreviation: RGT 1513

Classification: Vocational-Technical Core

Description: This course includes terminology, principles, and procedures involved in routine radiographic positioning for demonstration of the chest, abdomen, upper extremities, digestive system, and urinary system. Included is a review of radiographic anatomy on each procedure. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisite: None

Competencies and Suggested Objectives:

1. Identify basic radiographic positioning skills.
 - a. Define the following radiographic terms:
 - (1) View
 - (2) Position
 - (3) Projection
 - b. Define various terms of position.
 - c. Describe various positioning aids and discuss the application and advantages/disadvantages of each.
 - d. Describe various accessory equipment and discuss each in terms of function and application.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

2. Discuss general procedural considerations for radiographic examinations.
 - a. Discuss general considerations for radiographic procedures.
 - b. Explain the general considerations involved in various radiographic procedures using clinical simulations .
 - c. Demonstrate general considerations involved with various radiographic procedures through role playing.
 - d. Discuss positioning considerations for radiographic procedures.
 - e. Explain the positioning considerations involved for various radiographic procedures given clinical simulations.
 - f. Demonstrate positioning considerations involved with various radiographic procedures through role playing.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP3

3. Identify positioning considerations for routine radiographic procedures.
 - a. Describe routine and special views of the abdominal cavity in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.

- b. Label parts of the abdomen using diagrams including:
 - (1) Abdominal regions
 - (2) Abdominal quadrants
 - c. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved for routine and special views of the abdominal cavity given clinical simulations.
 - d. Perform radiographic procedures related to the abdominal cavity in a laboratory environment.
 - e. Evaluate given radiographs of body cavities in terms of positioning accuracy and image quality.
 - f. Describe routine and special views of the skeletal system relating to the upper extremities in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.
 - g. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations given clinical simulations for routine and special views of the skeletal system relating to the upper extremities and shoulder girdle.
 - h. In a laboratory environment, perform radiographic procedures of the skeletal system relating to the upper extremities.
 - i. Evaluate radiographs of various parts of the skeletal system relating to the upper extremities in terms of positioning accuracy and image quality.
 - j. Describe routine and special views of the respiratory system in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.
 - k. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved for routine and special views of the respiratory system given clinical simulations.
 - l. Perform radiographic procedures related to the respiratory system in a laboratory environment.
 - m. Evaluate radiographs of various parts of the respiratory system in terms of positioning accuracy and image quality.
- Related Academic Topics (See Appendix A): C1, S1*
Workplace Skills (See Appendix B): WP2
4. Identify positioning considerations for routine contrast studies.
- a. Discuss equipment and supplies necessary for contrast studies identified in this course.
 - b. Describe patient preparation necessary for various contrast studies.
 - c. Describe the general procedure for each of the radiographic studies identified in this course.
 - d. Describe routine and special views of the digestive system and accessory organs in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.

- e. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved for routine and special views of the digestive system and accessory organs given clinical simulations.
- f. In a laboratory environment, perform radiographic procedures related to the digestive system and accessory organs.
- g. Evaluate radiographs of various parts of the digestive system and accessory organs in terms of positioning accuracy and image quality.
- h. Describe routine and special views of the urinary system in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.
- i. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved for routine and special views of the urinary system given clinical simulations.
- j. Perform procedures related to the urinary system in a laboratory environment.
- k. Evaluate radiographs of various parts of the urinary system in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP1, WP3

- 5. Identify procedural considerations for special studies.
 - a. Apply a working knowledge of drugs and contrast media currently used in the radiology department.
 - b. Identify the possible actions, reactions, and interactions of drugs and contrast media used in health care institutions.
 - c. Define the categories of contrast media and give specific examples for each category.
 - d. Discuss the pharmacology of barium compounds in regard to:
 - (1) Patient history/allergy
 - (2) Chemical composition
 - (3) Patient precautions
 - (4) Patient reactions
 - (5) Emergency care
 - e. Discuss the pharmacology of iodine compounds in regard to:
 - (1) Patient history/allergy
 - (2) Chemical composition
 - (3) Patient precautions
 - (4) Patient reactions
 - (5) Emergency care
 - f. Describe methods of administering contrast media and discuss administration techniques for each method.

Related Academic Topics (See Appendix A): C1, S5

Workplace Skills (See Appendix B): WP2

6. Demonstrate the drug administration procedure.
 - a. Identify and describe the routes of drug administration.
 - b. Discuss the purposes and advantages of intravenous drug administration over other routes.
 - c. Differentiate between the two major sites of intravenous drug administration.
 - d. Identify, describe, and document complications associated with intravenous drug administration and appropriate actions to resolve these complications.
 - e. Discuss the various elements of initiating and discontinuing intravenous drug administration.
 - f. Differentiate and document dose calculations for adult and pediatric patients.
 - g. Prepare for injection, contrast agents/intravenous medications, utilizing aseptic technique.

Related Academic Topics (See Appendix A): C1, C3, M1, S1

Workplace Skills (See Appendix B): WP3, WP6

7. Identify legal and ethical issues of medication administration.
 - a. Discuss the current legal and ethical status of the radiographer's role in drug administration.
 - b. Discuss a radiographer's professional liability concerning drug administration.

Related Academic Topics (See Appendix A): C1, C6

Workplace Skills (See Appendix B): WP2

Course Name: Radiographic Procedures II

Course Abbreviation: RGT 1523

Classification: Vocational-Technical Core

Description: This course includes principles and procedures involved in the radiographic positioning of the spinal column, pelvic girdle, lower extremities, bony thorax, and the routine skull, including mobile and trauma radiography procedures. Included is a review of radiographic anatomy on each procedure. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: Radiographic Procedures I (RGT 1513)

Competencies and Suggested Objectives:

1. Identify positioning considerations for routine radiographic procedures.
 - a. Describe routine and special views of the skeletal system relating to the pelvic girdle, lower extremities, bony thorax, and the spinal column, in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved.
 - b. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved using clinical simulations and/or routine and special views of the skeletal system relating to the pelvic girdle, lower extremities, bony thorax, and spinal column.
 - c. In a laboratory environment, perform radiographic procedures of the skeletal system relating to the pelvic girdle, lower extremities, bony thorax, and spinal column.
 - d. Evaluate radiographs of various parts of the skeletal system relating to the pelvic girdle, lower extremities, bony thorax, and spinal column, in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, S1, S8

Workplace Skills (See Appendix B): WP3

2. Identify positioning considerations for routine skull procedures.
 - a. Describe routine views of the skull in terms of structure(s) visualized, including general and positioning considerations involved.
 - b. Perform the routine views of the skull in a laboratory environment.
 - c. Evaluate radiographs of the skull in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, S1, S8

Workplace Skills (See Appendix B): WP3

3. Identify positioning considerations for mobile and trauma radiography.
 - a. Describe alternate positions for mobile and trauma procedures.
 - b. Identify the locks and control panel components on a mobile radiography unit.
 - c. Describe special radiation protection considerations when performing mobile radiography.

Related Academic Topics (See Appendix A): C1, S1, S8

Workplace Skills (See Appendix B): WP

Course Name: Clinical Education II

Course Abbreviation: RGT 1123

Classification: Vocational-Technical Core

Description: This course involves clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (3 sch: 9 hr. clinical)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program level.
 - a. Provide for basic patient care and comfort and anticipate the patient's needs.
 - b. Provide appropriate patient education.
 - c. Apply radiation protection principles.
 - d. Discuss basic x-ray production and interactions.
 - e. Operate medical imaging equipment and accessory devices.
 - f. Position the patient and medical imaging system to perform examinations and procedures.
 - g. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.
 - h. Apply knowledge of human structure, function, and pathology.
 - i. Apply knowledge and skills relating to quality assurance activities.
 - j. Evaluate the performance of medical imaging systems.
 - k. Evaluate medical images for technical quality.
 - l. Apply knowledge and skills relating to recording medical image processing.
 - m. Operate equipment within safe limits.
 - n. Recognize equipment malfunctions and report them to the proper authority.
 - o. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - p. Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - q. Practice universal precautions at all times.

Related Academic Topics (See Appendix A): C1, C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

2. Perform clinical application skills for radiographic procedures.
 - a. Practice routine radiographic procedures including:
 - (1) Spinal column
 - (2) Pelvic girdle
 - (3) Lower extremities

Related Academic Topics (See Appendix A): C5, S1, S8

Workplace Skills (See Appendix B): WP3

3. Demonstrate tasks associated with radiographic procedures.
 - a. Perform routine radiographic procedures including:
 - (1) Routine Chest
 - (2) Abdomen
 - (3) Digestive system
 - (4) Upper extremities and shoulder girdle
 - (5) Urinary system

Related Academic Topics (See Appendix A): C3, C4, C5, S1

Workplace Skills (See Appendix B): WP3

Course Name: Radiation Physics

Course Abbreviation: RGT 1612

Classification: Vocational-Technical Core

Description: This course consists of a study of energy and matter, units of measurement, and basic principles of electronics and x-ray circuit. (2 sch: 2 hr. lecture)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Discuss the fundamental concepts of physics as they apply to radiologic technology.
 - a. State the fundamental units of the English, metric and SI systems.
 - b. Define derived units of the English, metric and SI systems.
 - c. Convert units from one system to the other using a list of problems.
 - d. Define and describe the general principles that relate to inertia, work, energy, and momentum.
 - e. Convert units from one system to the other using a list of problems.
2. Describe the structure of matter as it relates to radiographic physics.
 - a. Define mixture.
 - b. Describe the characteristics and give an example of a mixture.
 - c. Define substance and give an example of a substance.
 - d. Define element.
 - e. Describe the characteristics of an element using the periodic table.
 - f. Define compound and give an example of a compound.
 - g. Describe the characteristics of a molecule.
 - h. Describe Bohr's theory of atomic structure.
 - i. Discuss the characteristics and functions of a proton, neutron, and electron.
 - j. Discuss the energy levels of the atom.
 - k. Define the terms relating to atomic nomenclature.
 - l. Compare covalent bonding to ionic bonding.
 - m. Explain the process of ionization.

Related Academic Topics (See Appendix A): C1, M3, M4
Workplace Skills (See Appendix B): WP2

Related Academic Topics (See Appendix A): C1, S5
Workplace Skills (See Appendix B): WP2

3. Apply the concepts of electrostatics, electrodynamics, magnetism, and electromagnetism to radiographic equipment and circuits.
 - a. Define electrical charge and describe its source.
 - b. Define electrical field and describe its source.
 - c. Explain methods of electrification.
 - d. Explain the Laws of Electrostatics and their application.
 - e. Define potential difference, current, resistance, circuit, and electric power.
 - f. Describe the characteristics of direct and alternating currents.
 - g. Label the parts of a resistance circuit using a schematic diagram.
 - h. Identify and apply Ohm's Law to resolve direct current problems.
 - i. Identify and apply power formulas to determine power consumed.
 - j. Describe electrical measuring devices.
 - k. Label the electrical measuring devices using a schematic diagram of a circuit.
 - l. Describe electrical protective devices.
 - m. Discuss the properties of magnetism.
 - n. Discuss the laws of magnetism.
 - o. Discuss the domain theory.
 - p. Relate the electronic spin of an element to its potential magnetic properties.
 - q. Explain the principle of magnetic induction.
 - r. Classify a given list of materials according to magnetic characteristics.
 - s. Explain the interaction between electric and magnetic fields.
 - t. Discuss types of electromagnetic induction.
 - u. Describe types and functions of generators, motors, transformers, and rectification systems.
 - v. Compare single phase, three phase, high frequency, and falling load generators in terms of radiation production and efficiency.

Related Academic Topics (See Appendix A): C1, S6

Workplace Skills (See Appendix B): WP2

4. Analyze the x-ray circuit.
 - a. Define rectification.
 - b. Explain the purpose of rectification.
 - c. Compare solid state and vacuum tube rectification in terms of function and advantages/disadvantages.
 - d. Describe the components of a primary x-ray circuit and explain the function of each component.
 - e. Describe the components of a secondary x-ray circuit and explain the function of each component.
 - f. Describe the components of an x-ray filament circuit and explain the function of each component.

- g. Label the parts of a complete x-ray circuit using a simple diagram.
- h. Discuss the components and application of automatic exposure devices.

Related Academic Topics (See Appendix A): C1, S6

Workplace Skills (See Appendix B): WP2

- 5. Demonstrate the proper use and safety limits of x-ray tubes.
 - a. Discuss the characteristics of a rotating anode in terms of description and function.
 - b. Discuss the characteristics of a cathode in terms of description and function.
 - c. Discuss the construction characteristics of tube housing in terms of description and function.
 - d. Discuss the characteristics of cables in terms of description and function.
 - e. Using a diagram, label the parts of an x-ray tube.
 - f. Determine maximum allowable exposure factors for various radiographic procedures using tube rating charts.
 - g. Use an anode cooling chart to determine the anode cooling rate using simulated exposure factor.
 - h. Determine heat units and cooling characteristics of x-ray tube housings using simulated exposure factors and a cooling chart.
 - i. Describe methods to extend tube life.

Related Academic Topics (See Appendix A): C1, C2, S6

Workplace Skills (See Appendix B): WP2

Course Name: Radiation Exposure II

Course Abbreviation: RGT 1424

Classification: Vocational-Technical Core

Description: This course is a continuation of Radiation Exposure I. Included are beam limiting devices, filtration, production and control of scatter and secondary radiation, exposure systems, and advanced technical conversions and problem solving. This course presents an introduction to film processing including darkroom design and equipment. Included are chemistry of developing solutions, procedures of general maintenance, quality control, and silver recovery methods. (4 sch: 3 hr. lecture, 2 hr. lab)

Prerequisites: Radiation Exposure I (RGT 1413)

Competencies and Suggested Objectives:

1. Use x-ray beam restrictors for radiation protection and optimal radiographic quality.
 - a. List the types of beam limiting devices and describe the operation and applications for each.
 - b. Explain purposes of beam limiting devices in terms of patient dosage, scattered radiation production, radiographic density, and contrast.

Related Academic Topics (See Appendix A): C1
Workplace Skills (See Appendix B): WP2
2. Use x-ray beam filtration for radiation protection and optimal radiographic quality.
 - a. Define beam filtration.
 - b. Explain purposes of beam filtration in terms of patient dosage, scattered radiation production, radiographic density, and contrast.

Related Academic Topics (See Appendix A): C1
Workplace Skills (See Appendix B): WP2
3. Recognize the effects of scattered and secondary radiation on the radiographic image and patient dosage.
 - a. Define scattered and secondary radiation.
 - b. Describe interactions of x-rays with matter which produce scattered and secondary radiation.
 - c. Analyze relationships of factors affecting scattered and secondary radiation.
 - d. Discuss effects of scattered and secondary radiation in terms of patient dosage, image quality, and occupational exposure.

Related Academic Topics (See Appendix A): C1
Workplace Skills (See Appendix B): WP2

4. Utilize devices to control exit radiation.
 - a. Explain the relationship between kVp, and scattered and secondary radiation.
 - b. Describe a grid in terms of its purpose, components, and construction.
 - c. Differentiate among types of grids.
 - d. Analyze grid efficiency in terms of grid ratio and frequency.
 - e. Given technical information, select an appropriate grid.
 - f. Define grid cut off.
 - g. Describe factors influencing grid cut off.
 - h. Describe various grid artifacts.
 - i. Explain the relationship between beam limitation and scattered/secondary radiation.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

5. Utilize various imaging systems with consideration for radiation protection and radiographic quality.
 - a. Explain the purpose of an exposure system in terms of standardization of exposure and image consistency.
 - b. Discuss considerations involved in exposure selection.
 - c. Distinguish among various types of exposure systems.
 - d. Demonstrate patient measurement and exposure selection given clinical simulations.

Related Academic Topics (See Appendix A): C1

Workplace Skills: (See Appendix B): WP3, WP6

6. Perform mathematical calculations and measurement conversions used in Radiologic Technology.
 - a. Analyze relationships of exposure factors and their effects on exposure calculations.
 - b. Calculate the photographic effect given exposure factors.
 - c. Calculate penumbra, magnification factor, and percent magnification given exposure problems.
 - d. Apply Mas reciprocity to clinical situations.

Related Academic Topics (See Appendix A): C1, M3

Workplace Skills (See Appendix B): WP2

7. Describe processing area, film, storage, and handling considerations.
 - a. Discuss aspects of processing area location, construction, and function.
 - b. Explain safe light illumination in terms of definition, bulb size/color, and testing for blue and green sensitive film emulsions.
 - c. Describe the operation and utilization of day light processing.
 - d. Discuss processing area ventilation including considerations of temperature control and light proofing.
 - e. Discuss the location, purpose, and function/operation of each piece of processing area equipment/furnishings.

- f. Analyze the effects of processing considerations on film quality.
- g. Analyze the effects of storage considerations on film quality.

Related Academic Topics (See Appendix A): C1, C2

Workplace Skills (See Appendix B): WP2

- 8. Describe characteristics of films utilized in radiographic procedures.
 - a. Label the components and describe the structure and function of each component given cross-sectional diagrams of radiographic film.
 - b. Define properties of radiographic film and analyze the influence of each on the resultant image.
 - c. Relate properties of radiographic film to specific procedure applications.
 - d. Define latent image formation.
 - e. Explain how sensitization specks contribute to latent image formation.
 - f. Define characteristic curve and explain its purpose.
 - g. Graph characteristic curves for radiographic film using density values.
 - h. Interpret characteristic curves for radiographic film.
 - i. Analyze characteristic curves for various radiographic film and evaluate various films for specific procedures.

Related Academic Topics (See Appendix A): C1, C2

Workplace Skills (See Appendix B): WP2

- 9. Evaluate the use of film holders and intensifying screens.
 - a. Discuss various film holders in terms of purpose, construction, application, patient dosage, loading/unloading, and maintenance.
 - b. Explain the construction and purpose of intensifying screens.
 - c. Describe the principles and function of intensifying screens.
 - d. Explain classifications of intensifying screens and the applications of each.
 - e. Discuss the maintenance of intensifying screens in terms of handling, cleaning, testing, and evaluation.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

- 10. Assess the automatic processor systems, function, and maintenance.
 - a. Discuss the purpose of the automatic processor.
 - b. Label the components of automatic processors and explain the function of each using diagrams.
 - c. Describe systems of the automatic processor and functions of each.
 - d. Demonstrate how various types and sizes of film are fed into the processor.
 - e. Explain the components of the processing cycle providing the specific action and duration of time for each component.
 - f. Discuss daily and periodic aspects of processor maintenance and cleaning.
 - g. Describe the types of artifacts including the cause and effect on a radiograph and methods of preventing each.

- h. Identify the type of artifact, its cause, and methods of prevention using selected radiographs.

Related Academic Topics (See Appendix A): C1, C2

Workplace Skills (See Appendix B): WP2

- 11. Evaluate artifacts processing.

- a. Define the term artifact.
- b. Describe types of artifacts including the cause and effect on a radiograph and method of prevention for each.
- c. Identify the type of artifact, its cause, and methods of prevention using selected radiographs.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

- 12. Discuss the principles of silver recovery.

- a. Define silver recovery.
- b. Explain the rationale for silver recovery.
- c. Discuss methods of reclamation including process, advantages, and disadvantages of each method.
- d. Discuss silver recovery security as it relates to control, theft, and misappropriation.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

Course Name: Clinical Education III

Course Abbreviation: RGT 1139

Classification: Vocational-Technical Core

Description: This course is a clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (9 sch: 27 hr. clinical)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program level.
 - a. Provide for basic patient care and comfort and anticipate the patient's needs.
 - b. Provide appropriate patient education.
 - c. Apply radiation protection principles.
 - d. Discuss basic x-ray production and interactions.
 - e. Operate medical imaging equipment and accessory devices.
 - f. Position the patient and medical imaging system to perform examinations and procedures.
 - g. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.
 - h. Apply knowledge of human structure, function, and pathology.
 - i. Apply knowledge and skills relating to quality assurance activities.
 - j. Evaluate the performance of medical imaging systems.
 - k. Evaluate medical images for technical quality.
 - l. Apply knowledge and skills relating to recording medical image processing.
 - m. Operate equipment within safe limits.
 - n. Recognize equipment malfunctions and report them to the proper authority.
 - o. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - p. Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - q. Practice universal precautions at all times.

Related Academic Topics (See Appendix A): C1, C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP4, WP5

2. Perform clinical application skills for radiographic procedures.
 - a. Practice routine radiographic procedures including:
 - (1) Bony thorax
 - (2) Routine skull
 - (3) Mobile (portable) radiography
 - (4) Trauma

Related Academic Topics (See Appendix A): C3, C5, S1, S8
Workplace Skills (See Appendix B): WP3, WP6

3. Demonstrate tasks associated with radiographic procedures.
 - a. Perform routine radiographic procedures including:
 - (1) Spine
 - (2) Pelvic girdle
 - (3) Lower extremities
 - b. Perform advanced radiographic procedures including:
 - (1) Chest
 - (2) Abdomen
 - (3) Digestive system
 - (4) Upper extremities including shoulder girdle
 - (5) Urinary system

Related Academic Topics (See Appendix A): C3, C4, C5, S1, S8
Workplace Skills (See Appendix B): WP3, WP6

Course Name: Clinical Education IV

Course Abbreviation: RGT 2147

Classification: Vocational-Technical Core

Description: This course is a clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (7 sch: 21 hr. clinical)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program level.
 - a. Provide for basic patient care and comfort and anticipate the patient's needs.
 - b. Provide appropriate patient education.
 - c. Apply radiation protection principles.
 - d. Discuss basic x-ray production and interactions.
 - e. Operate medical imaging equipment and accessory devices.
 - f. Position the patient and medical imaging system to perform examinations and procedures.
 - g. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.
 - h. Apply knowledge of human structure, function, and pathology.
 - i. Apply knowledge and skills relating to quality assurance activities.
 - j. Evaluate the performance of medical imaging systems.
 - k. Evaluate medical images for technical quality.
 - l. Apply knowledge and skills relating to recording medical image processing.
 - m. Operate equipment within safety limits.
 - n. Recognize equipment malfunctions and report them to the proper authority.
 - o. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - p. Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - q. Practice universal precautions at all times.

Related Academic Topics (See Appendix A): C1, C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

2. Perform clinical application skills for radiographic procedures.

a. Practice routine radiographic procedures including:

- (1) Advanced cranium procedures
- (2) Routine and advanced facial bones
- (3) Procedural adjustments for trauma
- (4) Advanced mobile (portable) radiography

Related Academic Topics (See Appendix A): C3, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP6

3. Demonstrate tasks associated with radiographic procedures.

a. Perform routine radiographic procedures including:

- (1) Bony thorax
- (2) Skull
- (3) Mobile (portable) radiography

b. Perform advanced radiographic procedures including:

- (1) Spinal column
- (2) Pelvic girdle
- (3) Lower extremities

c. Demonstrate procedural adjustments to accommodate trauma cases.

Related Academic Topics (See Appendix A): C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP6

Course Name: Clinical Imaging

Course Abbreviation: RGT 2813

Classification: Vocational-Technical Core

Description: This course consists of a study of various imaging equipment, an introduction to special radiographic equipment, computers, quality improvement, and advanced imaging modalities such as magnetic resonance imaging (MRI), conventional tomography, computed tomography (CT), digital imaging, and electronic imaging. (3 sch: 3 hr. lecture)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Utilize radiographic and fluoroscopic equipment.
 - a. Discuss permanent installation of radiographic equipment in terms of purpose, components, types, and applications.
 - b. Demonstrate operation of various types of permanently installed radiographic equipment.
 - c. Discuss mobile units in terms of purpose, components, types, and applications.
 - d. Demonstrate operation of various types of mobile unit radiographic equipment.
 - e. Identify general radiation protection rules related to installation of new radiographic equipment.
 - f. Define image intensified fluoroscopy.
 - g. Diagram the components of an image intensifier.
 - h. Explain the function of an image intensifier.
 - i. Discuss gain and conversion factors as related to intensification.
 - j. Describe the optical system of an image intensifier.
 - k. Discuss image formation in terms of image size, framing, and brightness.
 - l. Discuss applications of image intensified fluoroscopy and brightness.
- Related Academic Topics (See Appendix A): C1, S8*
Workplace Skills (See Appendix B): WP3, WP5
2. Utilize various recording media and techniques.
 - a. Discuss purpose, construction, and application of video tubes.
 - b. Describe the purpose, construction, and application of video recorders.
 - c. Discuss the purpose, construction, and application of cine radiographic equipment and processor.
 - d. Describe the purpose, construction, and application of strip/cut film cameras.

- e. Discuss the purpose, construction, and application of automatic film changers.
 - f. Describe the purpose, equipment/film, and procedures of duplication and subtraction.
 - g. Discuss the purpose and procedure of radiographic magnification.
Related Academic Topics (See Appendix A): C1
Workplace Skills (See Appendix B): WP2
3. Produce quality tomograms.
- a. Discuss the purpose, principles, motions, equipment, procedure, and application of conventional tomography.
Related Academic Topics (See Appendix A): C4
Workplace Skills (See Appendix B): WP3, WP6
4. Recognize the history, fundamentals, components, operations, and the applications of computers in radiology.
- a. Discuss the history and development of computers.
 - b. Define computer.
 - c. Define various terms related to computer fundamentals.
 - d. Identify types of computers.
 - e. Define various terms related to components of computers.
 - f. List major functions of Central Processing Unit (CPU).
 - g. Differentiate among specific items on a list of input/output devices.
 - h. Define memory and describe the types.
 - i. Describe the care and preventive maintenance for the computer system.
 - j. Define various terms related to computer operation.
 - k. Discuss analog to digital conversion, distinguish between analog computers and digital computers.
 - l. Explain the binary function.
 - m. Define programming and describe its purpose.
 - n. Discuss application of various types of software.
 - o. Identify various types of computer imaging in radiology (these techniques are fully described under Imaging Equipment of specialized curricular areas).
Related Academic Topics (See Appendix A): C1, M1
Workplace Skills (See Appendix B): WP2
5. Discuss specialized imaging equipment in terms of its purpose, principles of operation, equipment and material required, and procedures.
- a. Examine the purpose of computed tomography, digital imaging, and MRI.
 - b. Describe the principles of operation of computed tomography, digital imaging, and MRI.
 - c. Identify the equipment required for computed tomography, digital imaging, and MRI.

- d. Summarize the operational procedures for computed tomography, digital imaging, and MRI.

Related Academic Topics (See Appendix A): C1, S6

Workplace Skills (See Appendix B): WP2

6. Apply quality improvement concepts.
 - a. Define quality improvement, quality assurance, and quality control.
 - b. Discuss the benefits of a quality improvement program to the patient and to the department.
 - c. List elements of a quality improvement program and discuss how each is related to the quality improvement program.
 - d. Discuss the importance of continuing education in regard to the rapid advancement of technology.
 - e. Identify and describe each of the steps used in the JCAHO 10-step model as applied to quality improvement.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

7. Recognize state, federal, and professional standards and regulations.
 - a. Identify state agencies involved with quality improvement aspects of radiographic systems.
 - b. Discuss state agency regulations, inspections, and enforcement as they relate to quality improvement.
 - c. Identify federal agencies involved with quality improvement aspects of radiographic systems.
 - d. Discuss federal regulations and enforcement/consultation service as they relate to quality improvement.
 - e. Discuss professional standards involved with quality improvement aspects of radiographic systems.

Related Academic Topics (See Appendix A): C1

Workplace Skills (See Appendix B): WP2

3. Implement a quality improvement program.
 - a. List categories of departmental personnel involved in a quality improvement program and discuss the responsibilities of each to the effective operation of the program.
 - b. List components of the radiographic system.
 - c. Describe test material/equipment, test procedures, and evaluation/interpretation relating to quality improvement for components of the radiographic system.
 - d. Discuss aspects of preventive and corrective maintenance for components of the radiographic system.
 - e. Define reject analysis and describe objectives of a reject analysis program.

- f. Explain the procedure, evaluation, and follow-up for a retake analysis program.
- g. Identify the necessary equipment to perform quality control tests.

Related Academic Topics (See Appendix A): C1, C5

Workplace Skills (See Appendix B): WP2

Course Name: Radiographic Procedures III

Course Abbreviation: RGT 2533

Classification: Vocational-Technical Core

Description: This course includes principles and procedures involved in radiographic positioning of the entire cranium, facial bones, reproductive systems, and special senses. Included is a review of radiographic anatomy on each procedure. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: Radiographic Procedures II (RGT 1523)

Competencies and Suggested Objectives:

1. Identify procedural considerations for special views of the face and cranium.
 - a. Describe routine and special views of the cranium and specific structures within the cranium and facial bones in terms of structure(s) visualized/function(s) demonstrated. Including general and positioning considerations.
 - b. Explain the structure(s) visualized/function(s) demonstrated. Include general and positioning considerations involved in routine and special views of the cranium and specific structures within the cranium and facial bones, given clinical simulations.
 - c. In a laboratory environment, perform radiographic procedures of the skeletal system relating to the cranium, and specific structures within the cranium and facial bones.
 - d. Evaluate radiographs of various parts of the cranium and structures within the cranium, and evaluate facial bones in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, C3, S1

Workplace Skills (See Appendix B): WP3, WP6

2. Identify procedural considerations for the reproductive system.
 - a. Describe routine and special views of the reproductive system in terms of structure(s) visualized/function(s) demonstrated including general and positioning considerations.
 - b. Explain the structure(s) visualized/function(s) demonstrated including general and positioning considerations involved using clinical simulations.
 - c. In a laboratory environment, perform radiographic procedures related to the reproductive system.
 - d. Evaluate radiographs of various parts of the reproductive system in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, C3, S1

Workplace Skills (See Appendix B): WP3, WP6

3. Identify procedural considerations for routine views of special senses.
 - a. Describe routine and special views of organs and parts related to special senses in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.
 - b. Explain the structure(s) visualized/function(s) demonstrated including general and positioning considerations involved using clinical simulations for routine and special views of organs and parts related to special senses.
 - c. In a laboratory environment, perform radiographic procedures related to the special sense organs and parts.
 - d. Evaluate radiographs of various parts of the organs and parts related to special senses in terms of positioning accuracy and image quality.

Related Academic Topics (See Appendix A): C1, C3, S1

Workplace Skills (See Appendix B): WP3, WP6

Course Name: Clinical Education V

Course Abbreviation: RGT 2157

Classification: Vocational-Technical Core

Description: This course is a clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (7 sch: 21 hr. clinical)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program levels.
 - a. Provide for basic patient care and comfort and anticipate the patient's needs.
 - b. Provide appropriate patient education.
 - c. Apply radiation protection principles.
 - d. Discuss basic x-ray production and interactions.
 - e. Operate medical imaging equipment and accessory devices.
 - f. Position the patient and medical imaging system to perform examinations and procedures.
 - g. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.
 - h. Apply knowledge of human structure, function, and pathology.
 - i. Apply knowledge and skills relating to quality assurance activities.
 - j. Evaluate the performance of medical imaging systems.
 - k. Evaluate medical images for technical quality.
 - l. Apply knowledge and skills relating to recording medical image processing.
 - m. Operate equipment within safety limits.
 - n. Recognize equipment malfunctions and report them to the proper authority.
 - o. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - p. Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - q. Practice universal precautions at all times.

Related Academic Topics (See Appendix A): C1, C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

2. Perform clinical application skills for radiographic procedures.

a. Practice routine radiographic procedures including:

- (1) Reproductive system
- (2) Sense organs
- (3) Special studies
- (4) Mammography
- (5) Advanced procedural adjustments for trauma

Related Academic Topics (See Appendix A): C1, C3, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP6

3. Demonstrate tasks associated with radiographic procedures.

a. Perform radiographic procedures including:

- (1) Advanced cranium procedures
- (2) Routine and advanced facial bones
- (3) Procedural adjustments for trauma
- (4) Advanced mobile (portable) radiography

Related Academic Topics (See Appendix A): C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP6

Course Name: Radiation Biology

Course Abbreviation: RGT 2912

Classification: Vocational-Technical Core

Description: This course is a study of the biological effects of radiation upon living matter. It includes genetic and somatic effects, instrumentation for detection, and measurement and calculation of dosage. (2 sch: 2 hr. lecture)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Relate cell anatomy to the mechanism of radiation injury.
 - a. Identify important functions of organic and inorganic cell constituents.
 - b. List and describe the function of various cell structures and organelles.
 - c. Describe the structure and function of the nucleus.
 - d. Identify events occurring in mitosis and meiosis and describe each process.
 - e. List the sequence of events in the cell cycle.
 - f. Define differentiation.
 - g. Distinguish between ionizing and non-ionizing radiations.
 - h. Identify sources of electromagnetic and particulate ionizing radiations.
 - i. Define directly ionizing radiations.
 - j. Define indirectly ionizing radiations.
 - k. Identify sources of radiation exposure.

Related Academic Topics (See Appendix A): C1, S1, S6
Workplace Skills (See Appendix B): WP2
2. Evaluate biophysical events relating to radiation exposure.
 - a. Identify and distinguish between the physical and biologic units of radiation dose.
 - b. Identify radiation induced chemical reactions resulting in the production of free radicals.
 - c. Describe how free radical production causes biologic damage.
 - d. Define LET and RBE (relative biologic effectiveness).
 - e. List and describe factors that influence RBE.

Related Academic Topics (See Appendix A): C1, S6
Workplace Skills (See Appendix B): WP2
3. Analyze radiation effects on living organisms.
 - a. Identify and describe types of biologic effects from radiation at the subcellular level.
 - b. State how subcellular radiation effects are expressed in humans.

- c. Identify and describe types of biologic effects from radiation at the cellular level.
- d. State how cellular radiation effects are expressed in humans.
- e. Define somatic, stochastic and genetic radiation effects.
- f. Identify specific diseases or syndromes associated with somatic, stochastic, and genetic radiation effects.
- g. Identify methods to measure radiation response.
- h. List physical, chemical, and biologic factors influencing radiation response.
- i. Distinguish between lethal and sublethal response. Identify factors which influence response.

Related Academic Topics (See Appendix A): C1, S6

Workplace Skills (See Appendix B): WP2

- 4. Demonstrate comprehension of radiosensitivity and response.
 - a. Define radiosensitivity.
 - b. Describe how the radiosensitivity of tissues relate to mitotic rate and degree of differentiation.
 - c. List factors influencing radiosensitivity.
 - d. Identify various survival curve parameters.
 - e. State how LET, oxygen, and fractionation influence the shape of survival curves.
 - f. Describe the clinical implications of those factors which influence survival curves.
 - g. Associate the expected responses to radiation with the appropriate dose levels for the various systems listed above.
 - h. Identify the factors influencing the degree of response.
 - i. Define and distinguish between the different levels of tolerance above.
 - j. State the clinical significance of LD50/30 and LD30.
 - k. Identify factors influencing tolerance at various tissue.
 - l. State the tolerance dose for specific tissue sites.
 - m. Describe conditions which result in a radiation syndrome.
 - n. Associate the various stages of a radiation syndrome with the appropriate dose levels.
 - o. Describe factors which influence responses in a radiation syndrome.
 - p. Identify possible medical interventions used to modify a radiation syndrome.
 - q. Define and identify possible radiation induced somatic effects.
 - r. Define and identify possible radiation induced stochastic effects.
 - s. Define and identify possible radiation induced genetic effects.

Related Academic Topics (See Appendix A): C1, C2, S6, S7

Workplace Skills (See Appendix B): WP2

Course Name: Radiographic Pathology

Course Abbreviation: RGT 2922

Classification: Vocational-Technical Core

Description: This course is an introduction to the concepts of disease. Pathology and disease as it relates to various radiographic procedures will be discussed.
(2 sch: 2 hr. lecture)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Identify terms and conditions related to pathology.
 - a. Define terms related to pathology.
 - b. Discuss manifestations of pathological conditions and their relevance to radiographic procedures.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP2

2. Relate radiographic diagnosis to the classification of trauma/physical injury.
 - a. List the classifications of trauma and define each.
 - b. Describe examples/sites, complications, and prognosis for classifications of trauma.
 - c. Discuss radiographic diagnosis for classifications of trauma.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP2

3. Explain classification and radiographic demonstration of systemic disease.
 - a. List the systemic classifications of disease and define each.
 - b. Describe etiology and examples/sites of systemic classifications of disease for each system (skeletal/articular, muscular, digestive, respiratory, urinary, reproductive, etc.).
 - c. Discuss complications and prognosis of examples of systemic classifications of disease for each system (skeletal/articular, muscular, digestive, respiratory, urinary, reproductive, etc.).
 - d. Describe radiographic procedures and techniques appropriate for different examples of disease in each of the systemic classifications.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP2

4. Discuss damage and repair of tissue.
 - a. Discuss the causes of tissue disruption and, for the different causes, describe the process and give examples.

- b. Describe the healing process.
 - c. Discuss complications connected with the repair and replacement tissue.
- Related Academic Topics (See Appendix A): C1, S1*
Workplace Skills (See Appendix B): WP2

Course Name: Radiographic Procedures IV

Course Abbreviation: RGT 2542

Classification: Vocational-Technical Core

Description: This course is a study of special radiographic procedures which utilizes sterile techniques and/or specialized equipment. It also includes patient preparation and contrast media utilized for these procedures. (2 sch: 2 hr. lecture)

Prerequisites: Radiographic Procedures III (RGT 1523)

Competencies and Suggested Objectives:

1. Identify procedural considerations for special routine radiographic studies.
 - a. Describe routine and special views of the circulatory system in terms of structure(s) visualized/function(s) demonstrated, including general and positioning considerations.
 - b. Explain the structure(s) visualized/function(s) demonstrated including general and positioning considerations involved using clinical simulations for routine and special views of the circulatory system.
 - c. Evaluate radiographs of various parts of the circulatory system in terms of positioning accuracy and image quality.
 - d. Describe routine and special views of the nervous system in terms of structure(s) visualized/function(s) demonstrated including general and positioning considerations.
 - e. Explain the structure(s) visualized/function(s) demonstrated including general and positioning considerations involved using clinical simulations for routine and special views of the nervous system.
 - f. Evaluate radiographs of various parts of the nervous system in terms of positioning accuracy and image quality.
 - g. Describe routine and special views of certain joints in terms of structure(s) visualized/function(s) demonstrated including general and positioning considerations.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP2

2. Identify procedural considerations for special radiographic studies.
 - a. Explain the structure(s) visualized/function(s) demonstrated, including general and positioning considerations involved for routine and special views of the soft tissue structures of the joints given clinical simulations.
 - b. Evaluate radiographs of the various parts of the soft tissue structures of the joints in terms of positioning accuracy and image quality.
 - c. Discuss imaging and other equipment used in various special studies.

- d. Describe special studies performed on parts of various systems including bronchography and lymphography.
- e. Describe the contrast medium utilized for each study in terms of type, administration method, and quantity, when given various special studies.
- f. Describe the patient preparation for various special studies.
- g. Discuss various special studies in terms of general description, patient care considerations, positioning considerations, and views.
- h. Identify the specific structure(s) visualized and function(s) demonstrated, given various special study images.
- i. Describe routine and special views of the soft tissue of the chest including a breast biopsy study.
- j. Evaluate radiographs of various soft tissue of the chest, including a breast biopsy study, in terms of positioning accuracy and imaging quality.

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP2

3. Identify various types of drugs and interactions.
 - a. Recognize various categories of drugs.
 - b. Recognize common drug nomenclature and basic concepts of pharmacology.
 - c. Discuss specific drugs in each category, particularly those associated with CPR procedures.
 - d. Discuss each drug's expected action, reactions, and possible interactions.
 - e. Discuss drugs used for premedications including recognition of initial and peak response times.
 - f. Identify normal ranges for basic laboratory studies.

Related Academic Topics (See Appendix A): C1, C3, S5

Workplace Skills (See Appendix B): WP2

4. Identify and describe diagnostic contrast agents.
 - a. Define the categories of contrast agents and give specific examples for each category.
 - b. Discuss the pharmacology of barium and iodine compounds.
 - c. Describe methods and techniques for the administration of various types of contrast agents.

Related Academic Topics (See Appendix A): C1, C6, S5

Workplace Skills (See Appendix B): WP2

Course Name: Certification Fundamentals

Course Abbreviation: RGT 2932

Classification: Vocational-Technical Core

Description: This course is designed to correlate scientific components of radiography to entry level knowledge required by the profession. (2 sch: 2 hr. lecture)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Recall Radiation Protection Standards.
 - a. Identify the biological effects of radiation.
 - b. Describe how exposure factors, shielding, beam restriction, filtration, and other appropriate devices minimize patient exposure.
 - c. Differentiate the various sources of radiation exposure.
 - d. Utilize NCRP recommendations for protective devices.
 - e. Explain the units of measurement.
 - f. Critique radiation exposure and monitoring.

Related Academic Topics (See Appendix A): C1, M4

Workplace Skills (See Appendix B): WP2

2. Identify equipment operation and maintenance practices.
 - a. Identify components of basic radiographic units.
 - b. Describe basic principles of operations of x-ray generators, transformers, and rectification systems.
 - c. Describe the operation and maintenance of fluoroscopic units.
 - d. Identify the implementation of performance evaluations for radiographic units and accessories.

Related Academic Topics (See Appendix A): C1, S6

Workplace Skills (See Appendix B): WP2

3. Summarize image production and evaluation methods.
 - a. Critique the factors used in the selection of technical factors.
 - b. Evaluate recorded detail, distortion, density, and contrast in image production.
 - c. Analyze film processing and quality assurance in image production.
 - d. Evaluate the diagnostic quality of radiographs.

Related Academic Topics (See Appendix A): C1, M3

Workplace Skills (See Appendix B): WP2

4. Summarize the routine radiographic procedures.
 - a. Identify the general procedural considerations.
 - b. Identify the positioning, anatomy, physiology, and pathology for each of the specific imaging procedure categories:
 - (1) Thorax
 - (2) Abdomen and GI series
 - (3) Urological studies
 - (4) Extremities
 - (5) Spine and pelvis
 - (6) Head and neck
 - (7) Other

Related Academic Topics (See Appendix A): C1, S1

Workplace Skills (See Appendix B): WP3

5. Identify all aspects of patient care.
 - a. Describe legal and professional responsibilities.
 - b. Provide patient education and safety.
 - c. Utilize universal precautions and help prevent the control of infection.
 - d. Identify patient condition.
 - e. Identify contrast medias and contraindications.

Related Academic Topics (See Appendix A): C1, C3, C6

Workplace Skills (See Appendix B): WP2

Course Name: Clinical Education VI

Course Abbreviation: RGT 2165

Classification: Vocational-Technical Core

Description: This course is a clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures. (5 sch: 15 hr. clinical)

Prerequisites: All core courses as scheduled

Competencies and Suggested Objectives:

1. Apply radiographic principles in the clinical setting with respect to program level.
 - a. Document completion of the following program outcomes:
 - (1) Provide for basic patient care and comfort, and anticipate the patient's needs.
 - (2) Provide appropriate patient education.
 - (3) Apply radiation protection principles.
 - (4) Discuss basic x-ray production and interactions.
 - (5) Operate medical imaging equipment and accessory devices.
 - (6) Position the patient and medical imaging system to perform examinations and procedures.
 - (7) Exercise independent judgement and discretion in the technical performance of medical imaging procedures.
 - (8) Apply knowledge of human structure, function, and pathology.
 - (9) Apply knowledge and skills relating to quality assurance activities.
 - (10) Evaluate the performance of medical imaging systems.
 - (11) Evaluate medical images for technical quality.
 - (12) Apply knowledge and skills relating to recording medical image processing.
 - (13) Operate equipment within safety limits.
 - (14) Recognize equipment malfunctions and report them to the proper authority.
 - (15) Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships.
 - (16) Abide by the profession's code of ethics and comply with the recognized scope of practice for the profession.
 - (17) Practice universal precautions.

Related Academic Topics (See Appendix A): C1, C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

2. Perform clinical application skills for radiographic procedures.
 - a. Integrate didactic and clinical competencies including:
 - (1) Knowledge of anatomy, physiology, positioning, and radiographic techniques to accurately demonstrate anatomical structures on a radiograph or other imaging receptor
 - (2) Determination of exposure factors to achieve optimum radiographic techniques with minimum radiation exposure to the patient
 - (3) Evaluation of radiographic images for appropriate positioning and image quality
 - (4) Application of the principles of radiation protection to the patient, self, and others
 - (5) Providing patient care and comfort
 - (6) Recognize emergency patient conditions. Initiate lifesaving first aid and basic life support
 - (7) Detect equipment malfunctions; report same to the proper authority and know the safe limits of equipment operation
 - (8) Exercise independent judgment and discretion in the technical performance of medical imaging procedures
 - (9) Participate in radiologic quality assurance programs
 - (10) Provide patient/public education related to radiologic procedures and radiation protection/safety

Related Academic Topics (See Appendix A): C1, C3, C5, S1, S8

Workplace Skills (See Appendix B): WP3, WP5, WP6

3. Demonstrate tasks associated with radiographic procedures.
 - a. Perform radiographic procedures including:
 - (1) Reproductive system
 - (2) Sense organs
 - (3) Special studies
 - (4) Advance procedural adjustments for trauma

Related Academic Topics (See Appendix A): C3, C4, C5, S1, S8

Workplace Skills (See Appendix B): WP2, WP3, WP6

RELATED ACADEMIC COURSES

Course Name: Anatomy and Physiology I

Course Abbreviation: BIO 1513

Classification: Related Academic

Description: A lecture/laboratory course dealing with the anatomical and physiological study of the human body, particularly the molecular, cellular, tissue, organs, and systems. Each system is considered in detail regarding both structure and function.

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Course Name: Anatomy and Physiology II

Course Abbreviation: BIO 1523

Classification: Related Academic

Description: A lecture/laboratory course of the systems listed but not covered in BIO 1513.

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SECTION III:
RECOMMENDED TOOLS AND EQUIPMENT

RECOMMENDED TOOLS AND EQUIPMENT FOR MEDICAL RADIOLOGIC TECHNOLOGY

CAPITALIZED ITEM(S)

1. Angulator (1 per 5 students)
2. Arm, Blood Pressure Simulator (1 per 10 students)
3. Arm, Injectable IV Training Simulator (1 per 10 students)
4. Cart, Film (1 per program)
5. Cassette Holder, Portable (1 per radiographic room)
6. Cassette, Radiographic Film Holder 8x10 in (6 per program)
7. Cassette, Radiographic Film Holder Curved 8x10 (1 per lab)
8. Cassette, Radiographic Film Holder Extremity 8x10 in (6 per lab)
9. Cassette, Radiographic Film Holder Extremity 24x30cm (6 per lab)
10. Cassette, Radiographic Film Holders 35x43cm (6 per lab)
11. Cassette, Radiographic Film Holders 24x30cm (6 per lab)
12. Cassette, Radiographic Film Holders 18x43cm (6 per lab)
13. Cassette, Radiographic Film Holders 18x34cm (6 per lab)
14. Cassette, Radiographic Film Holder 30x35cm (6 per lab)
15. Deluxe Enclosed Film Marking Devices (1 per lab)
16. Digital Densitometer with carrying case (1 per 10 students)
17. Film ID Flasher (1 per lab)
18. Film Storage Bin (Darkroom) (1 per darkroom)
19. Grid Cap 14x17 in. (1 per lab)
20. Grid Cap 10x12 in. (1 per lab)
21. Holder, Phantom Head Positioning (1 per lab)
22. Illuminators, Mobile Stand System (1 per 5 students)
23. Illuminators, Portable (1 per 5 students)
24. Illuminators, Portable single (1 per lab)
25. Illuminators, Wall Mounted (1 per lab)
26. Intravenous Continuous Pump (1 per 10 students)
27. IV Pole, On Wheels (1 per lab)
28. Lead Apron (2 per lab)
29. Lead Gloves (2 per lab)
30. Patient Care Simulator (1 per program)
31. Patient Restraint/Immobilizer/Positioner (1 per lab)
32. Patient Transfer Device Adult Positioner (1 per lab)
33. Phantom, Sectional Chest (1 per lab)
34. Phantom, Sectional, Elbow AP & 90 Flexion (1 per lab)
35. Phantom, Sectional, Foot (1 per lab)
36. Phantom, Sectional, Hand PA: Lateral (1 per lab)
37. Phantom, Sectional, Head with Cervical (1 per lab)
38. Phantom, Sectional, Knee AP & 90 Flexion (1 per lab)
39. Phantom, Sectional, Pelvis (1 per lab)

40. Phantom Patient, Whole Body with Lungs (1 per lab)
41. Pneumonic Compression Paddle (1 per lab)
42. Positioning Blocks, Various Sizes & Shapes (1 per lab)
43. Processor, Radiographic (1 per darkroom)
44. Quality Assurance System (1 per lab)
45. Safelight Illuminators (Darkroom) (1 per darkroom)
46. Sensitometer (1 per 10 students)
47. Silver Recovery Unit (1 per darkroom)
48. Stretcher (1 per lab)
49. Tool Modulator Transfer Tester (1 per program)
50. Wheelchair with IV Pole Attachment (1 per lab)
51. X-ray Radiography System (1 per 10 students)
52. X-ray Radiography System, Portable (1 per program)
53. Phantom, Entire Upper Extremity (1 per lab)
54. Phantom, Entire Lower Extremity (1 per lab)
55. Supply Storage Cabinet, Lockable (1 per program)
56. Lockable Student Storage (1 per student)

NON-CAPITALIZED ITEM(S)

1. Calipers (1 per lab)
2. Cervical Sandbags (1 set per lab)
3. Gowns, Cloth (1 per student)
4. Lead (Flat Shields) (3 per room)
5. Pillow Cases (1 per pillow)
6. Safe Light Filters (1 per safe light)
7. Sheets (2 per stretcher)
8. Sphygmomanometer with Stethoscope (1 per 2 students)
9. Stool, Step (1 per lab)
10. Stool, Adjustable (1 per lab)
11. Pillows (3 per lab)

INSTRUCTIONAL AIDS

1. Computer (1 per 4 students)
2. Laser Printer (1 per 2 computers)
3. Computer Workstation (1 per computer)
4. Heart Model (1 per 10 students)
5. Human Sexless Torso (1 per lab)
6. Interactive Video Equipment (1 per 5 students)
7. Kidney Model with Base (1 per lab)
8. Projector Sound/Slide 35mm (1 per room)
9. Projector, 35mm Slide (1 per room)
10. Projector Screen (1 per room)

11. Skeleton Human Bones, Disarticulated (1 per room or 2 per program)
12. Skeleton, With Stand Human Adult (1 per room or 2 per program)
13. Skull, Disarticulated (2 per program)
14. Television (1 per room)
15. VCR (1 per room)
16. Video Camera Standard VHS (1 per lab)
17. ELMO Presentation System (1 per program)
18. Projector, Overhead (1 per room)
19. Table, Mobile for portable overhead projector(desk type) (1 per program)
20. Portable AV Security Cabinet w/electronic hookups (1 per program)
21. Electrical Cart, steel, for AV equipment (1 per program)
22. Clock (1 per lab)

Videos and Software: (1 each per program unless otherwise specified)

General Radiology: An Interactive Compendium
Skeletal Radiology: The Bare Bones Teaching Collection
Radiologic Atlas of Brain Tumors
Radiography of Spine Injury
Ultrasound of Fetal Anomalies
MRI of the Musculoskeletal System
Radiological Pathological Conferences of the Massachusetts General Hospital
Mammography: Positioning and Technical Consideration for Optimal Image Quality
Radiographic Exposure and Technique
An Interactive Approach to Anatomy and Positioning
Selected Cases in General Systematic Pathology
Pathology of the Head and Neck
Diagnostic Liver Pathology
Atlas of Soft Tissue Tumors
Clinical Neuropathology
Gastrointestinal Pathology
X-ray Interaction Program
1990 Simulated Registry Program
Term Tamer Program
Retake Program
Fundamentals of MRI Program
X-Ray Circuitry Program
Radiographic Quality Program
Problem Solver Program
Radiation Protection Challenge Program
Physics Challenge Program
Image Production Challenge Program
Radiographic Procedures Challenge Program
Patient Care Challenge Program

National Radiography Certification Examination Review I
National Radiography Certification Examination Review II
National Radiography Certification Examination Review III
National Radiography Certification Examination Review IV
Anatomy Tutor Series Computer Program
X-ray Interactions: Interactions Between Ionizing Radiation and Matter
AIDS: The New Epidemic
AIDS: The Investigation
First Aid Basics
First Aid: Emergencies Mean Action
The Heart
The Ear
The Eye
The Human Body: An Overview
The Skeletal System
The Factory: Human Physiology
The Respiratory System: A Pull of Air
The Digestive System: The Disappearing Dinner
The Heart: A Mighty Pump
Sideways
Technical Review 2.1
Technical Review 3.1
Technical Review 4.1
Radiographic Technique 1.1
Human Structure and Function
Radiographic Physics 1.1
Patient Radiation Protection
Personnel Radiation Protection
Radiation Monitoring
Simulated Registry Examination A
Simulated Registry Examination B
Simulated Registry Examination C
Simulated Registry Examination D
Mas Machine
Inverse Square Law
Medical Terminology Review Program Disk
Radiologic Technology Study Series
The Three States of Matter
Atomic Structure and Bonding
Acids and Bases

Suggested References: (1 of each per program)

- Adam, A. Practical Interventional Radiology.
- Adler, A. Introduction to Radiologic Technology and Patient Care.
- American College of Radiology. Manual on Iodinated Contrast Media.
- American College of Radiology. Recognize and Respond: Treating Reactions to Contrast Media.
- American Registry of Radiologic Technologists. Code of Ethics. 1993.
- American Registry of Radiologic Technologists. Educators Handbook.
- American Society of Radiologic Technologists. Code of Ethics for Radiologic Technologists. 1993.
- American Society of Radiologic Technologists. Scopes of Practice and Position Descriptions in Radiologic Technology. 1992.
- Annas, G., Ganiza, L. & Katz, B. The Rights of Doctors, Nurses, and Allied Health Professionals.
- Anderson, G. & Anderson-Glenser, V. Health Care Ethics: A Guide for Decision Making.
- Applegate, E. The Sectional Anatomy Learning System.
- Ballinger, P. (Ed.). Merrill's Atlas of Radiographic Positions and Radiologic Procedures (7th ed. or newer).
- Beauchamp, T. & Walters, L. (Editors). Contemporary Issues in Bio-Ethics (3rd ed. or newer).
- Becker, D. Pharmacology for the Health Professional.
- Bloyd, M. Intravenous Therapy Procedures for Contrast Media and Medication.
- Bo, W., Meschan, I. & Kreuger. Basic Atlas of Cross-Sectional Anatomy: A Clinical Approach (2nd ed. or newer).
- Bontrager, K. & Anthony, B. Textbook of Radiographic Positioning and Related Anatomy (3rd ed.).
- Burns, M. Radiographic Imaging: A Guide for Producing Quality Radiographs.
- Bushong, S. Radiologic Science for Technologists: Physics, Biology, and Protection (5th ed. or newer).
- Bushong, S. Magnetic Resonance Imaging: Physical and Biological Principles.
- Cahill et. al. Atlas of Human Cross-Sectional Anatomy.
- Carder, T. Handling of Radiation Accident Patients by Paramedical and Hospital Personnel (2nd ed. or newer).
- Carroll, Q. Fuch's Principles of Radiographic Exposure, Processing and Quality Control (5th ed.).
- Carlton, R. & Adler, A. Principles of Radiographic Exposure.
- Cember, H. Introduction of Health Physics (2nd ed. or newer).
- Chabner, E. The Language of Medicine (4th ed. or newer).
- Chesney, D. & Chesney, M. A Radiographer's Handbook of Hospital Practice.
- Christoforidis, A. Atlas of Axilla, Sagittal, and Coronal Anatomy.
- Covvey, H. & McAlister. Computers in the Practice of Medicine. Vol.1.
- Cullinan, A. Optimizing Radiographic Positioning.

- Cullinan, A. Producing Quality Radiographs (2nd ed.).
- Curry, T., Dowdey, J. & Murry, R. Christensen's Physics of Diagnostic Radiology (4th ed. or newer).
- DeVos, D. Basic Principles of Radiographic Exposure.
- Dorland's Illustrated Medical Dictionary (27th ed. or newer).
- Dublin, A. Outpatient Invasive Radiologic Procedures.
- Ehrlich, A. Medical Terminology for Health Professionals (2nd ed. or newer).
- Ehrlich, R. & McCloskey. Patient Care in Radiography (4th ed. or newer).
- Eisenberg, R. & Dennis, C. Comprehensive Radiographic Pathology (2nd ed.).
- Eisenberg, R., Dennis, C., & May, C. Radiographic Positioning.
- Enlander, D. Computers in Medicine.
- Euganeo, K. Radiographic Exposure and Techniques (1st ed.).
- Fodor, J. & Malott, J. The Art and Science of Medical Radiography (7th ed.).
- Gaylord, Davis, & Baker. Diagnostic and Interventional Radiology-A Clinical Manual.
- Glass, W. & Varma, M. Physical and Chemical Mechanisms in Molecular Radiation Biology.
- Goldberg, A. & Buttaro, R. Hospital Departmental Profiles (3rd ed. or newer).
- Greenfield, G. & Hubbard, L. Computers in Radiology.
- Gurley, L. & Callaway, W. Introduction to Radiologic Technology (3rd ed.).
- Gyls, B. & Masters, R. Medical Terminology: A Systems Approach.
- Hall, E. Radiation and Life.
- Hames, C. & Joseph, D. Basic Concepts of Helping: A Holistic Approach. (2nd ed.).
- Hendee, W. Medical Radiation Physics (3rd ed. or newer).
- Hendee, W., Chaney, E. & Rossi, R. Radiologic Physics, Equipment and Quality Control.
- Henry, K. JD. The Health Care Supervisor's Legal Guide.
- Hiss, S.S. A Study Guide to Understanding Radiography (3rd ed. or newer).
- Hole, J. Essentials of Human Anatomy and Physiology (3rd ed. or newer).
- Hopp, J. & Rogers, E. AIDS and the Allied Health Professions.
- Hunter, T. The Computer in Radiology.
- Jenkins. Radiographic Photography and Imaging Processes.
- Kent, T. & Hart, M. Introduction to Human Disease (2nd ed.).
- Kuni, C. Introduction to Computers and Digital Processing in Medical Imaging.
- Lane, A. & Sharfaei, H. Modern Sectional Anatomy.
- Laudicina, P. Applied Pathology for Radiographers.
- Lauer, O., Mayes, J., et al. Evaluating Radiographic Quality: The Variables and Their Effects.
- Leonard, P. Building a Medical Vocabulary (2nd ed. or newer).
- Mace, J. & Kowalczyk, N. Radiographic Pathology for Technologists.
- Malcott, J. & Fodor, J. III. The Art and Science of Medical Radiography (7th ed.).
- Mallot, J. The Art and Science of Medical Radiography (7th ed. or newer).
- McKinney, W. Radiographic Processing and Quality Control.
- McLemore, J. Quality Assurance in Diagnostic Radiology.

- Meschan, I. An Atlas of Anatomy Basic to Radiology.
- Meschan, I. & Ott. Introduction to Diagnostic Imaging.
- Miller, B. & Keane, C. Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health (5th ed. or newer).
- Miller, K.L. CRC Handbook of Management of Radiation Protection Programs (2nd ed. or newer).
- Mitrop, M. Intravenous Catheterization: A Guide to Proper Insertion.
- Mulvihill, M. Human Disease: A Systemic Approach (2nd ed.).
- NCRP Reports: Numbers 37, 40, 49, 53, 54, 57, 64, 69, 82, 91, 99, 102, 105.
- Nias, A. & Dimbleby, R. An Introduction to Radiobiology.
- Nuclear Regulatory Commission, Code of Federal Regulations, (10 CFR Parts 19, 20, 30, 36, 40, 51, 70, and 170).
- Parelli, R. Medicolegal Issues for Radiographers (1st ed. or newer).
- Physician's Desk Reference (48th ed. or newer).
- Pizzarello, D. & Witcofski, R. Basic Radiation Biology (2nd ed. or newer).
- Purtilo, R. Health Professional and Patient Interaction (4th ed. or newer).
- Quality Assurance for Radiographic X-ray Units and Associated Equipment (FDA 79-8094).
- Raffensperger, E. et al. Quick Reference to Medical-Surgical Nursing.
- Ravin, C. Imaging/Invasive Radiology in Intensive Care Unit.
- Rice, J. Medical Terminology with Human Anatomy.
- Rosen, J. Angiography and Interventional Radiology.
- Seeram, E. X-ray Imaging Equipment.
- Selman, J. The Fundamentals of X-ray and Radium Physics (8th ed.).
- Sheldon, H. Boyd's Introduction to the Study of Disease (10th ed.).
- Shelly, G. & Casman, T. Computer Fundamentals with Application Software.
- Shillingford, C. Osteology for Radiographers.
- Smith, G., Davis, P. & Dennerll, J. Medical Terminology a Programmed Text.
- Smith, J. & Johnson. Nurses Guide to Clinical Procedures.
- Snook, I.D. Hospitals: What They Are and How They Work (2nd ed.).
- Snopek, A. Fundamentals of Special Radiographic Procedures (3rd ed.).
- Sprawls, P. Physical Principles of Medical Imaging.
- Sprawls, P. The Physical Principles of Diagnostic Radiology (2nd ed. or newer).
- Sprawls, P. Principles of Radiography for Technologists.
- Squire, L. Fundamentals of Radiology.
- Statkiewicz, M. & Ritnour, E. Radiation Protection for Student Radiographers.
- Statkiewicz-Sherer, M., Visconti, P. & Ritenour, E. Radiation Protection in Medical Radiography.
- Taber's Cyclopedic Medical Dictionary (16 ed. or newer).
- Taylor, L. & LeMone. Fundamentals of Nursing: The Art and Science of Nursing Care (2nd ed. or newer).
- The Joint Review Committee on Education in Radiologic Technology. Standards for an Accredited Educational Program for the Radiographer. 1996.
- Thibodeau, G. & Patton, K. Anatomy and Physiology (2nd ed.).

- Thompson, T. Cahoon's Formulating X-ray Techniques (9th ed. or newer).
Torres, L. Basic Medical Techniques and Patient Care for Radiologic Technologists (4th ed. or newer).
Tortora, G. & Anagnostakos, N. Principles of Anatomy and Physiology (6th ed. or newer).
Tortorici, M. Concepts in Medical Radiographic Imaging: Circuitry, Exposure, and Quality Control.
Travis, E. Primer of Medical Radiobiology (2nd ed.).
Walter, J. Pathology of Human Disease.
Warden-Tamparo, C. & Lewis, M. Diseases of the Human Body.
Wright, R. Human Values in Health Care.

APPENDIX A:
RELATED ACADEMIC TOPICS

APPENDIX A

RELATED ACADEMIC TOPICS FOR COMMUNICATIONS

- C1 Interpret written material.
- C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
- C3 Listen, comprehend, and take appropriate actions.
- C4 Access, organize, and evaluate information.
- C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
- C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.

EXPANDED TOPICS FOR COMMUNICATIONS

TOPIC C1: Interpret written material.

- C1.01 Read and follow complex written directions.
- C1.02 Recognize common words and meanings associated with a variety of occupations.
- C1.03 Adjust reading strategy to purpose and type of reading.
- C1.04 Use sections of books and reference sources to obtain information.
- C1.05 Compare information from multiple sources and check validity.
- C1.06 Interpret items and abbreviations used in multiple forms.
- C1.07 Interpret short notes, memos, and letters.
- C1.08 Comprehend technical words and concepts.
- C1.09 Use various reading techniques depending on purpose for reading.
- C1.10 Find, read, understand, and use information from printed matter or electronic sources.

TOPIC C2: Interpret visual materials (maps, charts, graphs, tables, etc.).

- C2.01 Use visuals in written and in oral presentations.
- C2.02 Recognize visual cues to meaning (layout, typography, etc.).
- C2.03 Interpret and apply information using visual materials.

TOPIC C3: Listen, comprehend, and take appropriate action.

- C3.01 Identify and evaluate orally-presented messages according to purpose.
- C3.02 Recognize barriers to effective listening.
- C3.03 Recognize how voice inflection changes meaning.
- C3.04 Identify speaker signals requiring a response and respond accordingly.
- C3.05 Listen attentively and take accurate notes.
- C3.06 Use telephone to receive information.

C3.07 Analyze and distinguish information from formal and informal oral presentations.

TOPIC C4: Access, organize, and evaluate information.

C4.01 Distinguish fact from opinion.

C4.02 Use various print and non-print sources for specialized information.

C4.03 Interpret and distinguish between literal and figurative meaning.

C4.04 Interpret written or oral communication in relation to context and writer's point of view.

C4.05 Use relevant sources to gather information for written or oral communication.

TOPIC C5: Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.

C5.01 Select appropriate words for communication needs.

C5.02 Use reading, writing, listening, and speaking skills to solve problems.

C5.03 Compose inquiries and requests.

C5.04 Write persuasive letters and memos.

C5.05 Edit written reports, letters, memos, and short notes for clarity, correct grammar, and effective sentences.

C5.06 Write logical and understandable statements, phrases, or sentences for filling out forms, for correspondence or reports.

C5.07 Write directions or summaries of processes, mechanisms, events, or concepts.

C5.08 Select and use appropriate formats for presenting reports.

C5.09 Convey information to audiences in writing.

C5.10 Compose technical reports and correspondence that meet accepted standards for written communications.

TOPIC C6: Communicate ideas and information using oral and written forms for a variety of audiences and purposes.

C6.01 Give complex oral instructions.

C6.02 Describe a business or industrial process/mechanism.

C6.03 Participate effectively in group discussions and decision making.

C6.04 Produce effective oral messages utilizing different media.

C6.05 Explore ideas orally with partners.

C6.06 Participate in conversations by volunteering information when appropriate and asking relevant questions when appropriate.

C6.07 Restate or paraphrase a conversation to confirm one's own understanding.

C6.08 Gather and provide information utilizing different media.

- C6.09 Prepare and deliver persuasive, descriptive, and demonstrative oral presentations.

RELATED ACADEMIC TOPICS FOR MATHEMATICS

- M1 Relate number relationships, number systems, and number theory.
- M2 Explore patterns and functions.
- M3 Explore algebraic concepts and processes.
- M4 Explore the concepts of measurement.
- M5 Explore the geometry of one-, two-, and three-dimensions.
- M6 Explore concepts of statistics and probability in real world situations.
- M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

EXPANDED TOPICS FOR MATHEMATICS

TOPIC M1: Relate number relationships, number systems, and number theory.

- M1.01 Understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real world and mathematical problem situations.
- M1.02 Develop number sense for whole numbers, fractions, decimals, integers, and rational numbers.
- M1.03 Understand and apply ratios, proportions, and percents in a wide variety of situations.
- M1.04 Investigate relationships among fractions, decimals, and percents.
- M1.05 Compute with whole numbers, fractions, decimals, integers, and rational numbers.
- M1.06 Develop, analyze, and explain procedures for computation and techniques for estimations.
- M1.07 Select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
- M1.08 Use computation, estimation, and proportions to solve problems.
- M1.09 Use estimation to check the reasonableness of results.

TOPIC M2: Explore patterns and functions.

- M2.01 Describe, extend, analyze, and create a wide variety of patterns.
- M2.02 Describe and represent relationships with tables, graphs, and rules.
- M2.03 Analyze functional relationships to explain how a change in one quantity results in a change in another.
- M2.04 Use patterns and functions to represent and solve problems.
- M2.05 Explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.

- M2.06 Use a mathematical idea to further their understanding of other mathematical ideas.
- M2.07 Apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, and business.

TOPIC M3: Explore algebraic concepts and processes.

- M3.01 Represent situations and explore the interrelationships of number patterns with tables, graphs, verbal rules, and equations.
- M3.02 Analyze tables and graphs to identify properties and relationships and to interpret expressions and equations.
- M3.03 Apply algebraic methods to solve a variety of real world and mathematical problems.

TOPIC M4: Explore the concepts of measurement.

- M4.01 Estimate, make, and use measurements to describe and compare phenomena.
- M4.02 Select appropriate units and tools to measure to the degree of accuracy required in a particular situation.
- M4.03 Extend understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.
- M4.04 Understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs.

TOPIC M5: Explore the geometry of one-, two-, and three-dimensions.

- M5.01 Identify, describe, compare, and classify geometric figures.
- M5.02 Visualize and represent geometric figures with special attention to developing spatial sense.
- M5.03 Explore transformations of geometric figures.
- M5.04 Understand and apply geometric properties and relationships.
- M5.05 Classify figures in terms of congruence and similarity and apply these relationships.

TOPIC M6: Explore the concepts of statistics and probability in real world situations.

- M6.01 Systematically collect, organize, and describe data.
- M6.02 Construct, read, and interpret tables, charts, and graphs.
- M6.03 Develop an appreciation for statistical methods as powerful means for decision making.
- M6.04 Make predictions that are based on exponential or theoretical probabilities.

M6.05 Develop an appreciation for the pervasive use of probability in the real world.

TOPIC M7: Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

M7.01 Use computers and/or calculators to process information for all mathematical situations.

M7.02 Use problem-solving approaches to investigate and understand mathematical content.

M7.03 Formulate problems from situations within and outside mathematics.

M7.04 Generalize solutions and strategies to new problem situations.

RELATED ACADEMIC TOPICS FOR SCIENCE

S1 Explain the Anatomy and Physiology of the human body.

S2 Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

S3 Relate the nine major phyla of the kingdom anomaly according to morphology, anatomy, and physiology.

S4 Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

S5 Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

S7 Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance, population genetics, the structure and function of DNA, and current applications of DNA technology.

S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

EXPANDED TOPICS FOR SCIENCE

TOPIC S1: Explain the Anatomy and Physiology of the human body.

S1.01 Recognize common terminology and meanings.

S1.02 Explore the relationship of the cell to more complex systems within the body.

- S1.03 Summarize the functional anatomy of all the major body systems.
- S1.04 Relate the physiology of the major body systems to its corresponding anatomy.
- S1.05 Compare and contrast disease transmission and treatment within each organ system.
- S1.06 Explore the usage of medical technology as related to human organs and organ systems.
- S1.07 Explain the chemical composition of body tissue.

TOPIC S2: Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

- S2.01 Identify the major types and structures of plants, viruses, monera, algae protista, and fungi.
- S2.02 Explain sexual and asexual reproduction.
- S2.03 Describe the ecological importance of plants as related to the environment.
- S2.04 Analyze the physical chemical and behavioral process of a plant.

TOPIC S3: Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.

- S3.01 Explain the morphology, anatomy, and physiology of animals.
- S3.02 Describe the characteristics, behaviors, and habitats of selected animals.

TOPIC S4: Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

- S4.01 Examine minerals and their identification, products of the rock cycle, byproducts of weathering, and the effects of erosion.
- S4.02 Relate the Hydrologic Cycle to include groundwater its zones, movement, and composition; surface water systems, deposits, and runoff.
- S4.03 Consider the effects of weather and climate on the environment.
- S4.04 Examine the composition of seawater; wave, tides, and currents; organisms, environment, and production of food; energy, food and mineral resources of the oceans.

TOPIC S5: Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

- S5.01 Examine the science of chemistry to include the nature of matter, symbols, formulas and nomenclature, and chemical equations.

- S5.02 Identify chemical reactions including precipitation, acids-bases, and reduction-oxidation.
- S5.03 Explore the fundamentals of chemical bonding and principles of equilibrium.
- S5.04 Relate the behavior of gases.
- S5.05 Investigate the structure, reactions, and uses of organic compounds; and investigate nuclear chemistry and radiochemistry.

TOPIC S6: Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

- S6.01 Examine fundamentals of motion of physical bodies and physical dynamics.
- S6.02 Explore the concepts and relationships among work, power, and energy.
- S6.03 Explore principles, characteristics, and properties of electricity, magnetism, light energy, thermal energy, and wave energy.
- S6.04 Identify principles of modern physics related to nuclear physics.

TOPIC S7: Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance; population genetics, the structure and function of DNA, and current applications of DNA technology.

- S7.01 Examine principles, techniques, and patterns of traits and inheritance in organisms.
- S7.02 Apply the concept of population genetics to both microbial and multicellular organism.
- S7.03 Identify the structure and function of DNA and the uses of DNA technology in science, industry, and society.

TOPIC S8: Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

- S8.01 Apply the components of scientific processes and methods in classroom and laboratory investigations.
- S8.02 Observe and practice safe procedures in the classroom and laboratory.
- S8.03 Demonstrate proper use and care for scientific equipment.
- S8.04 Investigate science careers, and advances in technology.
- S8.05 Communicate results of scientific investigations in oral, written, and graphic form.

APPENDIX B:
WORKPLACE SKILLS

**APPENDIX B
WORKPLACE SKILLS FOR THE 21ST CENTURY**

- WP1 Allocates resources (time, money, materials and facilities, and human resources).**
- WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.**
- WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.**
- WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.**
- WP5 Selects, applies, and maintains/troubleshoots technology.**
- WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.**

APPENDIX C:
STUDENT COMPETENCY PROFILE

STUDENT COMPETENCY PROFILE

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

Clinical Education I (RGT 1112)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program levels.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.

Fundamentals of Radiography (RGT 1213)

- _____ 1. Describe the rule, organization, and structure of the program, radiology department, hospital and profession.
- _____ 2. Assess and resolve ethical issues and dilemmas in health care.
- _____ 3. Identify legal responsibilities as they relate to the appropriate scope of practice.
- _____ 4. Define, spell, and pronounce medical terms.
- _____ 5. Employ interpersonal skills to alleviate patient fears and promote a professional environment.
- _____ 6. Employ patient transfer skills.
- _____ 7. Evaluate physical needs.
- _____ 8. Describe infection control precautions.
- _____ 9. Recognize and employ appropriate responses to acute situations and medical emergencies.
- _____ 10. Respond to patient needs in special situations.
- _____ 11. Formulate methods for patient education and health promotion.
- _____ 12. Recognize substance abuse.

Principles of Radiation Protection (RGT 1312)

- _____ 1. Examine concepts involved in an effective radiation protection program.
- _____ 2. Discuss the methods of detection and measurement of ionizing radiation.
- _____ 3. Review radiation surveys and regulatory agency regulations.

- _____ 4. Identify occupational exposure limits and methods of personnel monitoring.
- _____ 5. Analyze components of an effective patient protection program.
- _____ 6. Utilize concepts of practical radiation protection.

Radiation Exposure I (RGT 1413)

- _____ 1. Describe x-ray production and identify properties of x-rays as related to exposure and measurement of radiation.
- _____ 2. Analyze exposure factors to achieve optimum radiographic quality.
- _____ 3. Determine exposure factors to achieve optimum radiographic density with a minimum radiation exposure to the patient.
- _____ 4. Determine exposure factors to achieve optimum radiographic contrast with a minimum radiation exposure to the patient.
- _____ 5. Determine exposure factors to achieve optimum radiographic detail with a minimum radiation exposure to the patient.
- _____ 6. Determine exposure factors to achieve appropriate radiographic distortion with a minimum radiation exposure to the patient.
- _____ 7. Determine exposure factors to achieve optimum exposure latitude with a minimum of radiation exposure to the patient.

Radiographic Procedures I (RGT 1513)

- _____ 1. Identify basic radiographic positioning skills.
- _____ 2. Discuss general procedural considerations for radiographic examinations.
- _____ 3. Identify positioning considerations for routine radiographic procedures.
- _____ 4. Identify positioning considerations for routine contrast studies.
- _____ 5. Identify procedural considerations for special studies.
- _____ 6. Demonstrate the drug administration procedure.
- _____ 7. Identify legal and ethical issues of medication administration.

Radiographic Procedures II (RGT 1523)

- _____ 1. Identify positioning considerations for routine radiographic procedures.
- _____ 2. Identify positioning considerations for routine skull procedures.
- _____ 3. Identify positioning considerations for mobile and trauma radiography.

Clinical Education II (RGT 1123)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program level.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.

Radiation Physics (RGT 1612)

- _____ 1. Discuss the fundamental concepts of physics as they apply to radiologic technology.
- _____ 2. Describe the structure of matter as it relates to radiographic physics.
- _____ 3. Apply the concepts of electrostatics, electrodynamics, magnetism, and electromagnetism to radiographic equipment and circuits.
- _____ 4. Analyze the x-ray circuit.
- _____ 5. Demonstrate the proper use and safety limits of x-ray tubes.

Radiation Exposure II (RGT 1424)

- _____ 1. Use x-ray beam restrictors for radiation protection and optimal radiographic quality.
- _____ 2. Use x-ray beam filtration for radiation protection and optimal radiographic quality.
- _____ 3. Recognize the effects of scattered and secondary radiation on the radiographic image and patient dosage.
- _____ 4. Utilize devices to control exit radiation.
- _____ 5. Utilize various imaging systems with consideration for radiation protection and radiographic quality.
- _____ 6. Perform mathematical calculations and measurement conversions used in Radiologic Technology.
- _____ 7. Describe processing area, film, storage, and handling considerations.
- _____ 8. Describe characteristics of films utilized in radiographic procedures.
- _____ 9. Evaluate the use of film holders and intensifying screens.
- _____ 10. Assess the automatic processor systems, function, and maintenance.
- _____ 11. Evaluate artifacts processing.
- _____ 12. Discuss the principles of silver recovery.

Clinical Education III (RGT 1139)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program level.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.

Clinical Education IV (RGT 2147)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program level.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.

Clinical Imaging (RGT 2813)

- _____ 1. Utilize radiographic and fluoroscopic equipment.
- _____ 2. Utilize various recording media and techniques.
- _____ 3. Produce quality tomograms.
- _____ 4. Recognize the history, fundamentals, components, operations, and the applications of computers in radiology.
- _____ 5. Discuss specialized imaging equipment in terms of its purpose, principles of operation, equipment and material required, and procedures.
- _____ 6. Apply quality improvement concepts.
- _____ 7. Recognize State, Federal, and Professional Standards and Regulations.
- _____ 8. Implement a quality improvement program.

Radiographic Procedures III (RGT 2533)

- _____ 1. Identify procedural considerations for special views of the face and cranium.
- _____ 2. Identify procedural considerations for the reproductive system.
- _____ 3. Identify procedural considerations for routine views of special senses.

Clinical Education V (RGT 2157)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program levels.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.

Radiation Biology (RGT 2912)

- _____ 1. Relate cell anatomy to the mechanism of radiation injury.
- _____ 2. Evaluate biophysical events relating to radiation exposure.
- _____ 3. Analyze radiation effects on living organisms.
- _____ 4. Demonstrate comprehension of radiosensitivity and response.

Radiographic Pathology (RGT 2922)

- _____ 1. Identify terms and conditions related to pathology.
- _____ 2. Relate radiographic diagnosis to the classification of trauma/physical injury.
- _____ 3. Explain classification and radiographic demonstration of systemic disease.
- _____ 4. Discuss damage and repair of tissue.

Radiographic Procedures IV (RGT 2542)

- _____ 1. Identify procedural considerations for special routine radiographic studies.
- _____ 2. Identify procedural considerations for special radiographic studies.
- _____ 3. Identify various types of drugs and interactions.
- _____ 4. Identify and describe diagnostic contrast agents.

Certification Fundamentals (RGT 2932)

- _____ 1. Recall Radiation Protection Standards.
- _____ 2. Identify equipment operation and maintenance practices.
- _____ 3. Summarize image production and evaluation methods.
- _____ 4. Summarize the routine radiographic procedures.
- _____ 5. Identify all aspects of patient care.

Clinical Education VI (RGT 2165)

- _____ 1. Apply radiographic principles in the clinical setting with respect to program level.
- _____ 2. Perform clinical application skills for radiographic procedures.
- _____ 3. Demonstrate tasks associated with radiographic procedures.