

Radiologic Technology Mississippi Curriculum Framework

**Program CIP: 51.0911 – Radiologic Technology/Science - Radiographer
November 2018**



Published by:

Mississippi Community College Board
Division of Workforce, Career, and Technical Education
3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Copyright© 2018 by Mississippi Community College Board
For information, please contact curriculum@mccb.edu

FACULTY WRITING TEAM MEMBERS

Nanci Scoles, Hinds Community College
Tiffany Smith, Hinds Community College
Kristie Windham, Pearl River Community College
Laurie Cuevas, Hinds Community College
Brittany Weatherford, Jones County Junior College
Daniel Harris, Jones County Junior College
Tara Guice, Mississippi Gulf Coast Community College
Hope Harrelson, Northeast Mississippi Community College

ADMINISTRATOR WRITING TEAM MEMBERS

Libby Mahaffey, Dean, Nursing and Allied Health, Hinds Community College
Christy Bokros, Assistant Dean for Allied Health, Hinds Community College
Steve Compton, Department Chairperson, Hinds Community College
Paul Crum, Program Director, Itawamba Community College
Hope Husband, Program Director, Pearl River Community College
Debra Herring, Program Director, Meridian Community College
Mandy Pearson, Program Director, Jones County Junior College
Jennifer Davis, Program Director, Northeast Mississippi Community College
Billie Fay Sartin, Program Director, Copiah Lincoln Community College
Christie Kisner, Program Director, Mississippi Delta Community College
Stephen Cooper, Program Director, Mississippi Gulf Coast Community College
Angie Nelson, Chair of Allied Health, Mississippi Gulf Coast Community College

BUSINESS AND INDUSTRY WRITING TEAM MEMBERS

Kyle Fallin, Executive Director of Radiology, North Mississippi Medical Center, Tupelo, MS
Matt Heblon, Radiologic Technologist/Clinical Instructor, OCH Regional Medical Center, Starkville, MS
Jennifer Turner, Radiologic Technologist/Clinical Instructor, St. Dominic Hospital, Jackson, MS
*Chelsea Taylor, Radiologic Technologist/Clinical Instructor, St. Dominic Hospital, Jackson, MS
Jessica Moore, Radiologic Technologist/Clinical Instructor, TrustCare, Brandon, MS
Heather Lewis, Radiologic Technologist/Clinical Instructor, TrustCare, Brandon, MS
*Crystal Sumrall, Radiologic Technologist/Clinical Instructor, Baptist Hospital, Jackson, MS
Danny Lumpkin, Radiologic Technologist/Clinical Coordinator, Merit Wesley, Hattiesburg, MS
Victoria Cox, Radiologic Technologist/Clinical Instructor, Marion General Hospital, Columbia, MS
Jim Cowart, Radiologic Technologist/Clinic Instructor, Hattiesburg Clinic, Hattiesburg, MS
Courtney Powell, Radiologic Technologist/Clinical Instructor, Forrest General Hospital, Hattiesburg, MS
Jessica Ladner, Radiologic Technologist/Clinical Instructor, Highland Community Hospital, Picayune, MS
*Ashley Smith, Director of Imaging, St. Dominic Hospital, Jackson, MS
*Daniel Harris, Covington County Hospital, Collins, MS

*Denotes attendance at the writing team meeting.

OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Scott Kolle, Ph.D., Director of Curriculum and Instruction, Mississippi Community College Board
Sheriece Robinson, Ed.D., Curriculum Specialist, Mississippi Community College Board
LaToya Sterling, Curriculum Specialist, Mississippi Community College Board

Contents

RESEARCH ABSTRACT	6
ADOPTION OF NATIONAL CERTIFICATION STANDARDS	7
INDUSTRY JOB PROJECTION DATA	8
ARTICULATION	9
TECHNICAL SKILLS ASSESSMENT	9
ONLINE AND BLENDED LEARNING OPPORTUNITIES	9
PROGRAM DESCRIPTION	10
SUGGESTED COURSE SEQUENCE	11
General Education Core Courses.....	13
COURSE DESCRIPTIONS	14
RGT 1111 Radiologic Seminar I.....	14
RGT 1113(4-5) Clinical Education I	155
RGT 1121 Radiologic Seminar II	18
RGT 1123(4-5) Clinical Education II	19
RGT 113(5-9) Clinical Education III	22
RGT 1212/1213 Fundamentals of Radiography	25
RGT 1222/1223 Patient Care and Radiography	27
RGT 1312 Principles of Radiation Protection	31
RGT 1323 Principles of Exposure and Image Production	35
RGT 1333 Digital Image Acquisition and Display	38
RGT 1513/1514 Radiographic Procedures I	41
RGT 1523 Radiographic Procedures II	44
RGT 1613 Physics of Imaging Equipment.....	46
RGT 2111 Radiographic Seminar III.....	48
RGT 2113 Mammography.....	49
RGT 2121 Radiographic Seminar IV	51
RGT 2123 Sectional Anatomy.....	52
RGT 2132 Ethical and Legal Responsibilities	54
RGT 2133 Computed Tomography.....	56
RGT 2143 Magnetic Resonance Imaging.....	58
RGT 2147(6-7) Clinical Education IV.....	60
RGT 2157(6-7) Clinical Education V.....	63
RGT 2532/2533 Radiographic Procedures III	66
RGT 2542 Radiographic Procedures IV	68
RGT 2911 Radiation Biology.....	71
RGT 2922 Radiographic Pathology.....	73
RGT 2933 Certification Fundamentals	74
APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT	77

APPENDIX B: CURRICULUM DEFINITIONS AND TERMS.....	799
APPENDIX C: COURSE CROSSWALK	811
APPENDIX D: RECOMMENDED TEXTBOOK LIST	822

RESEARCH ABSTRACT

The curriculum framework in this document reflect changes in the workplace and a number of other factors that impact 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. Department 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.

The last validated and approved revision of this curriculum took place in 2014. In the fall of 2018, the Office of Curriculum and Instruction (OCI) met with different industry/program visits. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of the field. Industry members stated the curriculum was strong, but we might want to encourage students upon completion of this program to continue becoming certified in additional modalities. Currently there are some areas where students are being hired as part-time employees waiting on something full-time to open in the radiologic technology field. The Office of Curriculum and Instruction also met with advisory committee members who reiterated what industry had stated. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

ADOPTION OF NATIONAL CERTIFICATION STANDARDS

The American Society of Radiologic Technologists Radiography Curriculum competencies and objectives were adopted for this curriculum. The American Registry of Radiologic Technologists (ARRT) is the world's largest credentialing organization that seeks to ensure high quality patient care in medical imaging, interventional procedures, and radiation therapy.

In support of this mission, the ARRT:

- Adopts and upholds standards for educational preparation for entry into the profession;
- Adopts and upholds standards of professional behavior consistent with the level of responsibility required by professional practice; and
- Develops and administers examinations which assess the knowledge and skills underlying the intelligent performance of the tasks typically required by professional practice in the discipline.

In addition to initial recognition, ARRT provides a mechanism to recognize individuals who continue to demonstrate their qualifications through adherence to the standards of professional behavior and compliance with continuing education requirements.

More information related to these standards can be found at the following website:

https://www.asrt.org/docs/default-source/educators/curriculum/radiography/acad_curr_radcurrfinal2017_20170206.pdf?sfvrsn=2

Industry standards are based on the American Registry of Radiologic Technologists (ARRT) Content Specifications for the Examination in Radiography.

Permission was granted by the American Society of Radiologic Technologists Organization to include the competencies and objectives in this curriculum. More information can be found at:

Stephanie Barela

Administrative Assistant

American Society of Radiologic Technologists

15000 Central Ave, SE

Albuquerque, NM 87123-3909

Phone: 800-444-2778, Ext. 1264 or 505-298-4500, Ext. 1264

Fax: 505-298-5063

sbarela@asrt.org

www.asrt.org

INDUSTRY JOB PROJECTION DATA

The field of radiologic technology is growing steadily. This field provides not only opportunities in direct radiologic technology work but also room for multiple modality skill certifications. There is a 10.31% increase in occupational demand at the national level. Median annual income for radiologic technologists is \$46,613 at the state and regional level. A summary of occupational data from [National Strategic Planning and Analysis Research Center \(nSPARC\)](#) is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Radiologic technologists and technicians	Associate Degree

Table 2: Occupational Overview

	Region	State	United States
2016 Occupational Jobs	1,500	1,500	208,542
2026 Occupational Jobs	1,577	1,577	230,044
Total Change	77	77	21,502
Total % Change	5.13%	5.13%	10.31%
2016 Median Hourly Earnings	\$22.41	\$22.41	\$27.62
2016 Median Annual Earnings	\$46,613	\$46,613	\$57,450
Annual Openings	8	8	13,600

Table 3: Occupational Breakdown

Description	2016 Jobs	2026 Jobs	Annual Openings	2016 Hourly Earnings	2016 Annual Earnings 2,080 Work Hours
Electro-mechanical technicians	1,500	1,577	8	\$22.41	\$46,613
Total	1,500	1,577	8	\$22.41	\$46,613

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Electro-mechanical technicians	77	5.13%	5.13%	10.31%

ARTICULATION

No articulated credit will be offered upon implementation of this curriculum. Local agreements and dual credit partnerships are encouraged.

TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with an Associate of Applied Science Degrees for technical skills attainment:

The *American Registry of Radiologic Technologists (ARRT) Examination* will be used to assess students upon completion of this program, after meeting the requirements for the AAS degree.

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

PROGRAM DESCRIPTION

Radiographers perform imaging examinations and accompanying responsibilities at the request of physicians and/or qualified practitioners qualified to prescribe and/or perform radiologic procedures. They utilize equipment emitting ionizing radiation to produce radiographic images of the internal structures of human anatomy. These radiographic images are utilized by the physician for diagnostic purposes. The radiographer is responsible for all functions in the Radiology Department to ensure consistent radiographic images and provide for personal and patient safety from ionizing radiation. In addition to producing diagnostic images and primary patient care, other responsibilities may include administrative and educational functions, such as completing the requirements for an Associate of Applied Science Degree in Radiologic Technology.

Graduates of this 2-year 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 Technologist Radiographer.

Industry standards are based on the *ARRT Content Specifications for the Examination in Radiography*.

More information for ARRT can be found at <https://www.arrt.org/content-specifications>

SUGGESTED COURSE SEQUENCE

Associate of Applied Science Required Courses

			SCH Breakdown				Contact Hour Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship	Certification Name
RGT 121(2-3)	Fundamentals of Radiography	3	3			45	45			American Registry of Radiologic Technologist (ARRT) Examination
RGT 122(2-3)	Patient Care and Radiography	3	2	2		60	30	30		
RGT 111(3-5)	Clinical Education I	4			12	180			180	
RGT 112(3-5)	Clinical Education II	4			12	180			180	
RGT 113(5-9)	Clinical Education III	9			27	405			405	
RGT 1312	Principles of Radiation Protection	2	2			30	30			
RGT 1323	Principles of Exposure & Image Production	3	2	2		60	30	30		
RGT 1333	Digital Image Acquisition and Display	3	2	2		60	30	30		
RGT 151(3-4)	Radiographic Procedures I	3	2	2		60	30	30		
RGT 1523	Radiographic Procedures II	3	2	2		60	30	30		
RGT 1613	Physics of Imaging Equipment	3	3			45	45			
RGT 2132	Ethical and Legal Responsibilities	2	2			30	30			
RGT 214(6-7)	Clinical Education IV	7			21	315			315	
RGT 215(6-7)	Clinical Education V	7			21	315			315	
RGT 2532	Radiographic Procedures III	2	1	2		45	15	30		
RGT 2542	Radiographic Procedures IV	2	2			30	30			
RGT 2911	Radiation Biology	1	1			15	15			
RGT 2922	Radiographic Pathology	2	2			30	30			
RGT 29(2-3)	Certification Fundamentals	3	3			45	45			
	Total	66	29	12	93	2010	435	180	1395	

Academic Courses for Radiologic Technology

			SCH Breakdown			Credit Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Credit Hours	Lecture	Lab	Certification Name
BIO 1514 or 2514	Anatomy and Physiology I with Lab							
BIO 1524 or 2524	Anatomy and Physiology II with Lab							
MAT 1313	College Algebra*							
	Humanities/Fine Arts							
	Natural Science/Mathematics							
	Social/Behavioral Sciences							
	Other instructor approved courses per local community college requirements to meet for AAS degree.							
TOTAL								

*MAT 1233 Intermediate Algebra may be taken in lieu of MAT 1313 College Algebra

Approved Program Electives

			SCH Breakdown			Credit Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Credit Hours	Lecture	Lab	Certification Name
RGT 1111	Radiologic Seminar I	1	1		15			
RGT 1121	Radiologic Seminar II	1	1		15			
RGT 2111	Radiologic Seminar III	1	1		15			
RGT 2121	Radiologic Seminar IV	1	1		15			
RGT 2113	Mammography	3	3		45			
RGT 2123	Section Anatomy	3	3		45			
RGT 2133	Computed Tomography	3	3		45			
RGT 2143	Magnetic Resonance Imaging	3						
	All other electives approved by instructor							
TOTAL								

General Education Core Courses

To receive the Associate of Applied Science degree, a student must complete all of the required coursework found in the Career Certificate option, Technical certificate option, and a minimum of 15 semester hours of General Education core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science degree at their college. The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) Section 9 Standard 3 of the *Principles of Accreditation: Foundations for Quality Enhancement*¹ describes the general education core.

Section 9 Standard 3:

3. The institution requires the successful completion of a general education component at the undergraduate level that
 - a) is based on a coherent rationale.
 - b) is a substantial component of each undergraduate degree program. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours of the equivalent; for baccalaureate programs, a minimum of 30 semester hours or the equivalent.
 - c) ensures breadth of knowledge. These credit hours include at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. These courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3						
	Social/Behavioral Sciences	3						
	Math/Science	3						
	Academic electives	6						
	TOTAL	15						

¹ Southern Association of Colleges and Schools Commission on Colleges. (2017). *The Principles of Accreditation: Foundations for Quality Enhancement*. Retrieved from <http://www.sacscoc.org/2017ProposedPrinc/Proposed%20Principles%20Adopted%20by%20BOT.pdf>

COURSE DESCRIPTIONS

Course Number and Course Name: RGT 1111 Radiologic Seminar I

Description: This course is designed for students to participate in activities of various professional organizations such as the Radiologic Technology Student Organization, HOSA and other student activities. Leadership skills, an understanding of group dynamics, educational enrichment, stimulation of enthusiasm and interest, community service and rapport among health education professionals are outcomes of this course. One hour per week with additional activities to meet organizational goals.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interaction and cooperation in the modern workplace
 - a. Demonstrate communication skills by actively participating in program and campus activities
 - b. Evaluate new materials added to the classroom
2. Community participation
 - a. Actively participate in a class organized community service project

Course Number and Name: RGT 1113/1114/1115 Clinical Education I

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.

Hour Breakdown:

Semester Credit Hours	Lecture	Clinical	Contact Hours
3	0	9	135
4	0	12	180
5	0	15	225

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply radiographic principles in the clinical setting with respect to program levels ASRT - Clinical Practice 1-36
 - a. Demonstrate skills in assessment and evaluation of psychological and physical changes in the patient's condition, and carry out appropriate actions
 - b. Manage interaction with the patient and family in a manner that provides the desired psychosocial support
 - c. Provide patient and family education appropriate to comprehension level of the patient and family
 - d. Apply radiation protection principles
 - e. Discuss basic X-ray production and interactions
 - f. Operate medical imaging equipment and accessory devices
 - g. Position the patient and medical imaging system to perform examinations and procedures
 - h. Apply knowledge of human structure, function, and pathology
 - i. Evaluate the performance of medical imaging systems
 - j. Evaluate medical images for technical quality
 - k. Apply knowledge and skills relating to recording medical image processing
 - l. Operate equipment within safety limits
 - m. Recognize equipment malfunctions, and report them to the proper authority
 - n. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships
 - o. Demonstrate safe, ethical, and legal practices
 - p. Abide by the profession's code of ethics, and comply with the recognized scope of practice for the profession
 - q. Practice standard precautions at all times
2. Perform clinical application skills for radiographic procedures ASRT - Clinical Practice 1-36
 - a. Practice routine radiographic procedures including the following:
 - (1) Chest
 - (2) Abdomen
 - (3) Upper extremities to include shoulder girdle
 - (4) Digestive system
 - b. Perform image analysis of the following procedures:
 - (1) Chest
 - (2) Abdomen
 - (3) Upper extremities to include shoulder girdle

(4) Digestive system

3. Demonstrate tasks associated with radiographic procedures ASRT - Clinical Practice 1-36
 - a. Abide by 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 and institutions
 - i. Apply basic radiation protection
 - j. Demonstrate effective communication skills
4. Discuss medical and professional culture and diversity ASRT - Clinical Practice 1-36
 - a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
 - m. Contrast differences in age groups
 - 1) Infant
 - 2) Child
 - 3) Adolescent
 - 4) Adult
 - 5) Middle-age
 - 6) Geriatric
 - n. Examine relationships of individuals with regards to differences in religion, spirituality, belief system, lifestyle choices and behaviors, sexual orientation and disability

ASRT - Clinical Practice

1. Exercise the priorities required in daily clinical practice
2. Execute medical imaging procedures under the appropriate level of supervision
3. Adhere to team practice concepts that focus on organizational theories, roles of team members and conflict resolution
4. Adapt to changes and varying clinical situations
5. Describe the role of health care team members in responding/reacting to a local or national emergency
6. Provide patient-centered, clinically effective care for all patients regardless of age, gender, disability, special needs, ethnicity or culture
7. Integrate the use of appropriate and effective written, oral and nonverbal communication with patients, the public and members of the health care team in the clinical setting

8. Integrate appropriate personal and professional values into clinical practice
9. Recognize the influence of professional values on patient care
10. Explain how a person's cultural beliefs toward illness and health affect his or her health status
11. Use patient and family education strategies appropriate to the comprehension level of the patient/family
12. Provide desired psychosocial support to the patient and family
13. Demonstrate competent assessment skills through effective management of the patient's physical and mental status
14. Respond appropriately to medical emergencies
15. Examine demographic factors that influence patient compliance with medical care
16. Adapt procedures to meet age-specific, disease-specific and cultural needs of patients
17. Assess the patient and record clinical history
18. Demonstrate basic life support procedures
19. Use appropriate charting methods
20. Recognize life-threatening electrocardiogram (ECG) tracing
21. Apply standard and transmission-based precautions
22. Apply the appropriate medical asepsis and sterile technique
23. Demonstrate competency in the principles of radiation protection standards
24. Apply the principles of total quality management
25. Report equipment malfunctions
26. Examine procedure orders for accuracy and make corrective actions when applicable
27. Demonstrate safe, ethical and legal practices
28. Integrate the radiographer's practice standards into clinical practice setting
29. Maintain patient confidentiality standards and meet HIPAA requirements
30. Demonstrate the principles of transferring, positioning and immobilizing patients
31. Comply with departmental and institutional response to emergencies, disasters and accidents
32. Differentiate between emergency and non-emergency procedures
33. Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors
34. Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible
35. Critique images for appropriate anatomy, image quality and patient identification
36. Determine corrective measures to improve inadequate images

Course Number and Course Name: RGT 1121 Radiologic Seminar II

Description: This course is designed for students to participate in activities of various professional organizations such as the Radiologic Technology Student Organization, HOSA and other student activities. Leadership skills, an understanding of group dynamics, educational enrichment, stimulation of enthusiasm and interest, community service and rapport among health education professionals are outcomes of this course. One hour per week with additional activities to meet organizational goals.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interaction and cooperation in the modern workplace
 - a. Demonstrate problem-solving skills by actively participating in program and campus activities
 - b. Locate and utilize local resource sources
2. Community participation
 - a. Actively participate in a class organized community service project

Course Number and Name: RGT 1123/1124/1125 Clinical Education II

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.

Hour Breakdown:

Semester Credit Hours	Lecture	Clinical	Contact Hours
3	0	9	135
4	0	12	180
5	0	15	225

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply radiographic principles in the clinical setting with respect to program levels ASRT - Clinical Practice 1-36
 - a. Demonstrate skills in assessment and evaluation of psychological and physical changes in the patient's condition, and carry out appropriate actions
 - b. Manage interaction with the patient and family in a manner that provides the desired psychosocial support
 - c. Provide patient and family education appropriate to comprehension level of the patient and family
 - d. Apply radiation protection principles
 - e. Discuss basic X-ray production and interactions
 - f. Operate medical imaging equipment and accessory devices
 - g. Position the patient and medical imaging system to perform examinations and procedures
 - h. Apply knowledge of human structure, function, and pathology
 - i. Evaluate the performance of medical imaging systems
 - j. Evaluate medical images for technical quality
 - k. Apply knowledge and skills relating to recording medical image processing
 - l. Operate equipment within safety limits
 - m. Recognize equipment malfunctions, and report them to the proper authority
 - n. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships
 - o. Demonstrate safe, ethical, and legal practices
 - p. Abide by the profession's code of ethics, and comply with the recognized scope of practice for the profession
 - q. Practice standard precautions at all times
2. Perform clinical application skills for radiographic procedures ASRT - Clinical Practice 1-36
 - a. Practice routine radiographic procedures including the following:
 - (1) Spinal column
 - (2) Pelvic girdle
 - (3) Lower extremities
 - (4) Urinary systems
 - b. Perform image analysis on the following procedures:
 - (1) Spinal column
 - (2) Pelvic girdle
 - (3) Lower extremities
 - (4) Urinary systems
 - (5) Bony thorax

3. Demonstrate tasks associated with radiographic procedures ASRT - Clinical Practice 1-36
 - a. Perform routine radiographic procedures including the following:
 - (1) Chest
 - (2) Abdomen
 - (3) Digestive system
 - (4) Upper extremities and shoulder girdle
 - (5) Evaluate image analysis
4. Discuss medical and professional culture and diversity ASRT - Clinical Practice 1-36
 - a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
 - m. Contrast differences in age groups
 - 1) Infant
 - 2) Child
 - 3) Adolescent
 - 4) Adult
 - 5) Middle-age
 - 6) Geriatric
 - n. Examine relationships of individuals with regards to differences in religion, spirituality, belief system, lifestyle choices and behaviors, sexual orientation and disability

ASRT - Clinical Practice

1. Exercise the priorities required in daily clinical practice
2. Execute medical imaging procedures under the appropriate level of supervision
3. Adhere to team practice concepts that focus on organizational theories, roles of team members and conflict resolution
4. Adapt to changes and varying clinical situations
5. Describe the role of health care team members in responding/reacting to a local or national emergency
6. Provide patient-centered, clinically effective care for all patients regardless of age, gender, disability, special needs, ethnicity or culture
7. Integrate the use of appropriate and effective written, oral and nonverbal communication with patients, the public and members of the health care team in the clinical setting
8. Integrate appropriate personal and professional values into clinical practice
9. Recognize the influence of professional values on patient care
10. Explain how a person's cultural beliefs toward illness and health affect his or her health status
11. Use patient and family education strategies appropriate to the comprehension level of the patient/family

12. Provide desired psychosocial support to the patient and family
13. Demonstrate competent assessment skills through effective management of the patient's physical and mental status
14. Respond appropriately to medical emergencies
15. Examine demographic factors that influence patient compliance with medical care
16. Adapt procedures to meet age-specific, disease-specific and cultural needs of patients
17. Assess the patient and record clinical history
18. Demonstrate basic life support procedures
19. Use appropriate charting methods
20. Recognize life-threatening electrocardiogram (ECG) tracing
21. Apply standard and transmission-based precautions
22. Apply the appropriate medical asepsis and sterile technique
23. Demonstrate competency in the principles of radiation protection standards
24. Apply the principles of total quality management
25. Report equipment malfunctions
26. Examine procedure orders for accuracy and make corrective actions when applicable
27. Demonstrate safe, ethical and legal practices
28. Integrate the radiographer's practice standards into clinical practice setting
29. Maintain patient confidentiality standards and meet HIPAA requirements
30. Demonstrate the principles of transferring, positioning and immobilizing patients
31. Comply with departmental and institutional response to emergencies, disasters and accidents
32. Differentiate between emergency and non-emergency procedures
33. Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors
34. Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible
35. Critique images for appropriate anatomy, image quality and patient identification
36. Determine corrective measures to improve inadequate images

Course Number and Name: RGT 113(5-9) Clinical Education III

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.

Hour Breakdown:

Semester Credit Hours	Lecture	Clinical	Contact Hours
5	0	15	225
6	0	18	270
7	0	21	315
8	0	24	360
9	0	27	405

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply radiographic principles in the clinical setting with respect to program levels ASRT - Clinical Practice 1-36
 - a. Demonstrate skills in assessment and evaluation of psychological and physical changes in the patient's condition, and carry out appropriate actions
 - b. Manage interaction with the patient and family in a manner that provides the desired psychosocial support
 - c. Provide patient and family education appropriate to comprehension level of the patient and family
 - d. Apply radiation protection principles
 - e. Discuss basic X-ray production and interactions
 - f. Operate medical imaging equipment and accessory devices
 - g. Position the patient and medical imaging system to perform examinations and procedures
 - h. Apply knowledge of human structure, function, and pathology
 - i. Evaluate the performance of medical imaging systems
 - j. Evaluate medical images for technical quality
 - k. Apply knowledge and skills relating to recording medical image processing
 - l. Operate equipment within safety limits
 - m. Recognize equipment malfunctions, and report them to the proper authority
 - n. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships
 - o. Demonstrate safe, ethical, and legal practices
 - p. Abide by the profession's code of ethics, and comply with the recognized scope of practice for the profession
 - q. Practice standard precautions at all times
 - r. Adhere to concepts of team practice that focus on organizational theories, roles of team members, and conflict resolution
 - s. Evaluate procedure orders for accuracy, and follow up to make corrective changes
 - t. Exercise independent judgment and discretion in the technical performance of medical imaging procedures
2. Perform clinical application skills for radiographic procedures ASRT - Clinical Practice 1-36
 - a. Practice routine radiographic procedures including the following:
 - (1) Mobile (portable) radiography
 - (2) Trauma
 - b. Perform image analysis of the following:
 - (1) Mobile (portable) radiography

(2) Trauma Outline documentation procedures when abuse is suspected

3. Demonstrate tasks associated with radiographic procedures ^{ASRT - Clinical Practice 1-36}
- a. Perform routine radiographic procedures including the following:
 - (1) Spine
 - (2) Pelvic girdle
 - (3) Lower extremities
 - (4) Urinary systems
 - (5) Bony thorax
 - b. Perform advanced radiographic procedures including the following:
 - (1) Chest
 - (2) Abdomen
 - (3) Digestive system
 - (4) Upper extremities including shoulder girdle
 - (5) Bony thorax
4. Discuss medical and professional culture and diversity ^{ASRT - Clinical Practice 1-36}
- a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
 - m. Contrast differences in age groups
 - 1) Infant
 - 2) Child
 - 3) Adolescent
 - 4) Adult
 - 5) Middle-age
 - 6) Geriatric
 - n. Examine relationships of individuals with regards to differences in religion, spirituality, belief system, lifestyle choices and behaviors, sexual orientation and disability

ASRT - Clinical Practice

1. Exercise the priorities required in daily clinical practice
2. Execute medical imaging procedures under the appropriate level of supervision
3. Adhere to team practice concepts that focus on organizational theories, roles of team members and conflict resolution
4. Adapt to changes and varying clinical situations
5. Describe the role of health care team members in responding/reacting to a local or national emergency
6. Provide patient-centered, clinically effective care for all patients regardless of age, gender, disability, special needs, ethnicity or culture

7. Integrate the use of appropriate and effective written, oral and nonverbal communication with patients, the public and members of the health care team in the clinical setting
8. Integrate appropriate personal and professional values into clinical practice
9. Recognize the influence of professional values on patient care
10. Explain how a person's cultural beliefs toward illness and health affect his or her health status
11. Use patient and family education strategies appropriate to the comprehension level of the patient/family
12. Provide desired psychosocial support to the patient and family
13. Demonstrate competent assessment skills through effective management of the patient's physical and mental status
14. Respond appropriately to medical emergencies
15. Examine demographic factors that influence patient compliance with medical care
16. Adapt procedures to meet age-specific, disease-specific and cultural needs of patients
17. Assess the patient and record clinical history
18. Demonstrate basic life support procedures
19. Use appropriate charting methods
20. Recognize life-threatening electrocardiogram (ECG) tracing
21. Apply standard and transmission-based precautions
22. Apply the appropriate medical asepsis and sterile technique
23. Demonstrate competency in the principles of radiation protection standards
24. Apply the principles of total quality management
25. Report equipment malfunctions
26. Examine procedure orders for accuracy and make corrective actions when applicable
27. Demonstrate safe, ethical and legal practices
28. Integrate the radiographer's practice standards into clinical practice setting
29. Maintain patient confidentiality standards and meet HIPAA requirements
30. Demonstrate the principles of transferring, positioning and immobilizing patients
31. Comply with departmental and institutional response to emergencies, disasters and accidents
32. Differentiate between emergency and non-emergency procedures
33. Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors
34. Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible
35. Critique images for appropriate anatomy, image quality and patient identification
36. Determine corrective measures to improve inadequate images

Course Number and Name: RGT 1212/1213 Fundamentals of Radiography

Description: This course is an introduction to Radiologic Technology including professional, departmental, and historical aspects. Included are terminology, medical ethics, and fundamental legal responsibilities.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe the role, organization, and structure of the program, radiology department, hospital, and professions ASRT Introduction to Radiologic Science and Health Care 1-17
 - a. Identify other health science professions that participate in the patient's total health care
 - b. Describe the relationship of these health-care workers to the integrated care of patients
 - c. Identify the various sites and settings in which health care is delivered
 - d. Define the reimbursement and payment options for health-care services and the importance of CPT coding
 - e. Discuss the general employment outlook for the graduate radiographer
 - f. Discuss career advancement and opportunities for the radiographer
 - g. Identify the benefits of continuing education as related to improved patient care and professional enhancement
 - h. Discuss the philosophy and mission of the affiliated hospital and clinical education center(s)
 - i. Identify selected administrative personnel, and discuss their relationship with the radiology department
 - j. Describe relationships and interdependencies of departments within the hospitals and clinical education center(s)
 - k. Identify and discuss the responsibilities and relationships of all personnel in the radiology department
 - l. Explain patient services available in the radiology department
 - m. Define accreditation, credentialing, certification, licensure, and regulations
 - n. Describe how the JRCERT Standards for an accredited educational program in Radiologic Sciences relate to the educational program
 - o. Explain the difference between the accreditation and credentialing processes, and identify agencies involved in each process
 - p. Differentiate between programmatic and institutional accreditation
 - q. Identify the responsibilities of the health-care facility and members of the health-care team
 - r. List the general responsibilities of the radiographer
 - s. Describe the Scope of Practice for the radiographer as defined by the American Society of Radiologic Technologists (ASRT) and state licensure
 - t. Explain the use of various communication devices and systems
 - u. Explain the purpose, legal considerations, and procedures for reporting an accident or incident
2. Discuss ethical issues and dilemmas in health care ASRT Introduction to Radiologic Science and Health Care 1-17
 - a. Describe specialized standards of behavior for the healing arts as a continuum, with historical and philosophical roots in the earliest periods of human history

- b. List the major milestones in the development of codes of behavior and ethical standards in the healing arts
 - c. Explain ethics as a branch of philosophy and the moral, social, and cultural basis of the development of an ethic
 - d. Describe the moral, social, and cultural basis of ethics
 - e. Apply medical and professional ethics in the context of a broader societal ethic
 - f. Explain the role of ethical behavior in health-care delivery
 - g. Differentiate between empathetic rapport and sympathetic involvement in relationships with patients, and relate these to ethical conduct
 - h. Explain concepts of personal honesty, integrity, accountability, competence, and compassion as ethical imperatives in health care
 - i. Identify and describe accepted codes or guidelines for professional ethics in the chosen health profession
 - j. Identify specific ethical situations and dilemmas in health care that may impact the radiographer
 - k. Explain a basic system of examination, clarification, determination of alternatives, and decision making in addressing ethical questions and situations
 - l. Explain basic concepts embodied in principles of patients' rights, the doctrine of informed (patient) consent, and other issues related to patients' rights, including HIPAA
 - m. Identify the fundamental legal implications of professional liability, malpractice, professional negligence and carelessness, and other legal doctrines applicable to professional practice
3. Translate medical terms, abbreviations, and symbols into common language ASRT Introduction to Radiologic Science and Health Care 1-17
- a. Define, spell, and pronounce medical terms
 - b. Understand the word building process
 - c. Interpret medical abbreviations and symbols
 - d. Understand orders, requests, and diagnostic reports
 - e. Comprehend radiation science terms

ASRT - Introduction to Radiologic Science and Health Care

1. Identify health science professions that participate in the total health care of the patient
2. Identify various settings involved in the delivery of health care
3. Discuss the reimbursement/payment options for health care services
4. Discuss the role and value of a mission statement to the operation of a health care institution
5. Describe relationships and interdependencies of departments within a health care institution
6. Discuss the responsibilities and relationships of all personnel in the radiology department
7. Differentiate between accreditation types
8. Identify state and federal regulatory agencies
9. Define credentialing, national certification and registration and state licensure
10. Describe the types, purposes and functions of professional organizations
11. Discuss career opportunities and advancement for the radiographer
12. Identify the benefits of continuing education as related to improved patient care and professional development
13. Apply the word-building process of medical terminology
14. Interpret medical abbreviations and symbols
15. Critique orders, requests and diagnostic reports
16. Define medical imaging and radiation oncology terms
17. Translate medical terms, abbreviations and symbols from medical reports into layman's terms

Course Number and Name: RGT 1222/1223 Patient Care and Radiography

Description: Content provides the concepts of optimal patient care, including consideration for the physical and psychological needs of the patient and family. Routine and emergency patient care procedures are described, as well as infection control procedures using standard precautions. The role of the radiographer in patient education is identified.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Employ interpersonal skills to alleviate patients' fears, and promote a professional environment ^{ASRT -}
Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
 - 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 the following:
 - (1) Audio and visual communication systems
 - (2) Immobilization devices
 - (3) Machine type
 - (4) Auxiliary equipment
 - j. Alleviate fears by explaining the following:
 - (1) Positioning for examination
 - (2) Length of procedure
 - (3) Room noises
 - (4) Machine movement
 - (5) Machine and patient contact
 - k. Interact with patients' family members and friends using case studies
 - l. Identify select perceptions of death and dying from patient and technologist viewpoints
 - m. Identify ethical, emotional, personal, and physical aspects of death
 - n. Define communication
 - o. Identify methods of communication, and discuss how each can be utilized in patient education
 - p. Identify patient communication problems, and discuss how each can be overcome to provide patient education
 - q. Demonstrate explanations of radiographic examinations when given clinical simulations (e.g., chest, UGI, and extremity)
 - r. Demonstrate explanations for patients with various communication problems (e.g., hearing, vision, and speech problems; impaired mental function; altered states of consciousness; and patients who do not speak English) using clinical simulations
 - s. Explain the role of the technologist in patient education

2. Employ general environmental safety precautions ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
 - a. Demonstrate correct principles of body mechanics applicable to patient care
 - b. Demonstrate techniques for specific types of patient transfer
 - c. Demonstrate select procedures for turning patients with various health conditions
 - d. Describe select immobilization techniques for various types of procedures and patient conditions
 - e. Describe specific patient safety measures and concerns
 - f. Discuss procedures for assuring security of property of inpatients and outpatients
3. Evaluate physical needs ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
 - 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 the Celsius equivalent
 - 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
 - k. List the normal ranges for specific laboratory studies
4. Describe infection control precautions ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
 - a. Define terms related to infection control
 - b. Describe the importance of standard precautions and isolation procedures
 - c. Explain sources and modes of transmission of infections and diseases
 - d. List institutional and departmental procedures for infection control
 - e. Describe methods for the prevention of infection to the health worker and patient
5. Recognize and employ appropriate responses to acute situations and medical emergencies ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
 - a. Identify symptoms related to specific emergency situations
 - b. Describe the emergency medical code system for the institution and the role of the student during a medical emergency
 - c. Demonstrate the use of specific medical emergency equipment and supplies
 - d. Given simulations, demonstrate the use of oxygen, suction and pulse oximetry equipment
 - e. Given simulations, demonstrate select first aid techniques
 - f. List the special considerations necessary when performing radiographic procedures on an infant or a child
 - g. List the special considerations necessary when performing radiographic procedures on a geriatric patient
 - h. List the symptoms and precautions taken for a patient with a head injury
 - i. List the symptoms and precautions taken for a patient with a spinal injury
 - j. List the types, immobilization devices, and positioning for upper and lower extremity fractures
 - k. List the symptoms and precautions taken for a patient with massive wounds
 - l. List the classifications and medical interventions for burns
 - m. Describe the symptoms and medical interventions for a patient having a reaction to contrast agents

6. Respond to patient needs in special situations ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
- Explain the role of the technologist in patient education
 - Describe the different types of patient preparation for barium studies
 - Describe the procedure to properly prepare a patient for a barium study
 - Describe the purpose for using contrast agents
 - 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)
 - Identify the precautions involved when given specific tube management situations (nasogastric, suction, tracheostomy, chest tube, tissue drains, oxygen administration, urinary collection, and other ostomies)
 - Identify the steps in the operation and maintenance of suction equipment
 - Identify the monitoring, pre- and post-procedure care, drug administration, and special precautions for a patient undergoing myelography and urography
 - Demonstrate the appropriate procedure for gathering information prior to performing a bedside radiographic examination
 - Describe the initial steps in performing a bedside procedure
 - Describe the special precautions to be used when performing a procedure on a neonate
 - Explain the procedure for placing an image receptor under a patient in an orthopedic bed frame
 - Describe the special problems faced in performing procedures on patients with tracheotomy and specific tubes, drains, and catheters
 - Describe the procedure for producing diagnostic images in the surgical suite and endoscopy
7. Describe routine and special views of the respiratory system in terms of structure(s) visualized and function(s) demonstrated including general and positioning considerations ASRT - Patient Care in Radiologic Sciences 1-33, ASRT - Pharmacology and Venipuncture 1-14
- Explain the structure(s) visualized and function(s) demonstrated including general and positioning considerations involved for routine and special views of the respiratory system given clinical simulations
 - Simulate radiographic procedures related to the respiratory system in a laboratory environment
 - Evaluate radiographs of various parts of the respiratory system in terms of positioning accuracy and image quality

ASRT - Patient Care in Radiologic Sciences

- Identify the responsibilities of the health care facility and members of the health care team
- List the general responsibilities of the radiographer
- Describe the practice standards for the radiographer as defined by the ASRT and state licensure
- Differentiate between culture and ethnicity
- Explain how a person's cultural beliefs toward illness and health affect his or her health status
- Explain perceptions of dying and death from the viewpoint of both patient and radiographer
- Identify methods for determining the correct patient for a given procedure
- Explain the use of various communication models
- Explain specific aspects of a radiographic procedure to the patient
- Demonstrate correct principles of body mechanics applicable to patient care
- Demonstrate techniques for specific types of patient transfer
- Demonstrate select procedures to turn patients who have various health conditions
- Describe immobilization techniques for various types of procedures and patient conditions
- Describe specific patient safety measures and concerns
- Explain the purpose, legal considerations and procedures for incident reporting
- Describe methods to evaluate patient physical status

17. List the information to be collected prior to a patient examination
18. Describe vital signs and lab values used to assess the condition of the patient, including sites for assessment and normal values
19. Define terms related to infection control
20. Describe the importance of standard precautions and isolation procedures, including sources and modes of transmission of infection and disease and institutional control procedures
21. Identify symptoms related to specific emergency situations
22. Describe the institution's emergency medical code system and the role of the student during a medical emergency
21. Explain the age-specific considerations necessary when performing radiographic procedures
22. Describe appropriate procedures for management of various types of trauma situations
23. Describe the symptoms and medical interventions for a patient with a contrast agent reaction
24. Explain the role of the radiographer in patient education
25. Describe the patient preparation for contrast studies
26. Identify specific types of tubes, lines, catheters and collection devices
27. Outline the steps in the operation and maintenance of suction equipment
28. Outline the steps in the operation and maintenance of oxygen equipment and demonstrate proper use
29. Demonstrate competency in basic life support (BLS)
30. Describe the steps in performing various mobile procedures
31. Describe the special problems faced in performing procedures on a patient with a tracheotomy and specific tubes, drains and catheters
32. Describe the procedure for producing diagnostic images in the surgical suite
33. Explain the appropriate radiation protection required when performing mobile/surgical radiography

ASRT - Pharmacology and Venipuncture

1. Distinguish between the chemical, generic and trade names of various drugs
2. Describe the pharmacokinetic, pharmacodynamic and pharmacogenetic principles of drugs
3. Explain the uses and impact on the patient of different categories of drugs
4. Define the categories of contrast agents and give specific examples for each category
5. Explain the pharmacology of contrast agents
6. Describe methods and techniques for administering various types of contrast agents
7. Identify and describe the routes of drug administration
8. Demonstrate appropriate venipuncture technique
9. Differentiate between the two major sites of intravenous drug administration
10. Identify, describe and document complications associated with venipuncture and appropriate actions to resolve these complications
11. Discuss the various elements of initiating and discontinuing intravenous access
12. Differentiate and document dose calculations for adult and pediatric patients
13. Prepare for injection of contrast agents or intravenous medications using aseptic technique
14. Explain the current legal status and professional liability issues of the radiographer's role in contrast and drug administration

Course Number and Name: **RGT 1312** **Principles of Radiation Protection**

Description: This course is designed to present an overview of the principles of radiation protection including the responsibilities of the radiographer for patients, personnel, and the public. Radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies, and health-care organizations are incorporated.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Examine concepts involved in an effective radiation protection program ASRT – Radiation Protection 1-61
 - a. Identify and justify the need to minimize unproductive radiation exposure of humans
 - b. 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
2. Discuss the methods of detection and measurement of ionizing radiation ASRT – Radiation Protection 1-61
 - 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: ion-chambers, proportional counters, and thermoluminescent dosimeters (TLDs)
 - 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
 - h. Describe the relationship between equipment exposure value and patient dose
3. Review radiation surveys and regulatory agency regulations ASRT – Radiation Protection 1-61
 - 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 that 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 No. 3d
 - f. Describe the operation of various interlocking systems for equipment in objective No. 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 and the CARE (Consumer Assurance of Radiologic Excellence) Bill
 - 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
4. Identify occupational exposure limits and methods of personnel monitoring ASRT – Radiation Protection 1-61
- a. Identify the need and importance of personnel monitoring for radiation workers
 - b. Identify and describe the following monitoring devices:
 - (1) Body badge and ring badge
 - (2) Thermoluminescent dosimeters (TLDs)
 - (3) Pocket ionization chambers
 - c. List applications, advantages, and limitations for each device in objective No. 4b
 - d. Interpret personnel monitoring reports
 - e. Identify those structures that are considered critical for potential late effects for whole body irradiation exposure
 - f. State dose limits with reference to the latest NCRP reports
5. Analyze components of an effective patient protection program ASRT – Radiation Protection 1-61
- 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 relationship of exposure factors to patient dosage
 - f. Discuss various photon interactions in terms of description of interaction, relation to atomic number, and applications
 - g. Define photodisintegration
 - h. State the desired image receptor combination that will result in an optimum diagnostic image with the minimum radiation exposure to the patient using a list of various radiographic procedures
 - i. Discuss methods to avoid repeat radiographs
 - j. Discuss the importance of clear, concise instructions (effective communication skills) as a method of radiation protection
 - k. Discuss the effect(s) of immobilization techniques to eliminate voluntary motion
 - l. Describe the minimum source-to-tabletop distances for fixed and mobile fluoroscopes
 - m. Discuss safety factors for the patient (and other patients) in the room during mobile radiographic procedures
6. Utilize concepts of practical radiation protection ASRT – Radiation Protection 1-61
- a. Describe how isoexposure curves are used for radiation protection
 - 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 X-ray and 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 this 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 quality assurance 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/tenth-value layer and shielding design
- j. Identify emergency procedures to be followed during failures of X-ray mechanisms

ASRT – Radiation Protection

1. Describe fundamental atomic structure
2. Explain the processes of ionization and excitation
3. Describe the electromagnetic spectrum
4. Describe wavelength and frequency and how they are related to velocity
5. Explain the relationship of energy, wavelength and frequency
6. Explain the wave-particle duality phenomena
7. Identify the properties of x-rays
8. Describe particulate radiation
9. Differentiate between ionizing and nonionizing radiation
10. Describe radioactivity and radioactive decay in terms of alpha, beta and gamma emission
11. Compare the production of bremsstrahlung and characteristic radiations
12. Describe the conditions necessary to produce x-radiation
13. Describe the x-ray emission spectrum
14. Explain the factors that affect the x-ray emission spectrum
15. Discuss various photon interactions with matter
16. Discuss relationships of wavelength and frequency to beam characteristics
17. Discuss the clinical significance of the photoelectric and modified scattering (Compton) interactions in diagnostic imaging
18. Identify and justify the need to minimize unnecessary radiation exposure of humans
19. Explain the objectives of a radiation protection program
20. Define radiation and radioactivity units of measurement
21. Identify effective dose limits (EDL) for occupational and nonoccupational radiation exposure
22. Describe the ALARA concept
23. Identify the basis for occupational exposure limits
24. Distinguish between perceived risk and comparable risk
25. Describe the concept of the negligible individual dose (NID)
26. Identify ionizing radiation sources from natural and man-made sources
27. Comply with legal and ethical radiation protection responsibilities of radiation workers
28. Describe the relationship between irradiated area and effective dose
29. Describe the theory and operation of radiation detection devices
30. Identify appropriate applications and limitations for each radiation detection device
31. Describe how isoexposure curves are used for radiation protection
32. Identify performance standards for beam-limiting devices
33. Describe procedures used to verify performance standards for equipment

34. Describe the operation of various interlocking systems for equipment
35. Identify conditions and locations evaluated in an area survey for radiation protection
36. Distinguish between controlled and non-controlled areas and list acceptable exposure levels
37. Describe "Radiation Area" signs and identify appropriate placement sites
38. Describe the function of federal, state and local regulations governing radiation protection practices
39. Describe the qualifications and responsibilities of a radiation safety officer
40. Express the need and importance of personnel monitoring for radiation workers
41. Describe personnel monitoring devices, including applications, advantages and limitations for each device
42. Interpret personnel monitoring reports
43. Compare values for individual effective dose limits for occupational radiation exposures (annual and lifetime)
44. Identify effective dose limits for the embryo and fetus in occupationally exposed women
45. Distinguish between primary and secondary radiation barriers
46. Demonstrate how the operation of various x-ray and ancillary equipment influences radiation safety and describe the potential consequences of equipment failure
47. Perform calculations of exposure with varying time, distance and shielding
48. Discuss the relationship between workload, energy, half-value layer (HVL), tenth-value layer (TVL), use factor and shielding design
49. Identify emergency procedures to be followed during failures of x-ray equipment
50. Demonstrate how time, distance and shielding can be manipulated to keep radiation exposures to a minimum
51. Explain the relationship of beam-limiting devices to patient radiation protection
52. Discuss added and inherent filtration in terms of the effect on patient dosage
53. Explain the purpose and importance of patient shielding
54. Identify various types of patient shielding and state the advantages and disadvantages of each type
55. Use the appropriate method of shielding for a given radiographic or fluoroscopic procedure
56. Explain the relationship of exposure factors to patient dosage
57. Explain how patient position affects dose to radiosensitive organs
58. Identify the appropriate image receptor that will result in an optimum diagnostic image with the minimum radiation exposure to the patient
59. Select the immobilization techniques used to eliminate voluntary motion
60. Describe the minimum source-to-tabletop distances for fixed and mobile fluoroscopic devices
61. Apply safety factors for the patient, health care personnel and family members in the room during radiographic/fluoroscopic procedures

Course Number and Name: **RGT 1323** **Principles of Exposure and Image Production**

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, beam limiting devices, filtration, production and control of scatter and secondary radiation, exposure systems, technical conversions, and problem solving.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Analyze exposure factors to achieve optimum radiographic quality
 - a. Discuss practical considerations in setting imaging standards
 - b. Discuss acceptance limits
2. Determine exposure factors to achieve optimum radiographic image quality with a minimum radiation exposure to the patient
 - a. Define receptor exposure
 - b. Identify the acceptable range of radiographic exposure
 - c. Analyze relationships of factors affecting radiographic exposure
3. 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 image grayscale (contrast)
 - c. Analyze relationships of factors affecting radiographic grayscale (contrast)
4. Determine exposure factors to achieve optimum radiographic spatial resolution detail with a minimum radiation exposure to the patient
 - a. Define spatial resolution
 - b. Differentiate between umbra and penumbra
 - c. Analyze relationships of factors affecting spatial resolution
5. 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
6. 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
7. 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
8. 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
- 9. 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 that 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
- 10. 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 cutoff
 - g. Describe factors influencing grid cutoff
 - h. Describe various grid artifacts
 - i. Explain the relationship between beam limitation and scattered and secondary radiation
- 11. 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
- 12. 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

ASRT – Principles of Exposure and Image Production

1. Discuss practical considerations in setting standards for acceptable image quality
2. Assess radiographic exposure on radiographic images
3. Analyze the relationships of factors that control and affect image exposure
4. Critique the radiographic contrast within various radiographic images
5. Analyze the relationship of factors that control and affect radiographic contrast
6. Critique spatial resolution on various radiographic images
7. Analyze the relationships of factors that control and affect spatial resolution
8. Differentiate between size and shape distortion
9. Perform calculations to determine image magnification and percent magnification
10. Summarize the relationship of factors that control and affect distortion
11. Explain the rationale for using beam restriction
12. Describe the operation and applications for different types of beam restriction
13. Explain how beam filtration affects x-ray beam intensity, beam quality and patient exposure
14. Describe the change in the half-value layer (HVL) when filtration is added or removed
15. Summarize the relationship of factors affecting scattered radiation
16. Evaluate the effects of scattered radiation on the image
17. Compare grid types
18. Select the most appropriate grid for a given clinical situation

19. Interpret grid efficiency in terms of grid ratio and frequency
20. Summarize the factors that influence grid cutoff
21. Evaluate grid artifacts
22. Explain the use of standardized radiographic technique charts
23. Explain exposure factor considerations involved in selecting techniques
24. Compare fixed kilovoltage peak (kVp) and variable kVp systems
25. Apply the reciprocity law to clinical situations
26. Apply conversion factors for changes in the following areas: distance, grid, image receptors, reciprocity law and the 15 percent rule
27. Discuss the elements of a radiographic image
28. Apply a problem-solving process used for image analysis
29. Describe the role of the radiographer in image analysis
30. Apply a process for evaluating images for adequate image receptor exposure, exposure indicator contrast/grayscale/spatial resolution, identification markers and appropriate use of beam restriction
31. Apply a process for evaluating images for acceptable limits of distortion, image artifacts, radiation fog, noise and gross exposure error
32. Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary
33. Differentiate between technical factor problems, procedural factor problems and equipment malfunctions

Course Number and Name: RGT 1333 Digital Image Acquisition and Display

Description: Content imparts an understanding of the components, principles and operation of digital imaging systems found in diagnostic radiology. Factors that impact image acquisition, display, archiving and retrieval are discussed. Principles of digital system quality assurance and maintenance are presented.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss the fundamentals of digital radiography, distinguishing between cassette-based systems and cassette-less systems ASRT - Digital Image Acquisition and Display 1-46, Introduction to Computed Tomography 1-11
 - a. Define terminology associated with digital imaging systems
 - b. Describe the various types of digital receptors
 - c. Apply the fundamental principles to digital detectors
 - d. Describe the fundamental physical principles of exposure for digital detectors
2. Compare the image acquisition and extraction of cassette-based vs. cassette-less systems, including detector mechanism, initial image processing, histogram analysis, automatic rescaling, and exposure index determination ASRT - Digital Image Acquisition and Display 1-46, Introduction to Computed Tomography 1-11
 - a. Compare the advantages and limits of each system
 - b. Describe the evaluative criteria for digital radiography detectors
 - c. Describe the response of digital detectors to exposure variations
 - d. Describe the histogram and the process or histogram analysis as it relates to automatic rescaling and determining an exposure indicator
 - e. Compare dynamic range to latitude of a screen/film receptor system to that of a digital radiography system
 - f. Given the performance criteria for a digital radiography detector, evaluate the spatial resolution and dose effectiveness
 - g. Describe or identify the exposure indices used by each photostimulable phosphor (PSP)-based system
 - h. Employ appropriate beam/part/receptor alignment to avoid histogram analysis errors
 - i. Describe the various image processing employed for digital images
 - j. Evaluate the effect of a given exposure change on histogram shape, data width, and image appearance
 - k. Associate impact of image processing parameters to the image appearance
3. Describe the difference between dose area product (DAP) measured with a flat panel system vs. the exposure index for a PSP-based system ASRT - Digital Image Acquisition and Display 1-46, Introduction to Computed Tomography 1-11
 - a. Identify common limitations and technical problems encountered when using PSP systems
 - b. Relate the receptor exposure indicator values to technical factors, system calibration, part/beam/plate alignment, and patient exposure
 - c. Describe image acquisition precautions necessary for CR imaging
 - d. Describe the response of PSP systems to background and scatter radiation
4. Associate effects of inappropriate processing on image clarity or conspicuity ASRT - Digital Image Acquisition and

Display 1-46, Introduction to Computed Tomography 1-11

- a. Describe the selection of technical factors and technical factor systems to assure appropriate receptor exposure levels for digital detectors
 - b. Describe the conditions that cause quantum mottle in a digital image
 - c. Utilize appropriate means of scatter control
 - d. Avoid grid use errors associated with grid cutoff and Moiré effect
 - e. Formulate a procedure or process to minimize histogram analysis and rescaling errors
5. Define digital imaging and communications in medicine (DICOM) ASRT - Digital Image Acquisition and Display 1-46, Introduction to Computed Tomography 1-11
 - a. Describe Picture Archival and Communications System (PACS) and its function
 - b. Identify components of a PACS system
 - c. Describe patient benefits gained through the use of teleradiology
 - d. Identify modality types that may be incorporated into a PACS
 - e. Define accession number
 - f. Describe worklist and correct usage
 - g. Describe how an image is associated with a radiology order to create a DICOM image
 - h. Describe data flow for a DICOM image from an imaging modality to a PACS
 - i. Describe HIPPA concerns with electronic information
 - j. Identify common problems associated with retrieving/viewing images within a PACS
 - k. Identify the primary uses of the diagnostic display workstation and clinical display workstation
6. Examine the potential impact of digital radiographic systems on patient exposure and methods of practicing the as low as reasonably achievable (ALARA) concept with digital systems ASRT - Digital Image Acquisition and Display 1-46, Introduction to Computed Tomography 1-11
 - a. Describe the exposure precautions and limitations associated with PSP-based systems
 - b. Avoid poor quality images by observing acquisition precautions

ASRT - Digital Image Acquisition and Display

1. Describe contrast to noise (CNR) as it relates to digital radiography detectors
2. Describe signal to noise (SNR) as it relates to digital radiography detectors
3. Describe the conditions that cause quantum mottle in a digital image
4. Apply a process for evaluating images for adequate image receptor exposure, exposure indicator contrast/grayscale/spatial resolution, identification markers and appropriate use of beam restriction
5. Define terminology associated with digital imaging systems
6. Describe the various types of digital receptors
7. Describe the response of digital detectors to exposure variations
8. Compare the advantages and limits of each receptor type
9. Evaluate the spatial resolution of a digital imaging system
10. Define sampling frequency
11. Describe the Nyquist-Shannon theorem as it relates to sampling frequency
12. Describe the impact of sampling frequency on spatial resolution
13. Describe the impact of detector element size on spatial resolution
14. Describe detective quantum efficiency (DQE) for digital radiography detectors
15. Describe modulation transfer function (MTF) as it relates to digital radiography detectors
16. Describe the histogram and the process of histogram analysis as it relates to automatic rescaling
17. Describe the calculation of the exposure indicator (AAPM Task Group 116)
18. Define region of interest (ROI)
19. Relate the location and size of the ROI to the appearance of the image and exposure indicator
20. Relate how the values of interest (VOI) impact image appearance
21. Describe the process of image stitching

22. Relate the receptor exposure indicator values to technical factors, system calibration, part/beam/plate alignment and patient exposure
23. Describe the response of PSP systems to background and scatter radiation
24. Use appropriate means of scatter control
25. Avoid grid use errors associated with grid cutoff
26. Identify common limitations and technical problems encountered when using PSP systems
27. Employ appropriate beam/part/receptor alignment to avoid histogram analysis errors
28. Associate impact of image processing parameters to the image appearance
29. Apply the fundamental principles of radiographic exposure to digital detectors
30. Evaluate the effect of a given exposure change on histogram shape, data width and image appearance
31. Formulate a procedure or process to minimize histogram analysis and rescaling errors
32. Describe continuous quality improvement (CQI)
33. Differentiate between quality assurance (QA) and quality control (QC)
34. List the benefits of a quality control management to the patient and to the department
35. Examine the potential impact of digital radiographic systems on patient exposure and methods of practicing the As Low As Reasonably Achievable (ALARA) concept with digital systems
36. Discuss the appropriate use of electronic masking
37. Describe picture archival and communications system (PACS) and its function
38. Identify components of a PACS
39. Define digital imaging and communications in medicine (DICOM)
40. Identify critical components of the DICOM header
41. Describe HIPAA concerns with electronic information
42. Identify common problems associated with retrieving/viewing images within a PACS
43. Compare monitor types (e.g. acquisition, display)
44. Describe the components of the various types of display monitors
45. Discuss the impact of viewing angle, luminance, ambient lighting, and pixel size on image display
46. Describe display monitor aspect ratio and its impact on image display

ASRT - Introduction to Computed Tomography

1. Describe the components of the CT imaging system
2. Explain the functions of collimators in CT
3. List the CT computer data processing steps
4. Define algorithm and explain its impact on image scan factors and reconstruction
5. Define raw data and image data
6. Describe the following terms in relation to the CT data acquisition process:
 - a. Pixel
 - b. Matrix
 - c. Voxel
 - d. Linear attenuation coefficient
 - e. CT/Hounsfield number
 - f. Partial volume averaging
 - g. Window width (ww) and window level (wl)
 - h. Spatial resolution
 - i. Contrast resolution
 - j. Noise
 - k. Annotation
 - l. Region of interest (ROI)
7. Name the common controls found on CT operator consoles and describe how and why each is used
8. Identify the types and appearance of artifacts most commonly affecting CT images
9. Name the radiation protection devices that can be used to reduce patient dose in CT and describe the correct application of each
10. Describe the general purpose of commonly performed CT studies
11. Discuss general radiation safety and protection practices associated with examinations in CT

Course Number and Name: RGT 1513/1514 Radiographic Procedures I

Description: This course includes terminology, principles, and procedures involved in routine radiographic positioning for demonstration of the chest, abdomen, upper extremities, and digestive system. Included is a review of radiographic anatomy on each procedure.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify basic radiographic positioning skills ASRT - Image Analysis 1-6, Radiographic Procedures 1-18
 - 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 and disadvantages of each
 - d. Describe various accessory equipment, and discuss each in terms of function and application
2. Discuss general procedural considerations for radiographic examinations ASRT - Image Analysis 1-6, Radiographic Procedures 1-18
 - 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
3. Identify positioning considerations for routine radiographic procedures ASRT - Image Analysis 1-6, Radiographic Procedures 1-18
 - a. Describe routine and special views of the abdominal cavity in terms of structure(s) visualized and function(s) demonstrated including general and positioning considerations
 - b. Identify areas of the abdomen including the following:
 - (1) Abdominal regions
 - (2) Abdominal quadrants
 - c. Explain the structure(s) visualized and function(s) demonstrated including general and positioning considerations involved for routine and special views of the abdominal cavity given clinical simulations
 - d. Simulate 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 and function(s) demonstrated, including general and positioning considerations
 - g. Explain the structure(s) visualized and 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, simulate 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 and function(s) demonstrated including general and positioning considerations
 - k. Explain the structure(s) visualized and function(s) demonstrated including general and positioning considerations involved for routine and special views of the respiratory system given clinical simulations
 - l. Simulate 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
4. Identify positioning considerations for routine contrast studies ASRT - Image Analysis 1-6 , Radiographic Procedures 1-18
- 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 and function(s) demonstrated including general and positioning considerations
 - e. Explain the structure(s) visualized and 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, simulate 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
5. Identify procedural considerations for special studies ASRT - Image Analysis 1-6 , Radiographic Procedures 1-18
- a. Apply a working knowledge of gastrointestinal contrast media currently used in the radiology department
 - b. Identify the possible actions and reactions of gastrointestinal contrast media used in health-care institutions
 - c. Define the categories of gastrointestinal contrast media, and give specific examples for each category
 - d. Discuss the pharmacology of barium compounds in regard to the following:
 - (1) Patient history and allergy
 - (2) Chemical composition
 - (3) Patient precautions
 - (4) Patient reactions
 - (5) Emergency care
 - e. Describe methods of administering gastrointestinal contrast media, and discuss administration techniques for each method
6. Identify positioning considerations for mobile and/or trauma radiography for those areas of the body included in this course ASRT - Radiographic Procedures 1-18
- 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 and/or trauma radiography

ASRT – Image Analysis

1. Identify anatomy on radiographic images
2. Describe an effective image analysis method
3. Summarize the importance of proper positioning
4. Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary
5. Differentiate images produced by various modalities
6. Discuss the impact of patient preparation on the resulting radiographic image

ASRT - Radiographic Procedures

1. Demonstrate proper use of positioning aids
2. Discuss general procedural considerations for radiographic exams
3. Identify methods and barriers of communication and describe how each may be used or overcome effectively during patient education
4. Explain radiographic procedures to patients and family members
5. Modify directions to patients with various communication problems
6. Develop an awareness of cultural factors that necessitate adapting standard exam protocols
7. Adapt general procedural considerations to specific clinical settings
8. Identify the structures demonstrated on routine radiographic and fluoroscopic images
9. Adapt radiographic and fluoroscopic procedures for special considerations
10. Simulate radiographic and fluoroscopic procedures on a person or phantom in a laboratory setting
11. Evaluate images for positioning, centering, appropriate anatomy and overall image quality
12. Discuss equipment and supplies necessary to complete basic radiographic and fluoroscopic procedures
13. Explain the patient preparation necessary for various contrast and special studies
14. Explain the routine and special positions and projections for all radiographic and fluoroscopic procedures
15. Explain the purpose for using contrast media
16. Name the type, dosage and route of administration of contrast media commonly used to perform radiographic contrast and special studies
17. Describe the general purpose of radiographic and fluoroscopic studies
18. Apply general radiation safety and protection practices associated with radiographic and fluoroscopic examinations

Course Number and Name: RGT 1523 Radiographic Procedures II

Description: This course includes principles and procedures involved in the radiographic positioning of the spinal column, urinary system, pelvic girdle, lower extremities, bony thorax, and mobile and trauma radiography procedures. Included is a review of radiographic anatomy on each procedure.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify positioning considerations for routine radiographic procedures ASRT - Radiographic Procedures 1-25
 - 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 and function(s) demonstrated including general and positioning considerations involved
 - b. Explain the structure(s) visualized and function(s) demonstrated including general and positioning considerations involved using clinical simulations and routine and special views of the skeletal system relating to the pelvic girdle, lower extremities, bony thorax, and spinal column to include scoliosis survey
 - c. In a laboratory environment, simulate 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
 - e. Describe routine and special views of the urinary system in terms of structure(s) visualized and function(s) demonstrated including general and positioning considerations
 - f. Explain the structure(s) visualized and function(s) demonstrated including general and positioning considerations involved for routine and special views of the urinary system given clinical simulations.
 - g. Simulate procedures related to the urinary system in a laboratory environment
 - h. Evaluate radiographs of various parts of the urinary system in terms of positioning accuracy and image quality
2. Identify positioning considerations for mobile and trauma radiography for those areas of the body included in this course ASRT - Radiographic Procedures 1-25
 - 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
 3. 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 contrast agents and intravenous medications for injection utilizing aseptic technique
 - h. Discuss the radiographer's role in contrast media and drug administration
3. Demonstrate the drug administration procedure ASRT - Radiographic Procedures 1-25

- 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 contrast agents and intravenous medications for injection utilizing aseptic technique
- h. Discuss the radiographer's role in contrast media and drug administration

ASRT - Radiographic Procedures

1. Identify anatomy on radiographic images
2. Describe an effective image analysis method
3. Summarize the importance of proper positioning
4. Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary
5. Differentiate images produced by various modalities
6. Discuss the impact of patient preparation on the resulting radiographic image
7. Describe standard positioning terms
8. Demonstrate proper use of positioning aids
9. Discuss general procedural considerations for radiographic exams
10. Identify methods and barriers of communication and describe how each may be used or overcome effectively during patient education
11. Explain radiographic procedures to patients and family members
12. Modify directions to patients with various communication problems
13. Develop an awareness of cultural factors that necessitate adapting standard exam protocols
14. Adapt general procedural considerations to specific clinical settings
15. Identify the structures demonstrated on routine radiographic and fluoroscopic images
16. Adapt radiographic and fluoroscopic procedures for special considerations
17. Simulate radiographic and fluoroscopic procedures on a person or phantom in a laboratory setting
18. Evaluate images for positioning, centering, appropriate anatomy and overall image quality
19. Discuss equipment and supplies necessary to complete basic radiographic and fluoroscopic procedures
20. Explain the patient preparation necessary for various contrast and special studies
21. Explain the routine and special positions and projections for all radiographic and fluoroscopic procedures
22. Explain the purpose for using contrast media
23. Name the type, dosage and route of administration of contrast media commonly used to perform radiographic contrast and special studies
24. Describe the general purpose of radiographic and fluoroscopic studies
25. Apply general radiation safety and protection practices associated with radiographic and fluoroscopic examinations

Course Number and Name: **RGT 1613** **Physics of Imaging Equipment**

Description: This course is designed to establish knowledge based in radiographic, fluoroscopic, mobile, and tomographic equipment requirements and design. The content will also provide a basic knowledge of quality control. Computer applications in the radiologic sciences related to image capture, display, storage, and distribution are presented.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
4	4	0	60
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe X-ray production, and identify properties of X-rays as related to exposure and measurement of radiation ASRT - Imaging Equipment 1-16, ASRT – Radiation Production and Characteristics 1-17
 - 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
2. Utilize diagnostic imaging equipment ASRT - Imaging Equipment 1-16, ASRT – Radiation Production and Characteristics 1-17
 - a. Define potential difference, current, and resistance
 - b. Describe the characteristics of direct and alternating currents
 - c. Explain electrical protective devices
 - d. Identify the general components and function of the primary and secondary filament circuits and X-ray tubes
 - e. Identify the function of solid-state rectification
 - f. Compare single-phase, three-phase, high frequency, and falling load generators in terms of radiation production and efficiency
 - g. Discuss permanent installation of radiographic equipment in terms of purpose, components, types, and applications
 - h. Demonstrate operation of various types of permanently installed radiographic equipment
 - i. Discuss mobile units in terms of purpose, components, types, and applications
 - j. Demonstrate operation of various types of mobile unit radiographic equipment
 - k. Identify general radiation protection rules related to installation of new radiographic equipment
 - l. Discuss the application of automatic exposure devices
 - m. Explain image-intensified fluoroscopy
 - n. Discuss gain and conversion factors as related to intensification
 - o. Discuss image formation in terms of image size and brightness
 - p. Indicate the purpose, construction, and application of video camera tubes, TV monitors, and video records
 - q. Identify the purpose, construction, and application of cine radiographic equipment and processor
 - r. Describe the purpose, construction, and application of film cameras
 - s. Discuss the purpose, construction, and application of automatic film changers

- t. Explain the purpose, principles, motion, equipment, procedure, and application of conventional tomography
 - u. Discuss the purpose and procedure of radiographic magnification
 - v. Discuss electronic imaging equipment used in radiography and fluoroscopy
 - w. Discuss flat panel detectors used in digital electronic X-ray equipment
3. Differentiate among quality improvement and management, quality assurance, and quality control
ASRT - Imaging Equipment 1-16, ASRT – Radiation Production and Characteristics 1-17
- a. List the benefits of a quality management program to the patient and to the department
 - b. List elements of a quality management program, and discuss how each is related to the quality management program

ASRT - Imaging Equipment

1. Describe potential difference, current and resistance
2. Describe the general components and function of the x-ray circuit to include the tube and filament circuits
3. Compare generators in terms of radiation produced and efficiency
4. Discuss fixed and mobile radiographic equipment in terms of purpose, components, types and applications
5. Demonstrate operation of various types of fixed and mobile radiographic equipment
6. Describe the components and function of automatic exposure control (AEC) devices
7. Demonstrate proper use of AEC devices
8. Describe the components and function of diagnostic x-ray tubes
9. Explain methods used to extend x-ray tube life
10. Discuss fixed and mobile fluoroscopic equipment in terms of purpose, components, types and applications
11. Explain image-intensified, flat panel and pulsed fluoroscopy
12. Indicate the purpose, construction and application of the fluoroscopic monitor
13. Discuss quality control (QC) for imaging equipment and accessories
14. Evaluate the results of standard QC tests
15. Identify common equipment malfunctions that affect image quality, and corrective action
16. Differentiate between technical factor problems, procedural factor problems and equipment malfunctions

ASRT – Radiation Production and Characteristics

1. Describe fundamental atomic structure
2. Explain the processes of ionization and excitation
3. Describe the electromagnetic spectrum
4. Describe wavelength and frequency and how they are related to velocity
5. Explain the relationship of energy, wavelength and frequency
6. Explain the wave-particle duality phenomena
7. Identify the properties of x-rays
8. Describe particulate radiation
9. Differentiate between ionizing and nonionizing radiation
10. Describe radioactivity and radioactive decay in terms of alpha, beta and gamma emission
11. Compare the production of bremsstrahlung and characteristic radiations
12. Describe the conditions necessary to produce x-radiation
13. Describe the x-ray emission spectrum
14. Explain the factors that affect the x-ray emission spectrum
15. Discuss various photon interactions with matter
16. Discuss relationships of wavelength and frequency to beam characteristics
17. Discuss the clinical significance of the photoelectric and modified scattering (Compton) interactions in diagnostic imaging

Course Number and Course Name: RGT 2111 Radiologic Seminar III

Description: This course is designed for students to participate in activities of various professional organizations such as the Radiologic Technology Student Organization, HOSA and other student activities. Leadership skills, an understanding of group dynamics, educational enrichment, stimulation of enthusiasm and interest, community service and rapport among health education professionals are outcomes of this course. One hour per week with additional activities to meet organizational goals.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interaction and cooperation in the modern workplace
 - a. Demonstrate problem-solving skills by actively participating in program and campus activities
 - b. Locate and utilize local resource sources
2. Community participation
 - a. Actively participate in a class organized community service project

Course Number and Course Name: RGT 2113 Mammography

Description: This course is designed to provide the professional community with a cognitive online base of entry-level education in the practice of Mammography.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify and label anatomical structures of the breast, male and female
2. Identify and label the breakdown of the single lobe
3. Identify the three arterial branches supplying the breast and the three venous drainage channels
4. Describe the lymphatic system and lymphatic drainage
5. Correlate breast anatomical structures to mammographic anatomical structures
6. Identify and label mammographic anatomical structures when presented with a mammographic image
7. Discuss and understand the changes the breast undergoes due to hormonal influences during puberty, menses, pregnancy and the postmenopausal life cycles
8. Describe the physiologic changes caused by estrogen, progesterone and prolactin
9. Describe breast augmentation and identify the types of implants, common implant locations and the anatomical changes to the augmented breast
10. Describe the anomalies of development that can occur in the breast
11. Recognize clinical breast changes
12. List the physical changes of the breast related to pathology
13. List the mammographic changes of the breast related to pathology and, given mammographic images, identify the common mammographic appearance of breast pathology
14. Identify risk factors limited to breast cancer
15. State the recommendations for asymptomatic women regarding mammography
16. Provide information on the importance of manual and visual breast self-examination
17. Define treatment options for breast cancer
18. Describe the generally accepted (postulated) progression of breast cancers from the ductal epithelium and nonepithelial tissues
19. Describe changes seen after breast reduction surgery or following lumpectomy and surgical excision
20. Identify current epidemiology and risk factors of breast cancer
21. Describe elements of breast cancer screening protocols
22. Demonstrate an understanding of breast anatomy and topographical orientation
23. Detail a breast assessment
24. Explain proper techniques and procedures for conducting a breast assessment
25. Use nondiagnostic descriptors to record findings and document observations arising from the breast exam
26. Participate in patient education regarding breast self-examination
27. Discuss procedures to assist patients with special needs
28. Explain patient services in the mammography department
29. Discuss MQSA, American College of Radiology and Food and Drug Administration (FDA) guidelines and accreditations
30. Label the components of the mammographic unit
31. Demonstrate understanding of properly operated mammography equipment and demonstrate the understanding of correct use of compression devices, filtration devices, the magnification setup, use of grids and automatic exposure controls
32. State the specifications of the various components in a mammography unit (half-value layer, focal spot size, source-to-image distance and the minimum requirements based on MQSA guidelines)

33. Define heel effect
34. Define reciprocity law failure
35. Differentiate between the various types of x-ray generators used in mammography
36. Discuss and define digital mammography
37. Explain the additional functions available with digital imaging – measuring the area of interest, filtration of image, magnification, contrast, density, subtraction of image
38. Define compression, its usefulness and minimum and maximum requirements, based on MQSA guidelines
39. State the purpose of magnification
40. State the procedure used when magnifying breast tissue
41. Accessorize equipment according to the procedure being performed
42. Demonstrate the knowledge of setting appropriate kVp, mA and time or automatic exposure control (AEC) and the correct position of the photosensor
43. Review film processing and reloading cassettes with mammography film
44. Explain the process of producing hard copy images of digital images
45. Describe standard needle lesion localization
46. Describe stereotactic lesion localization
47. Describe fine-needle aspiration biopsy
48. Delineate Galactography
49. Describe a stereotactic or core biopsy
50. Describe the performance of quality control test procedures according to ACR and MQSA guidelines
51. Outline safety checks on radiographic equipment and accessories
52. Explain procedure and the need for compression to the patient before proceeding with the mammogram
53. Achieve the best demonstration of breast tissue by manipulating the breast into proper placement, adjusting the patient, mammography equipment and cassettes, and placing the marker correctly
54. Describe processing and evaluating the completed image
55. Identify the qualities necessary for an acceptable mammogram
56. Repeat films or additional views if necessary
57. Be professional, competent, confident and nonjudgmental
58. Describe how kVp, mA, time and compression affect the mammographic image and patient dose
59. Identify the maximum permissible dose per mammography exam based on MQSA standards
60. Identify the average dose per mammographic exposure
61. Describe selecting the correct technical variable based on variations in breast anatomy
62. Identify processing and imaging artifacts on mammography film
63. Describe different types of processing and their importance in the mammographic imaging chain
64. Describe sonography's role in mammography

Course Number and Course Name: RGT 2121 Radiologic Seminar IV

Description: This course is designed for students to participate in activities of various professional organizations such as the Radiologic Technology Student Organization, HOSA and other student activities. Leadership skills, an understanding of group dynamics, educational enrichment, stimulation of enthusiasm and interest, community service and rapport among health education professionals are outcomes of this course. One hour per week with additional activities to meet organizational goals.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interaction and cooperation in the modern workplace
 - a. Demonstrate problem-solving skills by actively participating in program and campus activities
 - b. Locate and utilize local resource sources
2. Community participation
 - a. Actively participate in a class organized community service project

Course Number and Course Name: RGT 2123 Sectional Anatomy

Description: This course is designed to study human sectional anatomy including location, structure, and function, as well as relationships among structures. Radiographs, Computed Tomography (CT) images, and Magnetic Resonance Imaging (MRI), Ultrasound and PET images may be used to demonstrate the characteristic appearance of anatomic structures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

- Describe the anatomy and physiology of the human body ASRT- Sectional Anatomy 1-13
 - Review the location and describe the relationship of the structures to surrounding structures
 - Review the function of the structures of the human body
- Identify the structures of each of the anatomical regions as they appear in sectional illustrations ASRT- Sectional Anatomy 1-13
 - Identify the structures of the head and brain as they appear in sectional illustrations
 - Identify the structures of the neck as they appear in sectional illustrations
 - Identify the structures of the chest and mediastinum as they appear in sectional illustrations
 - Identify the structures of the abdomen as they appear in sectional illustrations
 - Identify the structures of the pelvis as they appear in sectional illustrations
 - Identify the structures of the musculoskeletal system and spine as they appear in sectional illustrations
- Locate the structures of each of the anatomical regions as they appear on a CT image and a MR image and ultrasound images in the transverse axial, coronal, sagittal, and orthogonal (oblique) cross-sectional imaging planes ASRT- Sectional Anatomy 1-13
 - Locate the structures of the head and brain as they appear in sectional illustrations
 - Locate the structures of the neck as they appear in sectional illustrations
 - Locate the structures of the chest and mediastinum as they appear in sectional illustrations
 - Locate the structures of the abdomen as they appear in sectional illustrations
 - Locate the structures of the pelvis as they appear in sectional illustrations
 - Locate the structures of the musculoskeletal system and spine as they appear in sectional illustrations

ASRT- Sectional Anatomy

- Name the anatomical structures located within the head and neck
- Describe the relationship of each anatomical structure in the head and neck to surrounding structures
- Describe the function of each anatomical structure in the head and neck
- Locate each anatomical structure on CT, MR and ultrasound images in the transverse axial, coronal, sagittal and orthogonal (oblique) cross-sectional imaging planes
- Name the anatomical structures located within the thorax
- Describe the relationship of each thoracic structure to surrounding structures
- Describe the function of each anatomical structure located within the thorax

8. Locate each anatomical structure of the thorax on CT, MR and ultrasound images in the transverse axial, coronal, sagittal and oblique imaging planes
9. List and describe the function of each anatomical structure located within the abdomen and pelvis
10. Describe the relationship of each anatomical structure in the abdomen and pelvis to surrounding structures
11. Locate each anatomical structure of the abdomen and pelvis on CT, MR, PET and ultrasound images in the axial, coronal, sagittal and oblique planes
12. Name and describe the function of each anatomical structure located in the upper and lower extremities
13. Locate each anatomical structure in the upper and lower extremities on CT and MR images in the transverse axial, coronal, sagittal and oblique planes

Course Number and Name: RGT 2132 Ethical and Legal Responsibilities

Description: Legal terminology, concepts, and principles will be presented in this course. Topics include misconduct, malpractice, legal and professional standards, and the ASRT scope of practice. The importance of proper documentation and informed consent is emphasized. This course will prepare students to better understand their patients, the patients' families, and professional peers through comparison of diverse populations based on their value systems, cultural and ethnic influences, communication styles, socioeconomic influences, health risks, and life stages.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15
2	2	0	30
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply medical and professional ethics in the context of a broader society ASRT - Ethics and Law in the Radiologic Sciences 1-18
 - a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
2. Discuss the appropriate physical boundaries in relation to touching with no formal consent ASRT - Ethics and Law in the Radiologic Sciences 1-18
 - a. Compare pity, sympathy, and empathy in relation to a patient's situation
 - b. Discuss family dynamics in a cultural, social, ethnic, and lifestyle sense
3. Identify legal and professional standards and their relationship to practice in health professions ASRT - Ethics and Law in the Radiologic Sciences 1-18
 - a. Describe accepted codes or guidelines for professional ethics in their chosen health profession
 - b. Identify specific ethical situations and dilemmas in health care that may impact the radiographer
 - c. Employ a basic system of examination, clarification, determination of alternatives, and decision making in addressing ethical questions and situations
 - d. Explain select concepts embodied in principles of patients' rights, the doctrine of informed (patient) consent, and other issues related to patients' rights
 - e. Identify the legal implications of professional liability, malpractice, professional negligence and

- carelessness, and other legal doctrines applicable to professional practice
- f. Discuss the importance of accurate, complete, and correct methods of documentation as a legal and ethical imperative
- g. In groups and individually, explore responses to theoretical situations and questions relating to the ethics of care and health-care delivery
- h. Explain specific legal terms, principles, and laws
- i. Identify the elements necessary for valid malpractice claim
- j. Define specific legal doctrines to include vicarious liability, respondeat superior, and res ipsa loquitur
- k. Describe the ASRT Scope of Practice for the radiographer, the elements that comprise it, and the responsibilities of the radiographer
- l. Differentiate between professional and legal standards, and describe how each relates to radiography practice
- m. Identify institutional and professional liability protection typically available to the radiographer
- n. Describe the elements and implications of informed consent
- o. Identify standards for disclosure relative to informed consent
- p. Describe how consent forms are utilized relative to specific radiographic procedures

ASRT - Ethics and Law in the Radiologic Sciences

1. Discuss the origins of medical ethics
2. Apply medical and professional ethics in the context of a broader societal ethic
3. Explain the role of ethical behavior in health care delivery
4. Explain concepts of personal honesty, integrity, accountability, competence and compassion as ethical imperatives in health care
5. Identify legal and professional standards and relate each to practice in health professions
6. Identify specific situations and conditions that give rise to ethical dilemmas in health care
7. Explain select concepts embodied in the principles of patients' rights, the doctrine of informed consent and other issues related to patients' rights
8. Explain the legal implications of professional liability, malpractice, professional negligence and other legal doctrines applicable to professional practice
9. Describe the importance of timely, accurate and comprehensive methods of documentation as a legal and ethical imperative
10. Explore theoretical situations and questions relating to the ethics of health care delivery
11. Explain legal terms, principles, doctrines and laws specific to the radiologic sciences
12. Outline the conditions necessary for a valid malpractice claim
13. Describe institutional and professional liability protection typically available to the radiographer
14. Describe the components and implications of informed consent
15. Identify standards for informed consent and disclosure of protected health information
16. Describe how consent forms are used relative to specific radiographic procedures
17. Differentiate between civil and criminal liability
18. Define tort and explain the differences between intentional and unintentional torts

Course Number and Course Name: RGT 2133 Computed Tomography

Description: This course is designed to explore the technical principles of Computed Tomography (CT). A review of patient care, contrast media and adverse reactions, common CT procedures and protocols, image characteristics, and image quality control methods are taught.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe preparation, assessment, and monitoring of the patient for a CT procedure ASRT - Introduction to Computed Tomography 1-19
 - a. Describe screening and consent procedures
 - b. Explain patient education
 - c. Discuss immobilization techniques
 - d. Summarize assessment and monitoring techniques, to include history, vital signs, lab values, and medications
2. Discuss the use and administration of intravenous and oral contrast agents ASRT - Introduction to Computed Tomography 1-19
 - a. Explain venipuncture and injection techniques in CT procedures
 - b. List types of contrast agent
 - c. Describe the route of administration
 - d. Perform dosage calculations
 - e. Identify special considerations in contrast administration
 - f. Discuss recognition, treatment, and documentation of adverse reactions
3. Describe radiation safety measures in CT procedures ASRT - Introduction to Computed Tomography 1-19
 - a. Discuss the CT technical factors affecting patient dose including dose modulation techniques
 - b. Discuss CTDI, MSAD, DLP and other methods of dose measurement
 - c. Discuss radiation protection guidelines for personnel
 - d. Discuss radiation protection guidelines for pediatric dose reduction
 - e. Discuss radiation protection guidelines for adult patient dose reduction
4. Identify correct acquisition methods and protocols for CT examination of each of the anatomical regions of the body, to include modifications for pathology, trauma, and special procedures ASRT - Introduction to Computed Tomography 1-19
 - a. Identify correct acquisition methods and protocols for CT examination of the head and brain
 - b. Identify correct acquisition methods and protocols for CT examination of the neck
 - c. Identify correct acquisition methods and protocols for CT examination of the chest and mediastinum
 - d. Identify correct acquisition methods and protocols for CT examination of the abdomen
 - e. Identify correct acquisition methods and protocols for CT examination of the pelvis
 - f. Identify correct acquisition methods and protocols for CT examination of the musculoskeletal system and spine

5. Discuss equipment operation and image processing ASRT - Introduction to Computed Tomography 1-19
 - a. Describe the components of the CT unit
 - b. Describe image acquisition and attenuation
 - c. Discuss image processing and display, to include image reconstruction, display, post-processing, and data management
 - d. Define the components of image quality
 - e. Explain artifact recognition and reduction
6. Compare normal and abnormal structures in each of the anatomical regions of the body ASRT - Introduction to Computed Tomography 1-19
 - a. Compare normal and abnormal structures and pathology of the head and brain
 - b. Compare normal and abnormal structures and pathology of the neck
 - c. Compare normal and abnormal structures and pathology of the chest and mediastinum
 - d. Compare normal and abnormal structures and pathology of the abdomen
 - e. Compare normal and abnormal structures and pathology of the pelvis
 - f. Compare normal and abnormal structures and pathology of the musculoskeletal system and spine

ASRT - Introduction to Computed Tomography

1. Explain the difference between reconstructing and reformatting an image
2. Cite the structures demonstrated on commonly performed CT images
3. Describe commonly performed CT procedures
4. Evaluate images for positioning, centering, appropriate anatomy and overall image quality
5. Discuss equipment and supplies necessary to complete commonly performed CT procedures
6. Explain the CT acquisition protocol for commonly performed head/neck, thorax and abdomen procedures
7. Explain the patient preparation necessary for commonly performed CT contrast studies
8. Name the type, dosage purpose, and route of contrast administration for common CT procedures
9. Describe the components of the CT imaging system
10. Explain the functions of collimators in CT
11. List the CT computer data processing steps
12. Define algorithm and explain its impact on image scan factors and reconstruction
13. Define raw data and image data
14. Describe the following terms in relation to the CT data acquisition process:
 - Pixel
 - Matrix
 - Voxel
 - Linear attenuation coefficient
 - CT/Hounsfield number
 - Partial volume averaging
 - Window width (ww) and window level (wl)
 - Spatial resolution
 - Contrast resolution
 - Noise
 - Annotation
 - Region of interest (ROI)
15. Name the common controls found on CT operator consoles and describe how and why each is used
16. Identify the types and appearance of artifacts most commonly affecting CT images
17. Name the radiation protection devices that can be used to reduce patient dose in CT and describe the correct application of each
18. Describe the general purpose of commonly performed CT studies
19. Discuss general radiation safety and protection practices associated with examinations in CT

Magnetic Resonance Imaging

Description: This course provides a basic foundation of Magnetic Resonance Imaging (MRI). The physical and technical principles, imaging sequences, image artifacts, clinical applications, system components, and safety issues will be discussed. Images of sectional anatomy related to MRI will also be explored.

Semester Credit Hours	Lecture	Lab	Contact Hours
3	0	0	45

Instructor Approved

Student Learning Outcomes:

1. Describe preparation, assessment, and monitoring of the patient for a MRI procedure
 - a. Describe screening and consent procedures
 - b. Explain patient education
 - c. Discuss immobilization techniques
 - d. Summarize assessment and monitoring techniques, to include history, vital signs, and medications
2. Discuss safety and patient care considerations for MRI exams
 - a. Incorporate safety considerations when working in the MRI department
 - b. Describe patient care considerations for MRI exams
3. Describe biological considerations for MRI procedures
 - a. Discuss radio frequency guidelines and effects
 - b. Discuss static field guidelines and effects
 - c. Discuss gradient field guidelines and effects
4. Identify correct acquisition methods and protocols for MRI examination of each of the anatomical regions of the body, to include modifications for pathology, trauma, and special procedures
 - a. Identify correct acquisition methods and protocols for MRI examination of the head and neck
 - b. Identify correct acquisition methods and protocols for MRI examination of the spine
 - c. Identify correct acquisition methods and protocols for MRI examination of the thorax
 - d. Identify correct acquisition methods and protocols for MRI examination of the abdomen
 - e. Identify correct acquisition methods and protocols for MRI examination of the pelvis
 - f. Identify correct acquisition methods and protocols for MRI examination of the musculoskeletal system
5. Discuss data acquisition and image processing
 - a. Describe methods of pulse sequencing
 - b. Explain processes in data manipulation
 - c. Discuss special procedures
 - d. Explain how parameters and options affect image quality and contrast
6. Discuss physical principles of image formation
 - a. Describe the instrumentation used for MRI imaging
 - b. Discuss the fundamental physical principles of image formation
 - c. Explain causes, appearances, and methods of compensation for artifacts
 - d. Discuss quality control measures for MRI imaging

7. Compare normal and abnormal structures in each of the anatomical regions of the body
 - a. Compare normal and abnormal structures of the head and brain
 - b. Compare normal and abnormal structures of the neck
 - c. Compare normal and abnormal structures of the chest and mediastinum
 - d. Compare normal and abnormal structures of the abdomen
 - e. Compare normal and abnormal structures of the pelvis
 - f. Compare normal and abnormal structures of the musculoskeletal system and spine

Course Number and Name: RGT 2147(6-7) Clinical Education IV

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.

Hour Breakdown:

Semester Credit Hours	Lecture	Clinical	Contact Hours
6	0	18	270
7	0	21	315

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply radiographic principles in the clinical setting with respect to program levels ASRT - Clinical Practice 1-36
 - a. Demonstrate skills in assessment and evaluation of psychological and physical changes in the patient's condition, and carry out appropriate actions
 - b. Manage interaction with the patient and family in a manner that provides the desired psychosocial support
 - c. Provide patient and family education appropriate to the comprehension level of the patient and family
 - d. Apply radiation protection principles
 - e. Discuss basic X-ray production and interactions
 - f. Operate medical imaging equipment and accessory devices
 - g. Position the patient and medical imaging system to perform examinations and procedures
 - h. Apply knowledge of human structure, function, and pathology
 - i. Evaluate the performance of medical imaging systems
 - j. Evaluate medical images for technical quality
 - k. Apply knowledge and skills relating to recording medical image processing
 - l. Operate equipment within safety limits
 - m. Recognize equipment malfunctions, and report them to the proper authority
 - n. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships
 - o. Demonstrate safe, ethical, and legal practices
 - p. Abide by the profession's code of ethics, and comply with the recognized scope of practice for the profession
 - q. Practice standard precautions at all times
 - r. Adhere to concepts of team practice that focus on organizational theories, roles of team members, and conflict resolution
 - s. Evaluate procedure orders for accuracy, and follow up to make corrective changes
 - t. Exercise independent judgment and discretion in the technical performance of medical imaging procedures
 - u. Establish patient centered clinically effective service for all patients regardless of age, gender, disability, ethnicity, and culture
 - v. Differentiate among gender, cultural, age, and socioeconomic related factors that influence patient compliance with procedures, diagnosis, treatment, and follow-up of patients
 - w. Adapt procedures to meet age-specific, disease-specific, and cultural needs of patients
 - x. Interpret patient side effects and complications of radiologic procedures, contrast administration and other procedures, and take appropriate actions
 - y. Document care in the patient's record

2. Perform clinical application skills for radiographic procedures ASRT - Clinical Practice 1-36
 - a. Practice routine radiographic procedures including the following:
 - (1) Cranium procedures
 - (2) Routine and advanced facial bones
 - (3) Procedural adjustments for trauma
 - (4) Advanced mobile (portable) radiography
 - b. Perform image analysis on the following:
 - (1) Cranium procedures
 - (2) Routine and advanced facial bones
 - (3) Procedural adjustments for trauma
 - (4) Advanced mobile (portable) radiography
3. Demonstrate tasks associated with radiographic procedures ASRT - Clinical Practice 1-36
 - a. Perform routine radiographic procedures including the following:
 - (1) Bony thorax
 - (2) Mobile (portable) radiography
 - b. Perform advanced radiographic procedures including the following:
 - (1) Spinal column
 - (2) Pelvic girdle
 - (3) Lower extremities
 - (4) Urinary systems
 - c. Demonstrate technical adjustments to accommodate trauma procedures
4. Discuss medical and professional culture and diversity ASRT - Clinical Practice 1-36
 - a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
 - m. Contrast differences in age groups
 - 1) Infant
 - 2) Child
 - 3) Adolescent
 - 4) Adult
 - 5) Middle-age
 - 6) Geriatric
 - n. Examine relationships of individuals with regards to differences in religion, spirituality, belief system, lifestyle choices and behaviors, sexual orientation and disability

ASRT - Clinical Practice

1. Exercise the priorities required in daily clinical practice
2. Execute medical imaging procedures under the appropriate level of supervision

3. Adhere to team practice concepts that focus on organizational theories, roles of team members and conflict resolution
4. Adapt to changes and varying clinical situations
5. Describe the role of health care team members in responding/reacting to a local or national emergency
6. Provide patient-centered, clinically effective care for all patients regardless of age, gender, disability, special needs, ethnicity or culture
7. Integrate the use of appropriate and effective written, oral and nonverbal communication with patients, the public and members of the health care team in the clinical setting
8. Integrate appropriate personal and professional values into clinical practice
9. Recognize the influence of professional values on patient care
10. Explain how a person's cultural beliefs toward illness and health affect his or her health status
11. Use patient and family education strategies appropriate to the comprehension level of the patient/family
12. Provide desired psychosocial support to the patient and family
13. Demonstrate competent assessment skills through effective management of the patient's physical and mental status
14. Respond appropriately to medical emergencies
15. Examine demographic factors that influence patient compliance with medical care
16. Adapt procedures to meet age-specific, disease-specific and cultural needs of patients
17. Assess the patient and record clinical history
18. Demonstrate basic life support procedures
19. Use appropriate charting methods
20. Recognize life-threatening electrocardiogram (ECG) tracing
21. Apply standard and transmission-based precautions
22. Apply the appropriate medical asepsis and sterile technique
23. Demonstrate competency in the principles of radiation protection standards
24. Apply the principles of total quality management
25. Report equipment malfunctions
26. Examine procedure orders for accuracy and make corrective actions when applicable
27. Demonstrate safe, ethical and legal practices
28. Integrate the radiographer's practice standards into clinical practice setting
29. Maintain patient confidentiality standards and meet HIPAA requirements
30. Demonstrate the principles of transferring, positioning and immobilizing patients
31. Comply with departmental and institutional response to emergencies, disasters and accidents
32. Differentiate between emergency and non-emergency procedures
33. Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors
34. Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible
35. Critique images for appropriate anatomy, image quality and patient identification
36. Determine corrective measures to improve inadequate images

Course Number and Name: RGT 2157(6-7) Clinical Education V

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.

Hour Breakdown:

Semester Credit Hours	Lecture	Clinical	Contact Hours
6		18	270
7		21	315

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply radiographic principles in the clinical setting with respect to program levels ASRT - Clinical Practice 1-36
 - a. Demonstrate skills in assessment and evaluation of psychological and physical changes in the patient's condition, and carry out appropriate actions
 - b. Manage interaction with the patient and family in a manner that provides the desired psychosocial support
 - c. Provide patient and family education appropriate to the comprehension level of the patient and family
 - d. Apply radiation protection principles
 - e. Discuss basic X-ray production and interactions
 - f. Operate medical imaging equipment and accessory devices
 - g. Position the patient and medical imaging system to perform examinations and procedures
 - h. Apply knowledge of human structure, function, and pathology
 - i. Evaluate the performance of medical imaging systems
 - j. Evaluate medical images for technical quality
 - k. Apply knowledge and skills relating to recording medical image processing
 - l. Operate equipment within safety limits
 - m. Apply knowledge and skills relating to verbal, nonverbal, and written medical communication in patient care intervention and professional relationships
 - n. Demonstrate safe, ethical, and legal practices
 - o. Abide by the profession's code of ethics, and comply with the recognized scope of practice for the profession
 - p. Practice standard precautions at all times
 - q. Adhere to concepts of team practice that focus on organizational theories, roles of team members, and conflict resolution
 - r. Evaluate procedure orders for accuracy, and follow up to make corrective changes
 - s. Exercise independent judgment and discretion in the technical performance of medical imaging procedures
 - t. Establish patient-centered, clinically effective service for all patients regardless of age, gender, disability, ethnicity, and culture
 - u. Differentiate gender, cultural, age, and socioeconomic related factors that influence patient compliance with procedures, diagnosis, treatment, and follow-up of patients
 - v. Adapt procedures to meet age-specific, disease-specific, and cultural needs of patients
 - w. Interpret patient side effects and complications of radiologic procedures, contrast administration, and other procedures, and take appropriate actions
 - x. Document care in the patient's record
 - y. Differentiate between normal ECG rhythms and abnormal ECG tracings

- z. Apply the principles of total quality management
 - 1) Report equipment malfunctions to assist with appropriate corrective actions
- 2. Demonstrate tasks associated with radiographic procedures ASRT - Clinical Practice 1-36
 - a. Perform radiographic procedures on facial bones
 - b. Perform radiographic procedures on nasal bones
 - c. Perform radiographic procedures on paranasal sinuses
 - d. Perform radiographic surgical procedures
 - e. Perform advanced mobile (portable) radiography
- 3. Integrate didactic and clinical competencies to perform radiographic procedures ASRT - Clinical Practice 1-36
 - a. Demonstrate knowledge of anatomy, physiology, positioning, and radiographic techniques to accurately demonstrate anatomical structures on a radiograph or other imaging receptor
 - b. Determine exposure factors to achieve optimum radiographic techniques with minimum radiation exposure to the patient
 - c. Evaluate radiographic images for appropriate positioning and image quality
 - d. Apply the principles of radiation protection to the patient, self, and others
 - e. Provide patient care and comfort
 - f. Recognize emergency patient conditions; initiate lifesaving first aid and basic life support
 - g. Detect equipment malfunctions; report same to the proper authority, and know the safe limits of equipment operation
 - h. Exercise independent judgment and discretion in the technical performance of medical imaging procedures
 - i. Participate in radiologic quality assurance programs
 - j. Provide patient and public education related to radiologic procedures and radiation protection and safety
- 4. Discuss medical and professional culture and diversity ASRT - Clinical Practice 1-36
 - a. Examine the interrelationship between personal, community, and societal values
 - b. Explain the influence a person's value system has on his or her behavior
 - c. Examine how professional values are imparted
 - d. Assess the effect of a conflict between a patient's values and a health professional's values on the resultant care that a patient may receive
 - e. Discuss morality and its development
 - f. Contrast culture and ethnicity, and provide examples of each
 - g. Explain how a person's cultural bias toward illness affects his or her recovery
 - h. Explain the roots of medical ethnocentrism
 - i. Discuss the societal factors that influence the quality of health care a patient may receive
 - j. Describe the culture of poverty and the effect and delivery on the health-care system
 - k. Discuss the patient advocacy role of the health professional in relation to effective patient communication
 - l. Discuss the importance of understanding verbal and nonverbal communications in various cultures
 - m. Contrast differences in age groups
 - 1) Infant
 - 2) Child
 - 3) Adolescent
 - 4) Adult
 - 5) Middle-age
 - 6) Geriatric
 - n. Examine relationships of individuals with regards to differences in religion, spirituality, belief system, lifestyle choices and behaviors, sexual orientation and disability

ASRT - Clinical Practice

1. Exercise the priorities required in daily clinical practice
2. Execute medical imaging procedures under the appropriate level of supervision
3. Adhere to team practice concepts that focus on organizational theories, roles of team members and conflict resolution
4. Adapt to changes and varying clinical situations
5. Describe the role of health care team members in responding/reacting to a local or national emergency
6. Provide patient-centered, clinically effective care for all patients regardless of age, gender, disability, special needs, ethnicity or culture
7. Integrate the use of appropriate and effective written, oral and nonverbal communication with patients, the public and members of the health care team in the clinical setting
8. Integrate appropriate personal and professional values into clinical practice
9. Recognize the influence of professional values on patient care
10. Explain how a person's cultural beliefs toward illness and health affect his or her health status
11. Use patient and family education strategies appropriate to the comprehension level of the patient/family
12. Provide desired psychosocial support to the patient and family
13. Demonstrate competent assessment skills through effective management of the patient's physical and mental status
14. Respond appropriately to medical emergencies
15. Examine demographic factors that influence patient compliance with medical care
16. Adapt procedures to meet age-specific, disease-specific and cultural needs of patients
17. Assess the patient and record clinical history
18. Demonstrate basic life support procedures
19. Use appropriate charting methods
20. Recognize life-threatening electrocardiogram (ECG) tracing
21. Apply standard and transmission-based precautions
22. Apply the appropriate medical asepsis and sterile technique
23. Demonstrate competency in the principles of radiation protection standards
24. Apply the principles of total quality management
25. Report equipment malfunctions
26. Examine procedure orders for accuracy and make corrective actions when applicable
27. Demonstrate safe, ethical and legal practices
28. Integrate the radiographer's practice standards into clinical practice setting
29. Maintain patient confidentiality standards and meet HIPAA requirements
30. Demonstrate the principles of transferring, positioning and immobilizing patients
31. Comply with departmental and institutional response to emergencies, disasters and accidents
32. Differentiate between emergency and non-emergency procedures
33. Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors
34. Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible
35. Critique images for appropriate anatomy, image quality and patient identification
36. Determine corrective measures to improve inadequate images

Course Number and Course Name: **RGT 2532/2533** **Radiographic Procedures III**

Description: This course includes principles and procedures involved in radiographic positioning of the entire cranium and facial bones. Included is a review of radiographic anatomy on each procedure.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify positioning considerations for routine skull procedures ASRT - Image Analysis 1-6 .Radiographic Procedures 1-18
 - 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

2. Identify procedural considerations for special views of the face and cranium ASRT - Image Analysis 1-6 .Radiographic Procedures 1-18
 - a. Describe routine and special views of the cranium and specific structures within the cranium and facial bones in terms of structure(s) visualized and function(s) demonstrated including general and positioning considerations
 - b. Explain the structure(s) visualized and function(s) demonstrated including 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
 - e. Evaluate cranial cross-sectional anatomy

ASRT – Image Analysis

1. Identify anatomy on radiographic images
2. Describe an effective image analysis method
3. Summarize the importance of proper positioning.
4. Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary
5. Differentiate images produced by various modalities
6. Discuss the impact of patient preparation on the resulting radiographic image

ASRT - Radiographic Procedures

1. Demonstrate proper use of positioning aids
2. Discuss general procedural considerations for radiographic exams
3. Identify methods and barriers of communication and describe how each may be used or overcome effectively during patient education
4. Explain radiographic procedures to patients and family members
5. Modify directions to patients with various communication problems
6. Develop an awareness of cultural factors that necessitate adapting standard exam protocols
7. Adapt general procedural considerations to specific clinical settings

8. Identify the structures demonstrated on routine radiographic and fluoroscopic images
9. Adapt radiographic and fluoroscopic procedures for special considerations
10. Simulate radiographic and fluoroscopic procedures on a person or phantom in a laboratory setting
11. Evaluate images for positioning, centering, appropriate anatomy and overall image quality
12. Discuss equipment and supplies necessary to complete basic radiographic and fluoroscopic procedures
13. Explain the patient preparation necessary for various contrast and special studies
14. Explain the routine and special positions and projections for all radiographic and fluoroscopic procedures
15. Explain the purpose for using contrast media
16. Name the type, dosage and route of administration of contrast media commonly used to perform radiographic contrast and special studies
17. Describe the general purpose of radiographic and fluoroscopic studies
18. Apply general radiation safety and protection practices associated with radiographic and fluoroscopic examinations

Course Number and Course Name: RGT 2542 Radiographic Procedures IV

Description: This course is a study of special radiographic procedures that utilizes sterile techniques and specialized equipment. It also includes basic concepts of pharmacology. In addition, it also includes principles and procedures involved in radiographic positioning of the reproductive system.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify procedural considerations for special routine radiographic studies ASRT - Image Analysis 1-6
Pharmacology/Venipuncture 1-14, Radiographic Procedures 1-18, Additional Modalities and Radiation Therapy 1-7
 - a. Describe routine and special views of arthrography in regard to structure and positioning considerations
 - b. Describe routine and special views of myelography in regard to structure and positioning considerations
 - c. Describe routine and special views of venography in regard to structure and positioning considerations
2. Identify procedural considerations for special radiographic studies ASRT - Image Analysis 1-6
Pharmacology/Venipuncture 1-14, Radiographic Procedures 1-18, Additional Modalities and Radiation Therapy 1-7
 - a. Explain the structure(s) visualized and 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 various parts including bone survey, long bone measurement, and bone age
 - 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
3. Identify various types of drugs and interactions ASRT - Image Analysis 1-6
Pharmacology/Venipuncture 1-14, Radiographic Procedures 1-18, Additional Modalities and Radiation Therapy 1-7
 - a. Distinguish between the chemical, generic, and trade names for select drugs
 - b. Describe pharmacokinetic and pharmacodynamic principles of drugs
 - c. Classify drugs according to specific categories
 - d. Explain the action uses and side effects for select drugs
 - e. Explain the effects of select drugs on imaging procedures
 - f. Describe methods and techniques for the administration of various types of contrast agents
 - g. Identify and describe the routes of drug administration
 - h. Discuss the purposes and advantages of intravenous drug administration over other routes
 - i. Differentiate between the two major sites of intravenous drug administration
 - j. Identify, describe, and document complications associated with intravenous drug therapy and appropriate actions to resolve these complications

- k. Discuss the various elements of initiating and discontinuing intravenous drug therapy
 - l. Differentiate between and document dose calculations for adult and pediatric patients
 - m. Prepare contrast agents and intravenous medications for injection, utilizing aseptic technique
- 4. Identify and describe diagnostic contrast agents
 - a. Define the categories of contrast agents, and give specific examples for each category
 - b. Explain the pharmacology of barium and iodine compounds
- 5. Identify procedural considerations for the reproductive system
 - a. Describe routine and special views of the reproductive system in terms of structure(s) visualized and function(s) demonstrated including general and positioning considerations
 - b. Explain the structure(s) visualized and 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

ASRT – Image Analysis

1. Identify anatomy on radiographic images
2. Describe an effective image analysis method
3. Summarize the importance of proper positioning
4. Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary
5. Differentiate images produced by various modalities
6. Discuss the impact of patient preparation on the resulting radiographic image

ASRT- Pharmacology/Venipuncture

1. Distinguish between the chemical, generic and trade names of various drugs
2. Describe the pharmacokinetic, pharmacodynamic and pharmacogenetic principles of drugs
3. Explain the uses and impact on the patient of different categories of drugs
4. Define the categories of contrast agents and give specific examples for each category
5. Explain the pharmacology of contrast agents
6. Describe methods and techniques for administering various types of contrast agents
7. Identify and describe the routes of drug administration
8. Demonstrate appropriate venipuncture technique
9. Differentiate between the two major sites of intravenous drug administration
10. Identify, describe and document complications associated with venipuncture and appropriate actions to resolve these complications
11. Discuss the various elements of initiating and discontinuing intravenous access
12. Differentiate and document dose calculations for adult and pediatric patients
13. Prepare for injection of contrast agents or intravenous medications using aseptic technique
14. Explain the current legal status and professional liability issues of the radiographer's role in contrast and drug administration

ASRT - Radiographic Procedures

1. Demonstrate proper use of positioning aids
2. Discuss general procedural considerations for radiographic exams
3. Identify methods and barriers of communication and describe how each may be used or overcome effectively during patient education
4. Explain radiographic procedures to patients and family members
5. Modify directions to patients with various communication problems
6. Develop an awareness of cultural factors that necessitate adapting standard exam protocols

7. Adapt general procedural considerations to specific clinical settings
8. Identify the structures demonstrated on routine radiographic and fluoroscopic images
9. Adapt radiographic and fluoroscopic procedures for special considerations
10. Simulate radiographic and fluoroscopic procedures on a person or phantom in a laboratory setting
11. Evaluate images for positioning, centering, appropriate anatomy and overall image quality
12. Discuss equipment and supplies necessary to complete basic radiographic and fluoroscopic procedures
13. Explain the patient preparation necessary for various contrast and special studies
14. Explain the routine and special positions and projections for all radiographic and fluoroscopic procedures
15. Explain the purpose for using contrast media
16. Name the type, dosage and route of administration of contrast media commonly used to perform radiographic contrast and special studies
17. Describe the general purpose of radiographic and fluoroscopic studies
18. Apply general radiation safety and protection practices associated with radiographic and fluoroscopic examinations

ASRT- Additional Modalities and Radiation Therapy

1. Recognize and compare basic equipment used in various imaging modalities and radiation therapy
2. Define basic terms related to dose differences
3. Compare and contrast different types of radiation
4. Explain basic terms related to patient preparations
5. Define basic terms related to indications and contraindications
6. Identify educational and certification requirements
7. Discuss the image appearance and basic principles of operation for equipment used in various imaging modalities and radiation therapy

Course Number and Course Name: RGT 2911 Radiation Biology

Description: This course is a study of the biological effects of radiation upon living matter. It includes genetic and somatic effects.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15
2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Evaluate biophysical events relating to radiation exposure ASRT – Radiation Biology 1-21
 - a. Identify sources of electromagnetic and particulate ionizing radiations
 - b. Discuss direct or indirect effects of ionizing radiations
 - c. Identify sources of radiation exposure
 - d. Describe radiation induced chemical reactions, and analyze biologic damage
2. Analyze radiation effects on living organisms ASRT – Radiation Biology 1-21
 - a. Identify methods to measure radiation response
 - b. Describe physical, chemical, and biologic factors influencing radiation response of cells and tissues
 - c. Explain factors influencing radiosensitivity
 - d. Recognize the clinical significance of lethal dose
3. Demonstrate comprehension of radiosensitivity and response ASRT – Radiation Biology 1-21
 - a. Examine effects of limited versus total body exposure
 - b. Relate short-term and long-term effects as a consequence of high and low radiation doses
 - c. Differentiate between somatic and genetic radiation effects as well as discuss specific diseases or syndromes associated with them
 - d. Discuss stochastic and non-stochastic (deterministic) effects
 - e. Discuss risk estimates for radiation-induced malignancies
 - f. Employ dose response curves to study the relationship between radiation dose levels and the degree of biologic response
 - g. Discuss use of and information to be gained from various dose/response curves
 - h. Discuss factors affecting radiation patient dose, such as ESE, bone marrow, and gonadal dose

ASRT – Radiation Biology

1. Differentiate between ionic and covalent molecular bonds
2. Describe principles of cellular biology
3. Identify sources of electromagnetic and particulate ionizing radiations
4. Discriminate between the direct and indirect effects of radiation
5. Identify sources of radiation exposure
6. Describe radiation-induced chemical reactions and potential biologic damage
7. Evaluate factors influencing radiobiologic and biophysical events at the cellular and subcellular level
8. Identify methods to measure radiation response
9. Describe physical, chemical and biologic factors influencing the radiation response of cells and tissues
10. Explain factors influencing radiosensitivity
11. Recognize the clinical significance of lethal dose (LD)
12. Identify the radiosensitivity of specific cells
13. Employ dose response curves to study the relationship between radiation dose levels and the

degree of biologic response

14. Examine effects of limited vs. total body exposure
15. Relate short-term and long-term effects as a consequence of high and low radiation doses
16. Differentiate between somatic and genetic radiation effects, and discuss specific diseases or syndromes associated with them
17. Discuss stochastic (probabilistic) and nonstochastic (deterministic) effects
18. Differentiate between the stochastic (probabilistic) and nonstochastic (deterministic) effects of radiation exposure
19. Discuss embryonic and fetal effects of radiation exposure
20. Discuss risk estimates for radiation-induced malignancies
21. Discuss acute radiation syndromes

Course Number and Course Name: RGT 2922 Radiographic Pathology

Description: This course is designed to introduce theories of disease causation and the pathophysiologic disorders that compromise healthy systems. Etiology, pathophysiologic responses, clinical manifestations, radiographic appearance, and management of alterations in body systems will be presented.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15
2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify terms and conditions related to pathology ^{ASRT – Radiographic Pathology 1-11}
 - a. Define terms related to pathology
 - b. Discuss manifestations of pathological conditions and their relevance to radiographic procedures
2. Relate radiographic diagnosis to the classification of trauma and physical injury ^{ASRT – Radiographic Pathology 1-11}
 - a. Discuss the classifications of trauma
 - b. Describe examples and sites, complications, and prognosis for classifications of trauma
 - c. Describe radiologic procedures used in the diagnosis for trauma
3. Explain classification and radiographic demonstration of systemic disease ^{ASRT – Radiographic Pathology 1-11}
 - a. List the systemic classifications of disease, and define them
 - b. Describe the various systemic classifications of disease in terms of etiology, types, common sites, complications, and prognosis
 - c. Discuss the radiographic appearance of selected diseases
 - d. Describe radiographic procedures and interventional techniques appropriate for different examples of disease in each of the systemic classifications
4. Discuss damage and repair of tissue ^{ASRT – Radiographic Pathology 1-11}
 - a. Discuss the causes of tissue disruption; for the different causes, describe the process, and give examples
 - b. Describe the healing process
 - c. Discuss complications connected with the repair and replacement of tissue

ASRT – Radiographic Pathology

1. Define basic terms related to pathology
2. Describe the basic manifestations of pathological conditions and their relevance to radiologic procedures
3. Discuss the classifications of trauma
4. Describe imaging procedures used in diagnosing disease
5. List the causes of tissue disruption
6. Describe the healing process
7. Identify complications connected with the repair and replacement of tissue
8. Describe the various systemic classifications of disease in terms of etiology, types, common sites, complications and prognosis
9. Describe the radiographic appearance of diseases
10. Identify imaging procedures and interventional techniques appropriate for diseases common to each body system
11. Identify diseases caused by or connected to genetic factors

Course Number and Course Name: RGT 2933 Certification Fundamentals

Description: This course is designed to correlate scientific components of radiography to entry-level knowledge required by the profession.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30
3	3	0	45
4	2	4	90
4	4	0	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Recall radiation protection standards ASRT - Human Structure and Function 1-67
 - 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 among the various sources of radiation exposure
 - d. Utilize National Council of Radiation Protection (NCRP) recommendations for protective devices
 - e. Explain the units of measurement
 - f. Critique radiation exposure and monitoring
2. Identify equipment operation and maintenance practices ASRT - Human Structure and Function 1-67
 - 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
 - e. Describe the operation of digital imaging equipment
3. Summarize image production and evaluation methods ASRT - Human Structure and Function 1-67
 - 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, image acquisition, and quality assurance
 - d. Evaluate the diagnostic quality of radiographs
4. Summarize the routine radiographic procedures ASRT - Human Structure and Function 1-67
 - 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
5. Identify all aspects of patient care ASRT - Human Structure and Function 1-67

- 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 media and contraindications

The following ASRT standards are taught in other academic/technical courses that are not listed as Radiologic Technology courses:

ASRT - Human Structure and Function

1. Discuss the basics of anatomical nomenclature
2. Describe the chemical composition of the human body
3. Identify cell structure and elements of genetic control
4. Explain the essentials of human metabolism
5. Describe the types and functions of human tissues
6. Classify tissue types, describe the functional characteristics of each and give examples of their location within the human body
7. Describe the composition and characteristics of bone
8. Identify and locate the bones of the human skeleton
9. Identify bony processes and depressions found on the human skeleton
10. Describe articulations of the axial and appendicular skeleton
11. Differentiate the primary and secondary curves of the spine
12. Summarize the functions of the skeletal system
13. Label different types of articulations
14. Compare the types, locations and movements permitted by the different types of articulations
15. Examine how muscle is organized at the gross and microscopic levels
16. Differentiate between the structures of each type of muscle tissue
17. State the function of each type of muscle tissue
18. Name and locate the major muscles of the skeleton
19. Differentiate between the structure and function of different types of nerve cells
20. State the structure of the brain and the relationship of its component parts
21. Describe brain functions
22. List the meninges and describe the function of each
23. Outline how cerebrospinal fluid forms, circulates and functions
24. Describe the structure and function of the spinal cord
25. Determine the distribution and function of cranial and spinal nerves
26. Summarize the structure and function of components that comprise the autonomic nervous system
27. Describe the structures and functions of the components that comprise the human eye and ear
28. List the component body parts involved in the senses of smell and taste
29. List the somatic senses
30. Define endocrine
31. Describe the characteristics and functions of the components that comprise the endocrine system
32. Describe the hard and soft palates
33. Describe the structure and function of the tongue
34. Identify the structure, function and locations of the salivary glands
35. Describe the composition and characteristics of the primary organs of the digestive system
36. Describe the function(s) of each primary organ of the digestive system

37. Differentiate between the layers of tissue that comprise the esophagus, stomach, small intestine, large intestine and rectum
38. Differentiate between peritoneum, omentum and mesentery
39. List and label the accessory organs of the digestive system and describe their function
40. Identify the secretions and function of each accessory organ of the digestive system
41. Explain the purpose of digestion
42. List the digestive processes that occur in the body
43. Describe the composition and characteristics of blood
44. List the types of blood cells and state their functions
45. Differentiate between blood plasma and serum
46. Outline the clotting mechanism
47. List the blood types
48. Explain the term Rh factor
49. Explain the antigen/antibody relationship and its use in blood typing
50. Label the parts of the human heart
51. Describe the flow of blood through the body and identify the main vessels
52. Describe the structure and function of arteries, veins and capillaries
53. Differentiate between arterial blood in systemic circulation and arterial blood in pulmonary circulation
54. Outline the major pathways of lymphatic circulation
55. Correlate cardiac electrophysiology to a normal ECG tracing
56. Differentiate between nonspecific defenses and specific immunity
57. Explain antibody production and function
58. List the different types and functions of T- and B-cells and explain their functions
59. Label the components of the respiratory system
60. Describe the physiology and regulation of respiration
61. Label the parts of the kidneys, ureters, bladder and urethra
62. Describe the function of each organ of the urinary system
63. Describe the composition and formation of urine
64. Explain micturition
65. Label the anatomy of the male and female reproductive organs
66. Analyze the function of each of the male and female reproductive organs
67. Identify major sectional anatomical structures found within the head/neck, thorax and abdomen

APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT

CAPITALIZED ITEMS

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. Cassette, radiographic film holder 30 cm by 35 cm (6 per lab)
5. Computer (1 per 2 students)
6. Computer workstation (1 per computer)
7. Digital densitometer with carrying case (1 per 10 students)
8. Grid cap 14 by 17 in. (1 per lab)
9. Grid cap 10 by 12 in. (1 per lab)
10. Holder, phantom head positioning (1 per 10 students)
11. Human sexless torso (1 per lab)
12. Illuminators, mobile stand system (1 per 5 students)
13. Illuminator, portable (1 per classroom)
14. Illuminator, portable, single (1 per lab)
15. Illuminator, wall mounted (1 per lab)
16. Interactive video equipment (1 per 5 students)
17. Intravenous continuous pump (1 per 10 students)
18. Laser printer (1 per 2 computers)
19. Lockable student storage (1 per student)
20. Patient care simulator (1 per program)
21. Patient restraint/Immobilizer/Positioner (1 per lab)
22. Patient transfer device adult positioner (1 per lab)
23. Phantom, sectional chest (1 per lab)
24. Phantom, sectional, elbow AP and 90 flexion (1 per lab)
25. Phantom, sectional, foot (1 per lab)
26. Phantom, sectional, hand PA: Lateral (1 per lab)
27. Phantom, sectional, head with cervical (1 per lab)
28. Phantom, sectional, knee AP and 90 flexion (1 per lab)
29. Phantom, sectional, pelvis (1 per lab)
30. Phantom patient, whole body with lungs (1 per lab)
31. Pneumonic compression paddle (1 per lab)
32. Quality assurance system (1 per lab)
33. Stretcher (1 per lab)
34. Wheelchair with IV pole attachment (1 per lab)
35. X-ray radiography system (1 per 10 students)
36. X-ray radiography system, portable (1 per program)
37. Phantom, entire upper extremity (1 per lab)
38. Phantom, entire lower extremity (1 per lab)
39. Projector screen (1 per room)
40. Skeleton human bones, disarticulated (1 per room or 2 per program)
41. Skeleton, with stand, human adult (1 per room or 2 per program)
42. Supply storage cabinet, lockable (1 per program)
43. CR radiography system (1 per program)
44. DR radiography system (1 per program)
45. Resolution Grid
46. Pulse Oximeter

NON-CAPITALIZED ITEMS

1. Calipers (1 per lab)
2. Cart, film (1 per program)
3. Cassette holder, portable (1 per radiographic room)
4. Cassette, radiographic film holder 8 by 10 in. (6 per program)
5. Cassette, radiographic film holder extremity 8 by 10 in. (6 per lab)
6. Cassette, radiographic film holder extremity 10 by 12 in. (6 per lab)
7. Cassette, radiographic film holders 14 by 17 in. (6 per lab)
8. Cassette, radiographic film holders 10 by 12 in. (6 per lab)
9. Cassette, radiographic film holders 7 by 17 in. (6 per lab)
10. Cassette, radiographic film holders 7 by 14 in. (6 per lab)
11. Cervical sandbags (1 set per lab)
12. Clock (1 per lab)
13. Deluxe enclosed film marking devices (1 per lab)
14. Gowns, cloth (1 per student)
15. Heart model (1 per 10 students)
16. IV Pole, on wheels (1 per lab)
17. Kidney model with base (1 per lab)
18. Lead apron (2 per lab)
19. Lead gloves (2 per lab)
20. Lead (flat shields) (3 per room)
21. Pillows (3 per lab)
22. Pillow cases (1 per pillow)
23. Positioning blocks, various sizes and shapes (1 per lab)
24. Portable AV security cabinet with electronic hookups (1 per program)
25. Skull, disarticulated (2 per program)
26. Sheets (2 per stretcher)
27. Sphygmomanometer with stethoscope (1 per 2 students)
28. Teaching Stethoscope
29. Stool, step (1 per lab)
30. Stool, adjustable (1 per lab)

It is recommended that instructors have access to the following items:

1. Television (1 per room)
2. VCR/DVD (1 per room)
3. Video camera standard VHS (1 per lab)
4. ELMO presentation system (1 per program)
5. Projector, overhead (1 per room)
6. Table, mobile for portable overhead projector (desk type) (1 per program)
7. Electrical cart, steel, for AV equipment (1 per program)
8. Interactive whiteboard (1 per program)
9. iPads (1 per instructor)

APPENDIX B: CURRICULUM DEFINITIONS AND TERMS

Course Name – A common name that will be used by all community colleges in reporting students

Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

Classification – Courses may be classified as the following:

- a. Career Certificate Required Course – A required course for all students completing a career certificate.
- b. Technical Certificate Required Course – A required course for all students completing a technical certificate.
- c. Technical Elective – Elective courses that are available for colleges to offer to students.

Description – A short narrative that includes the major purpose(s) of the

Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

Corequisites – A listing of courses that may be taken while enrolled in the course

Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) 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:

The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:

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 that 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 or revised
Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas.

Sequencing of the course within a program is left to the discretion of the local college. 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. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework.

Revising or extending the student learning outcomes

Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

APPENDIX C: COURSE CROSSWALK

COURSE CROSSWALK Radiologic Technology CIP 51.0911 Radiologic Technology/Science-Radiographer					
Note: Courses that have been added or changed in the 2018 curriculum are highlighted.					
Existing			Revised		
2014 MS Curriculum Framework			2018 MS Curriculum Framework		
Course Number	Course Title	Hours	Course Number	Course Title	Hours
RGT 1213	Fundamentals of Radiography	3	RGT 1213	Fundamentals of Radiography	3
RGT 1223	Patient Care and Radiography	4	RGT 1223	Patient Care and Radiography	4
RGT 1114	Clinical Education I	4	RGT 1114	Clinical Education I	4
RGT 1124	Clinical Education II	4	RGT 1124	Clinical Education II	4
RGT 113(5-9)	Clinical Education III	5-9	RGT 113(5-9)	Clinical Education III	5-9
RGT 1312	Principles of Radiation Protection	2	RGT 1312	Principles of Radiation Protection	2
RGT 1413	Imaging Principles	4	RGT 1323	Principles of Exposure and Image Production	3
RGT 1423	Digital Imaging	3	RGT 1333	Digital Image Acquisition and Display	3
RGT 1513	Radiographic Procedures I	3	RGT 1513	Radiographic Procedures I	3
RGT 1523	Radiographic Procedures II	3	RGT 1523	Radiographic Procedures II	3
RGT 1613	Physics of Imaging Equipment	3	RGT 1613	Physics of Imaging Equipment	3
RGT 2132	Ethical and Legal Responsibilities	2	RGT 2132	Ethical and Legal Responsibilities	2
RGT 2147	Clinical Education IV	7	RGT 2147	Clinical Education IV	7
RGT 2157	Clinical Education V	7	RGT 2157	Clinical Education V	7
RGT 2532	Radiographic Procedures III	2	RGT 2532	Radiographic Procedures III	2
RGT 2542	Radiographic Procedures IV	2	RGT 2542	Radiographic Procedures IV	2
RGT 2911	Radiation Biology	1	RGT 2911	Radiation Biology	1
RGT 2922	Radiographic Pathology	2	RGT 2922	Radiographic Pathology	2
RGT 2933	Certification Fundamentals	3	RGT 2933	Certification Fundamentals	3

APPENDIX D: RECOMMENDED TEXTBOOK LIST

Recommended Textbook List		
CIP 51.0911 Radiologic Technology/Science-Radiographer		
Book Title	Author(s)	ISBN
Introduction to Radiologic Technology 7 th edition	Gurley	978-0323073516
Introduction to Radiologic Sciences and Patient Care (NEW) 7th Edition	Adler/Carlton	978-1437716467
Bontrager Handbook Rad. Positioning/Tech. 9th Edition	Lampignano & Kendrick	978-0323399661
Comprehensive Radiographic Pathology 6th Edition	Eisenberg & Johnson	978-0323353243
Digital Radiography & PACS (NEW) 3rd Edition	Carter & Veale	978-0323044448
Merrill's Atlas Rad. Positioning/Proc. (3 volumes) (NEW) 14th Edition	Long, Rollins & Smith	978032356667
Radiation Protection in Medical Radiography 8th Edition	Statkiewicz & Ritenour	978-0323446662
Radiation Protection in Medical Radiography 7 th edition	Sherer & Visconti	9780323172202
Workbook Atlas Radiographic Positioning & Procedures (NEW) 14th Edition	Long, Rollins & Smith	9780323597043
Workbook Radiographic Image Analysis (NEW) 5th Edition	Martensen	
Principles of Radiographic Imaging 5th Edition	Carlton	9781439058725
Radiography Prep	Saia	9781259863578
Mosby's Comprehensive Review of Radiography	Calloway	978-0323354233
Basic Medical Techniques and Patient Care in Imaging Technology 8 th edition	Torres	9781451115659
Radiation Protection in Medical Radiography	Sherer/ Visconti/ Haynes	
Radiographic Pathology for Technologists	Kowalczyk	978-0323089029
Ethical Dimensions in the Health Professions	Doherty/ Purtilo	978-0323328920
Rad Science for Technologists 11	Bushong	9780323353779
Ethical and Legal Issues for Imaging Professionals 2 nd edition	Towsley-Cook, Young	978-0323045995
Radiographic Imaging and Exposure 5 th edition	Fauber	9780323356244