Community College
of
Philadelphia

DIAGNOSTIC MEDICAL IMAGING

PROGRAM POLICY MANUAL
2023 – 2024

Effective July 2023 (supersedes and replaces any previous version)

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Program Overview

Mission Statement

The mission of the Diagnostic Medical Imaging Program is to prepare individuals in the judicious use of ionizing radiation in both diagnostic radiographic and fluoroscopic procedures. This is accomplished by the application of knowledge in anatomy, physiology, and osteology; in the skillful positioning of the client-patient; the selection of correct technical factors; the proper handling and manipulation of radiation producing equipment; the utilization of accepted radiation protection procedures; and the processing of the image in preparation for diagnostic interpretation.

Goals and Student Learning Outcomes

Upon completion of the Program, students will be able to:

1. **Competently and safely perform radiographic and fluoroscopic procedures.**
   Student Learning Outcomes:
   - Perform routine radiographic procedures
   - Demonstrate quality patient care
   - Apply appropriate radiation protection of patients, themselves and others

2. **Communicate effectively.**
   Student Learning Outcomes:
   - Demonstrate effective oral communication skills
   - Demonstrate effective written communication skills

3. **Think critically and problem solve in various patient care situations.**
   Student Learning Outcomes:
   - Demonstrate the ability to perform non-routine procedures
   - Demonstrate knowledge of C-arm equipment and OR procedures
   - Identify diagnostic quality images and correct non-quality images accordingly

4. **Demonstrate professionalism.**
   Student Learning Outcomes:
   - Demonstrate professional behavior in delivering patient care
   - Demonstrate professional characteristics in the clinical education setting

Programmatic Effectiveness

In addition to evaluating program goals and student learning outcomes, the DMI Program evaluates the following for programmatic effectiveness:

1. Program completion rate
2. ARRT certification examination pass rate
3. Graduate employment
4. Graduate satisfaction
5. Employer satisfaction

Programmatic Assessment

The Diagnostic Medical Imaging Program incorporates a systematic approach to evaluating program goals, student learning outcomes, and programmatic effectiveness data. The results are evaluated for continual program development. The assessment plan details the tools utilized for assessment and performance benchmarks. Results are documented and the data are analyzed annually followed by the development of action plans for improvement.

See Appendix A – Assessment Plan

Program Standards

Performance Standards

The Community College of Philadelphia's Department of Allied Health has adopted Core Performance Standards for all applicants to the Allied Health degree and certificate programs. These standards are based upon required abilities that are compatible with effective performance in allied health programs. If an applicant is not able to meet the Core Performance Standards, they are responsible to acknowledge their inability to perform the required tasks. If while in the program, a student fails to meet the Core Performance Standards, the student will be removed from the program as the Performance Standards are considered Essential Functions for health care professionals. **See Appendix B – Performance Standards for Allied Health Programs**

Accreditation Standards

The DMI Program is accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). During orientation, students are provided with information regarding programmatic accreditation. The Diagnostic Medical Imaging Program at the Community College of Philadelphia seeks to provide a program in compliance with JRCERT Standards and encourages students to be cognizant of the Standards.
See Appendix C – JRCERT Standards for an Accredited Educational Program in Radiography

Students seeking more information regarding the Standards or program accreditation may contact the Program Director or the JRCERT directly:

Joint Review Committee on Education in Radiologic Technology
20 North Wacker Drive, Suite 2850
Chicago, IL 60606-3182
Phone: (312) 704-5300
Email: mail@jrcert.org
Website: www.jrcert.org

Professional Standards

The Diagnostic Medical Imaging Program at the Community College of Philadelphia holds students to very high professional standards. The American Registry of Radiologic Technologists Standards of Ethics applies to all students enrolled in the Diagnostic Medical Imaging Program. **See Appendix D – ARRT Standards of Ethics**

Moral and Ethical Conduct

A student enrolled in the Community College of Philadelphia's Diagnostic Medical Imaging Program assumes an obligation to conduct themselves in a manner compatible with the College's function as an educational institution and comply with the Standards of Ethics as established by the ARRT. This includes, but is not limited to, compliance with State and Federal laws. **Any violation may result in immediate dismissal from the DMI Program.**

A conviction of, or a plea of guilty to, or a plea of nolo contendere to a crime which is either a felony or is a crime of moral turpitude must be investigated by the ARRT in order to determine eligibility for the ARRT certification examination.

Misconduct for which students are subject to discipline and possible dismissal from the Program includes:

- Dishonesty, such as cheating, plagiarism, or knowingly furnishing false information to the College.
- Forgery, alteration or misuse of College or clinical documents, records or identification.
- Theft of, or damage to, property of the College or clinical affiliates, or of a member of the College community or clinical affiliate personnel, or campus visitor or patient.
- Unauthorized entry to, or use of, College or clinical affiliate facilities.
- Unauthorized exposure to radiation of any person without a physician requisition. This is a breach of ethics and Federal Law and will result in immediate Program dismissal.
- Charge of, arrest for, and/or conviction of possession, use or distribution of any narcotic drug, central nervous system stimulant, hallucinogenic drug or barbiturate.
- Disorderly conduct or lewd, indecent or obscene conduct or expression on college-owned or controlled property or within the clinical affiliate facilities.
- The violation of a patient's personal privacy, morally or ethically by a student during the period of clinical education.

The Program Director reserves the right to remove any student from the Program at any time if such action appears to be in the best interest of the Program and the clinical affiliate.

Professional Conduct

Professionalism is the key to success as a Radiologic Technologist student and later as an active participant in the medical imaging profession. Students must understand the importance of such intangibles as effective communication, concern for others, ethical conduct, honesty, initiative, empathy, enthusiasm, loyalty, tact, dedication, cooperation, efficiency and professional sophistication. Students are representatives of not only the Diagnostic Medical Imaging Program, but also the Community College of Philadelphia and clinical affiliates. The Program sincerely hopes that student conduct will bring only compliments. Students must always conduct themselves in a professional manner and maintain the rules of common courtesy. This includes, but is not limited to:

- Unnecessary talking in class is distracting to faculty and to fellow students. When faculty is responding to the question(s) of student-radiographers, all students in the class can benefit by refraining from unnecessary talking while the question(s) is/are being answered.
- Whether in the classroom or in the clinical facility, if a student-radiographer is dissatisfied with any situation, they may request a conference with the respective faculty and/or Program Director.
- Loud or boisterous conversation or activity in the classroom, College corridors, or in the clinical facilities is to be avoided.
- Smoking is prohibited in all College buildings and clinical facilities.
- Eating is not permitted in the College classroom/laboratory and in the radiographic/fluoroscopic rooms in the clinical facilities.
- Gum chewing during lab simulations and at the clinical facilities is not professional and will not be tolerated.
- College faculty and clinical staff are appropriately referred to as Professor, Doctor, Mister, Miss or Mrs. and surname.
- Student-radiographers must answer the telephone in the College classroom/laboratory and in the clinical facilities by identifying themselves by name and location.

Communication and Email Etiquette

Communication between faculty and students will occur through the MyCCP portal, Canvas, and/or email. Students are required to check their accounts on a regular basis. If a student needs assistance and contacts a faculty member via email, the message may be forwarded to an appropriate department or person who can assist. Students should be reminded that email is not the same as text messaging. All messages to program officials should be addressed in a professional manner.

Additional program information, such as schedules, meetings and continuing education opportunities, will be posted on the bulletin boards located in the DMI classroom/laboratory (W2-13/14). Students are also assigned a mailbox in the classroom/laboratory non-graded faculty communications.

Social Networking

Students should be cognizant of statements, pictures and/or conversations posted on social networking sites. Use of social networking during scheduled classroom or clinical hours is strictly prohibited. **Conversing on these sites regarding classes or clinical education will result in disciplinary action and possible dismissal from the Program.**

Professional Organizations

Students are encouraged to become members of national, state, and local medical imaging organizations such as the following:

American Society of Radiologic Technologists (ASRT)
15000 Central Ave. S.E.
Albuquerque, NM 87123-3917
(505) 298-4500
www.asrt.org

Pennsylvania Society of Radiologic Technologists (PSRT)
www.psrtonline.org

Philadelphia Society of Radiologic Technologists (PhilaSRT)
https://philasrt.wildapricot.org/

Aunt Minnie
www.auntminnie.com

Membership benefits of these organizations include opportunities for mentoring, scholarships, continuing education and professional networking.

Faculty

Department and Division Leadership

Professor Michele Dattilo mdattilo@ccp.edu
Allied Health Department Head

Dr. Vishal Shah vshah@ccp.edu
Dean, Division of Math, Science and Health Careers

Full-Time Faculty

Rebecca Peterson M.S. Ed., R.T.(R)(ARRT) rpeterson@ccp.edu
Program Director, Associate Professor, Curriculum Coordinator

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Assistant Professor

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Clinical Faculty

Kristen Vogel B.S., R.T. (R)(M)(BD)(ARRT) kvogel@ccp.edu
Lab Assistant, Clinical Faculty

Note: Part-time faculty will advise students of their availability to meet with them.

Faculty Rights

Faculty members have the academic freedom to employ the teaching methodologies they deem appropriate to their subject. The course syllabi provided to the students will clearly state all faculty course expectations.

Advising and Counseling

Faculty members in the DMI Program are student advisors and mentors. Advisement sessions may be initiated by faculty or students as deemed necessary. Faculty availability for advising will be made known to the student. Availability of Program faculty does not reduce the responsibility of the student for academic and clinical success.

Academic Advising at Community College of Philadelphia supports students' lifelong learning by guiding them, as stated in the College's mission statement, through "greater insight into their strengths, needs, and aspirations." Academic Advising provides students the opportunity to collaborate with a faculty advisor to explore academic and vocational goals, and to align these with a curriculum that best meets students' objectives. Students can access advising services by visiting https://www.myccp.online/academic-advising.

The College's Counseling Center is staffed by professional counselors and offers students free educational, career and personal counseling services. Counselors also assist both current students and graduates who wish to continue their education at another institution. Information discussed in counseling is kept strictly confidential. Appointments can be made at the reception desk in the Bonnell Building, Room BG-07 or by calling 215.751.8169 or email counseling@ccp.edu.

Tutoring

Tutoring is available to DMI students through the Science, Technology and Allied Health Learning Lab. The Learning Lab Department offers free academic support services to Community College of Philadelphia students. Faculty specialists and tutors with expertise in a broad range of subject areas are available to provide students with a personalized learning experience. All the Learning Lab Department's services are designed to help students achieve success throughout their College careers.

Admissions Information

Admissions Process

Admission into the Diagnostic Medical Imaging Program is selective, competitive, and requires potential students to fulfill all admission requirements of the College. Applications submitted from **October 1st until January 1st** will receive priority in the Allied Health pre-entrance testing and review process.

Students must meet the following minimum requirements before applying to the Diagnostic Medical Imaging Program:

- High School diploma or GED documentation
- High School Biology or its equivalent (BIOL106) with grade "C" or better in the past 10 years
- Demonstration of readiness for ENGL 101 and MATH 118 as determined by the College's placement tests, or by successfully completing developmental coursework
- Minimum grade point average of 2.50

Applicants must be at least 18 years of age by the start of the Diagnostic Medical Imaging clinical experience.

Applicants who are new to the College must begin the application process by first applying to the College. A transcript evaluation (for students transferring in college credits from another school) and/or completion of a placement test (or test waiver) is required. Students can apply to the College by visiting the Admissions Process page.

After applying to the Community College of Philadelphia, students will be placed into the Health Care Studies Program until they have completed the requirements to be accepted into the program. Health Care Studies is designed for students interested in entering a health care profession.

Current Community College of Philadelphia students can begin the Diagnostic Medical Imaging program application process by visiting the Diagnostic Medical Imaging Program Intake Process page. Applicants must:

- Complete & sign a DMI Program application form
- Submit official copies of supporting documents (e.g., official transcripts)
- Complete the pre-entrance Allied Health testing program with benchmark score or higher

Applicants who complete and meet the aforementioned requirements will be eligible to continue in the admissions process and will be contacted, in writing, concerning the scheduling of an admissions interview with the Program Director (or designee). **An admission interview is not guaranteed and will only be granted to highly qualified applicants. A scheduled interview also does not guarantee admission.** Applicants will be asked to submit the following if they are called for an interview:

- Resume with letter of intent
- Two recommendation forms

Upon completion of the admissions interview, the Program Director (or designee) will review and score all applicants with particular attention to:

1. Cumulative grade point average
2. Strength of secondary/post-secondary academic curriculum
3. Allied Health pre-entrance examination score
4. Extracurricular activities, community service, and work experience
5. Personal interview

All applicants are notified in writing regarding the admissions decision. All offers of acceptance are contingent upon successful completion of the following:

- **Acknowledgement of Core Performance Standards for Health Care Career Programs and physical demand analysis.**
    - Clinical education requires a full range of motion, including pushing, pulling, twisting, lifting and bending. Standing and walking are required for the entire clinical day (8 hours). Students who are registered with the Center on Disability must inform the Program Director if special accommodations are required.
- **Completion of Criminal Background Check**
    - Conviction of serious and/or violent crimes results in denial of admission into the DMI Program.
        - Upon completion of the DMI Program, students will be eligible to apply for the American Registry of Radiologic Technologists certification examination in Radiography. The ARRT reserves the right to deny or reject an application for certification as stated in the ARRT Standards of Ethics. Prior to applying to the DMI Program, candidates are encouraged to complete an Ethics Review Preapplication with the ARRT for the following circumstances:
            - Criminal proceedings including:
                - Misdemeanor charges and convictions,
                - Felony charges and convictions,
                - Military courts-martials; and/or
            - Disciplinary actions taken by state or federal regulatory authority or certification board; and/or
            - Honor code (academic) violations.
- **Completion of Child Abuse Clearance**
    - Any record results in denial of admission into the DMI Program.
- **Completion of Drug Screening**
    - A positive drug screening results in denial of admission into the DMI Program.

Additional conditions for Program commencement include:

- Documentation of a complete physical examination, including required laboratory tests. All health information is kept confidential. Students will have direct contact with patients and have the responsibility to maintain very high standards of health practice.
- Documentation of up-to-date immunizations prior to clinical assignment. Additional immunizations (e.g., influenza) may be necessary.
- Documentation of current health insurance coverage, which must be maintained throughout the Program.
- Attendance at scheduled Program orientation prior to entry.
- Purchase of DMI student uniform.
- Adult, child, and infant CPR certification for Healthcare Providers (due prior to the commencement of Clinical Education I).

Disciplinary Action

Involvement in any incident which resulted in disciplinary action against a student at the Community College of Philadelphia or any post-secondary institution is considered in the admissions process. The Diagnostic Medical Imaging Program reserves the right to deny admission to any applicant who has a documented history of violating College rules and/or regulations or who has been previously suspended or expelled from the College or any other post-secondary educational institution. Students subjected to sanction as a result of violating an academic honor code or suspended or dismissed by an educational program may not qualify for the ARRT certification examination.

Reconsideration

An applicant who believes that an error of fact has been made in terms of the information provided to the decision-making committee can request reconsideration by the committee. This request must be made in writing within 10 days from the date of the letter notifying the applicant of the decision. The reconsideration should address what the applicant considers to be errors of fact. Following reconsideration by the decision-making committee, the applicant can appeal the committee's decision to the Vice President for Academic and Student Success whose decision is final.

Any official change or the initiation of any governmental proceeding affecting the information revealed by the required criminal or child abuse background check must be reported immediately to the Program Director of DMI.

Tuition, Fees and Program Expenses

Continuation in the DMI Program requires all College financial obligations to be met. Tuition for the DMI Program varies based on student residency. Tuition and fees for College courses can be found by visiting www.ccp.edu. Additional Program expenses include textbooks, uniforms, pinning ceremony and certification examination application fee.

See Appendix E – DMI Program Expenses

Documentation of DMI Program Attendance

Any student requiring a letter of documentation of attendance in the DMI Program for insurance companies, unions or other agencies must submit the following information to the Program Director:

- Their own name, address, and identification number
- Name of organization to whom this information is to be sent
- Address of organization
- Case worker's name
- Case ID number

Each time a letter is required this information must be re-submitted. **Students requiring a letter with the official College seal must submit their request to the Office of Admissions.**

Dismissal from the Program

The DMI Program reserves the right to dismiss any student:

- who fails to observe the regulations of College and its clinical affiliates,
- whose general conduct is detrimental to the College and its clinical affiliates, and/or
- who does not meet the scholastic requirements of the Diagnostic Medical Imaging Program. A student who receives a grade of "D" or lower in any course will be dismissed from the program.

Readmission Policy

The DMI program is intended to be completed in twenty-four months beginning in July of each year. In order to progress through the program, students must complete all curriculum courses with a grade of "C" or better and maintain a GPA of 2.5 or higher. Eligible students seeking program readmission must do so within twelve (12) months of program separation. Program readmission is not guaranteed and is dependent upon program capacity and availability. A student must be eligible for readmission according to the College standards. Students who request to be considered for program readmission must meet the current admissions criteria and requirements at the time the request for readmission is placed. Readmitted students must follow the curriculum requirements at the time of their return to the program. A student may only be readmitted to the program once.

Eligible Students

- Students who withdraw from the DMI program in good academic standing (grade "C" or better in all completed curriculum courses and GPA of 2.5 or higher)
- Students who are dismissed from the DMI program due to a grade "D" or lower in any academic course, with a GPA at time of readmission request of 2.5 or higher

Ineligible Students

- Students who are dismissed from the DMI program due to a grade "D" or lower in any clinical course
- Students who are dismissed from the DMI program due to inappropriate conduct and/or violations of the College's academic integrity policy, clinical code of conduct, moral/ethical standards, professional standards, performance standards or accreditation standards

Process for Readmission Consideration

In order to be considered for program readmission, the applicant must:

- Meet all current admission guidelines.
- Submit a written request to the DMI Curriculum Coordinator. Request must be received at least three (3) months prior to the expected date of enrollment.
- Successfully complete a comprehensive written exam as scheduled by the DMI Curriculum Coordinator. The exam content will include current material from courses which the student previously completed with a grade "C" or better.
- Successfully demonstrate clinical competence through simulation testing as scheduled by the DMI Curriculum Coordinator. Competency procedures will be selected based on the course(s) the student has successfully completed with a grade "C" or better.

  The results of the written exam and competency testing, as well as the student's prior academic and clinical progress, will be evaluated by faculty to determine the student's potential for success in the Program and semester placement. DMI courses are offered chronologically and only once a year, therefore a readmission date will be based on the semester in which the courses are being offered.
- Repeat previously completed courses as recommended by Program faculty. Curriculum analysis is conducted annually, and course content may change to ensure Program alignment with the American Registry of Radiologic Technologists (ARRT) Content Specifications for the Examination in Radiography and the American Society of Radiologic Technologists (ASRT) Radiography Curriculum. Repeating of recommended courses ensures the student is appropriately prepared for Radiography certification and registration in accordance with the ARRT.

Academic Information

DMI Curriculum

The DMI Program curriculum is designed to prepare students for *Radiography* certification and registration in accordance with the American Registry of Radiologic Technologists (ARRT). Curriculum analysis is conducted annually to ensure alignment with the ARRT Radiography Examination Content Specifications (**See Appendix F**), ARRT Radiography Examination Task Inventory (**See Appendix G**), and the American Society of Radiologic Technologists (ASRT) Radiography Curriculum (**See Appendix H**).

Course Sequence

Late Summer Term – Year I

- DMI 101 – Introduction to Diagnostic Medical Imaging (2 credits)

Fall Semester – Year I

- DMI 105 – Image Production & Evaluation I (4 credits)
- DMI 119 – Radiation Safety I (2 credits)
- DMI 131 – Patient Care & Procedures I (4 credits)
- DMI 181 – Radiographic Osteology & Pathology I (2 credits)
- DMI 196 – Clinical Education I (1 credit)

Spring Semester – Year I

- DMI 106 – Image Production & Evaluation II (2 credits)
- DMI 120 – Radiation Safety II (2 credits)
- DMI 132 – Patient Care & Procedures II (4 credits) *fulfills Am/Global Diversity gen ed. requirement*
- DMI 182 – Radiographic Osteology & Pathology II (2 credits)
- DMI 197 – Clinical Education II (1 credit)

Early Summer Term – Year I

- DMI 198 – Clinical Education III (1 credit)

Late Summer Term – Year II

- DMI 199 – Clinical Education IV (1 credit)

Fall Semester – Year II

- DMI 221 – Advanced Imaging I (4 credits)
- DMI 231 – Patient Care & Procedures III (3 credits)
- DMI 261 – Radiation Safety III (2 credits)
- DMI 297 – Clinical Education V (2 credits)

Spring Semester – Year II

- DMI 222 – Advanced Imaging II (2 credits)
- DMI 232 – Registry Review & Career Planning (3 credits)
- DMI 298 – Clinical Education VI (2 credits)

Early Summer Term – Year II

- DMI 299 – Clinical Education VII (1 credit)

General Education Requirements

- BIOL 109 – Anatomy & Physiology I (4 credits)
- BIOL 110 – Anatomy & Physiology II (4 credits)
- CIS 103 – Applied Computer Technology (3 credits)
- ENGL 101 – English Composition I (3 credits)
- ENGL 102 – English Composition II (3 credits)
- FNMT 118 – Intermediate Algebra *or higher* (3 credits)
- Oral Communication/Creative Expression Elective (3 credits)
- Cultural Analysis and Interpretation Elective (3 credits)

All general education requirements necessary for graduation are met through the courses in the program as indicated above. Students who wish to take courses that differ from the general education courses indicated above must complete a course substitution request form. To access the form, login to the MyCCP portal, and in the **Student** tab, under **Electronic Forms**, click on the **Records and Registration Forms** link, then choose **Request For Course Substitution Of Graduation Requirement** link. A more detailed explanation of the College's general education requirements is also available at https://www.ccp.edu/college-catalog/general-education-requirements.

All General Education courses may be completed before entering the DMI Program **or** along with DMI Program courses. Students are encouraged to complete General Education requirements prior to Program commencement to make their schedules more manageable.

Graduation Requirements

To qualify for the Associate in Applied Science (A.A.S.) degree in Diagnostic Medical Imaging, students must complete 73 credit hours as prescribed, attain a grade point average of 2.00 in all Program core courses, and attain no grade below a "C" in any course. Upon successful completion of the Program, graduates are eligible for certification and registration in *Radiography* by the American Registry of Radiologic Technologists (ARRT).

The National Honor Society for the Allied Health Professions

Alpha Eta is The National Honor Society for the Allied Health Professions. Each year, up to twenty (20) percent of the DMI graduating class meeting the requirements can qualify for membership and induction into the Alpha Eta Society. Eligibility requirements for the Alpha Eta Society include:

- Enrollment in a program leading to an Associate of Applied Science degree (A.A.S.)
- Enrollment in the second year, spring semester of the DMI Program
- Maintenance of a 3.50 GPA or better while enrolled in the DMI Program
- Recommendation by the Program Director
- Approval from the Allied Health Department Head and Dean of Math, Science and Health Careers

Invitations for eligible students are sent during the spring semester of the second year.

Transfer Agreements

DMI students may wish to take advantage of transfer agreements with colleges awarding a bachelor's degree. Further information on these agreements can be found at https://www.myccp.online/transfer-agreements. Continuing education information is also provided upon request of the Program Director and as part of the DMI 232 course during the spring semester of the second year of the program.

Clinical Education

The DMI Program places a strong emphasis on clinical education with its competency-based curriculum. The clinical education component provides students with the opportunity to practice and apply the skills necessary to become competent entry-level Radiologic Technologists.

The Program's *Clinical Expectations and Evaluations Manual* provides a comprehensive overview of clinical education expectations and evaluation methods. Content of the manual includes the following:

- Clinical Officials
- Student Levels
- Clinical Assignments
- Orientation to the Clinical Setting
- Competency Requirements
- Scheduling Sequence
- Rotation Expectations
- Grading Criteria
- Evaluation Forms

The information in the clinical manual shall serve as a guide for students, faculty and preceptors **in addition to the program policy manual and clinical course syllabi.** Compliance with all Program policies and course expectations related to clinical education is required. Grades in clinical courses will be lowered to reflect lack of adherence to policies and expectations.

Clinical Affiliates

The recognized clinical affiliates for the DMI Program include the following primary and secondary sites. Upon Program commencement, students are assigned to a primary clinical affiliate ("home site") in which the majority of clinical rotations will be completed throughout the program. Secondary clinical affiliates are utilized for additional clinical rotations as noted below.

See Appendix I – Clinical Affiliate Assignment Form

Primary Clinical Affiliates	Secondary Clinical Affiliates
Bryn Mawr Hospital 130 S. Bryn Mawr Avenue Bryn Mawr, PA 19010 *Pending Approval for 2023-2024 Academic Year*	**The Children's Hospital of Philadelphia** 34th Street and Civic Center Boulevard Philadelphia, PA 19104 *Pediatric/level I trauma rotation for all students*
Corporal Michael J. Crescenz VAMC 3900 Woodland Avenue Philadelphia, PA 19104	**Main Line Health Broomall** 1991 Sproul Road Broomall, PA, 19008 *Urgent care rotation for all students* *Pending Approval for 2023-2024 Academic Year*
Jefferson Frankford Hospital 4900 Frankford Avenue Philadelphia, PA 19124	**Penn Medicine Rittenhouse (Tuttleman)** 1840 South Street Philadelphia, PA 19146 *Pennsylvania Hospital rotation* *separate recognition due to proximity*
Jefferson Torresdale Hospital 10800 Knights Road Philadelphia, PA 19114	
Lankenau Medical Center 100. E. Lancaster Avenue Wynnewood, PA 19096 *Pending Approval for 2023-2024 Academic Year*	
Methodist Hospital 2301 S. Broad Street Philadelphia, PA 19145	
Paoli Hospital 255 W. Lancaster Avenue Paoli, PA 19301 *Pending Approval for 2023-2024 Academic Year*	
Penn Presbyterian Medical Center 51 N. 39th Street Philadelphia, PA 19104	
Pennsylvania Hospital 800 Spruce Street Philadelphia, PA 19107	
Riddle Hospital 1068 W. Baltimore Pike Media, PA 19063 *Pending Approval for 2023-2024 Academic Year*	

Parking and public transportation is available for all clinical affiliates.

JRCERT Recognized Clinical Preceptors

Each Clinical Education setting has appointed Clinical Preceptors recognized by the JRCERT to promote sound clinical education practices.
See Appendix J – Clinical Affiliates & JRCERT Recognized Clinical Preceptors

Qualifications for this role require the Clinical Preceptor to:

- be proficient in supervision, instruction, and evaluation,
- document two years' clinical experience in the professional discipline, and
- hold American Registry of Radiologic Technologists current registration in radiography or equivalent.

Additionally, Program Clinical Preceptors:

- maintain knowledge of program mission and goals;
- understand the clinical objectives and clinical evaluation system and evaluating student's clinical competence;
- provide students with clinical instruction and supervision;
- participate in the assessment process, as appropriate;
- maintain current knowledge of program policies, procedures, and student progress and monitoring and enforcing program policies and procedures.

Clinical Rotation Scheduling

Students accepted into the DMI Program should expect to spend a minimum of 16 hours/maximum of 32 hours per week in clinical each semester. Students will follow a structured clinical rotation schedule throughout seven (7) clinical education courses.

Working with the Clinical Preceptors at each clinical affiliate, the Program Clinical Coordinator (or designee) assigns students to specific clinical areas to assure timely, appropriate and educationally valid clinical experiences. These assignments provide students with the volume and variety of clinical experiences required to successfully progress through the DMI Program. They also ensure a 1:1 student-technologist ratio at all times and equitable learning opportunities.

Competency Requirements

The DMI Program strives to provide a well-structured, competency-based curriculum that prepares students to practice in the professional discipline. Students must demonstrate competence in patient care and radiographic performance skills as outlined by the ARRT Radiographic Didactic and Clinical Competency Requirements (**See Appendix K**).

Competency eligibility means the student has successfully completed classroom assessment or a Clinical Objective Evaluation (COE) for the respective patient care activity or imaging procedure. Students may not perform clinical competencies in the clinical education setting unless this is verified. **See Appendix L – Competency Eligibility Timeline**

Students are required to maintain up-to-date documentation of competency procedures successfully completed. The Program keeps a master log of completed requirements for each student. Students are advised of their progress at planned intervals and are also required to keep track of personal progress.

Competency Evaluations by College Faculty

All students demonstrate proficiency in clinical procedures by successfully completing required competency evaluations with College faculty during their clinical observation visits. Per ARRT requirements, "**Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively.**"

Each semester, students are assigned specific examinations for which competency may be documented. Through appropriate scheduling of clinical rotation assignments, students gain experience and proficiency in the given procedures. When the student feels competent in a procedure and can complete the procedure from beginning to end **without assistance**, a competency evaluation is conducted by College faculty. The staff technologist should remain in the radiographic room and remain attentive to the procedure, but step back and let the student perform the procedure without assistance. It is expected that before an exposure is taken, the staff technologist and/or College faculty can correct the student on anything that should be changed. This will ensure that patients are not needlessly exposed to radiation. The faculty will note these comments and use them in the evaluation. Faculty reserves the right to determine that the student is not ready to be evaluated and may ask the technologist to step in and take over the procedure. Clinical competency requirements are detailed in each clinical course syllabus. **Students must receive a passing grade on competency evaluations to meet course and ARRT clinical competency requirements.**

Program Policies & Procedures (alphabetical listing)

DMI Program students are expected to understand all regulations in the College Catalog that may affect their academic progress, financial obligations, relationships with College authorities, transferability of credits for courses completed, acceptance of credits for graduation and eligibility to graduate. To this end, it is their responsibility to become familiar with the information below, as well as at https://www.ccp.edu/college-catalog/college-policies-and-procedures and in the College Student Handbook. Students still in doubt about the meaning of any College regulation should seek advice from their academic advisor, a counselor or an appropriate officer of the College.

Academic Integrity

The Community College of Philadelphia is dedicated to fostering the intellectual and personal development of its students, and to promoting an environment that exemplifies the College's core values, including Integrity, Academic Excellence, and a Commitment to Teaching and Learning.

Academic Integrity requires respect for, and acknowledgement of, the work and efforts of others. It is essential to a high level of teaching and learning. Academic integrity emphasizes fairness, honesty, and responsibility in all academic endeavors and communications, on the part of both faculty and students.

Faculty Rights and Responsibilities

- It is the responsibility of faculty to know and execute College policies regarding academic integrity in a fair and diligent manner.
- It is the responsibility of faculty to inform students of class expectations and assessment guidelines in a timely manner.
- It is the right of faculty to work within the College in an environment of discernible, structured guidelines of due process concerning matters of academic integrity.
- It is the right and responsibility of faculty to participate in a fair and equitable process concerning any allegations of violations of academic integrity.

Student Rights and Responsibilities

- It is the responsibility of students to familiarize themselves with College and class policies regarding academic integrity, and to seek clarification if needed.
- It is the responsibility of students to comply with College and class policies regarding academic integrity.
- It is the right of students to be informed of any alleged violations and possible sanctions concerning academic integrity.
- It is the right of students to receive due process concerning alleged violations of academic integrity, including an appeal process.

Violations of Academic Integrity

Violations of academic integrity can include, but are not limited to, cheating and plagiarism. Cheating is an intentional effort at deception or gaining of an unfair advantage in completing academic work. Plagiarism is the act of appropriating the work of another person and passing it off as one's own. Any student who assists another in an activity that constitutes a violation of academic integrity is also responsible and accountable for such a violation.

The following list is not exhaustive, but includes some common examples of plagiarism and cheating:

- copying original ideas, images, words, or design elements and using them without proper citation or permission of the author
- creating a bibliography with fabricated sources or citing sources as references that were not used in the preparation of the report or essay
- deceiving the instructor to get more time for an assignment or examination
- hiring someone to write an essay or complete other assignments
- collaborating with classmates or others on an assignment when the class rules explain that only individual work is permitted
- using unauthorized electronic devices or software during an examination
- allowing other students to copy exam responses or homework assignment answers so that they can pass it off as their own work

Community College of Philadelphia uses Turnitin.com, an online plagiarism detection software. Turnitin.com serves as a teaching tool and promotes academic integrity at the College. Subject to FERPA, student writing assignments may be submitted to Turnitin.com as required by a department or faculty member for the purpose of plagiarism detection and/or prevention. Turnitin.com checks students' writing assignments for originality by comparing them to internet sources, other student submissions, academic databases, and other resources. Written work submitted to Turnitin.com may be stored in the Turnitin.com reference database for the purpose of detecting plagiarism. Use of Turnitin.com is subject to the Usage Policy posted on the Turnitin.com site. More information regarding plagiarism is available in the Student Code of Conduct.

Violations of academic integrity will open a student to disciplinary action. Committing acts of academic dishonesty may result in assignment failure, exam failure, course failure and/or dismissal from the DMI Program. This includes cheating, plagiarism, fabrication, and deception.

Attendance – Clinical Education Policies

The clinical portion of the DMI Program allows students, under the supervision of registered Radiologic Technologists, to put into practice the theories and skills learned in the classroom/laboratory. In addition, students master the objectives in the cognitive, affective, and psychomotor domains required of a healthcare professional. Students are held to very high professional standards in the clinical education setting, which includes responsibility and dependability.

Clinical Education consists of seven sequential courses. While in Clinical Education courses, the student-radiographer is required to observe the rules and regulations established by CCP and its clinical affiliates. **Clinical attendance is imperative for students to gain confidence, competence, and procedural proficiency.** Clinical attendance will be recorded by the student clocking in and out each day in accordance with their scheduled clinical hours and the clinical course syllabi. **Student-radiographers are advised to keep a personal record of their absences from Clinical Education so that they do not abuse the policies set forth.**

The clinical attendance policies are as follows:

- **There are no "personal days" off from clinical education courses.** Students should plan personal days (e.g., vacation, appointments) during scheduled College breaks. The College academic calendar is updated regularly at https://www.ccp.edu/college-catalog/academic-calendar. **See Appendix M – 2023-2024 DMI Academic Calendar**

- **Students will begin the program with a total of sixteen (16) days of sick or religious/holy day obligation absences in their "bank".** The bank is based on allowing a certain number of sick or religious/holy day obligation absences for each clinical course as outlined in the following table:

Course	Semester/Term	Clinical Days/Length	Allotted Absences
DMI 196	Fall Year I	TR (14 weeks)	Two (2) Days
DMI 197	Spring Year I	TR (14 weeks)	Two (2) Days
DMI 198	Early Summer Year I	MTWR (7 weeks)	Two (2) Days
DMI 199	Late Summer Year II	MTWR (7 weeks)	Two (2) Days
DMI 297	Fall Year II	MWF (14 weeks)	Three (3) Days
DMI 298	Spring Year II	MWF (14 weeks)	Three (3) Days
DMI 299	Early Summer Year II	MTWR (7 weeks)	Two (2) Days

- Each absence taken during a clinical course will be deducted from the student's bank and documented as excused or unexcused as defined in the following sections.

- If a student does not exhaust the sick or religious/holy day obligation absences in a particular course, the **unused absences will remain in the student's bank**.

- Students who exceed a course absence allotment will be counseled by College faculty.

- Students deemed to have a communicable condition or injury preventing them from meeting the Performance Standards for Allied Health Programs will be sent home from clinical and the time will be deducted from the student's bank.

- Students deemed to have a communicable condition or injury preventing them from meeting the Performance Standards for Allied Health Programs by a physician will NOT be permitted to return to Clinical Education without a physician's note/clearance. Students are to present the **original** physician's note/clearance to the Clinical Coordinator and a **photocopy** of the note/clearance to the clinical affiliate.

- **Absence for three (3) or more consecutive days requires a physician's note/medical clearance to return.**

- In the event of serious illness or hospitalization, the Program Director will advise the student with regard to the attendance policy and available absences.

- There are no designated clinical make-up days. Students are expected to use their bank time wisely. **Excessive absenteeism may result in clinical course failure/program dismissal due to incomplete requirements.**

Excused Absences

- Excused absences are deducted from the student's bank with **no impact on the clinical course grade**.
- The allotted absences in a particular course are automatically excused and require no documentation (see above table).
- Absences exceeding the allotted number of days in a particular course require documentation to be excused. Documentation must be in the form of a physician's note or religious absence letter.
- Absences for bereavement, jury duty/court subpoenas, and interviews/new hire orientation require documentation to be excused.

Unexcused Absences

- Unexcused absences are deducted from the student's bank with a **negative impact on the clinical course grade** (see Impact on Grade/Program Continuation).
- Absences exceeding the allotted number in a particular course **without documentation** in the form of a physician's note or religious absence letter will be recorded as unexcused.
- Absences for bereavement, jury duty/court subpoenas, and interviews/new hire orientation without required documentation will be recorded as unexcused.
- Absences taken without proper notification to program officials (see Reporting and Recording of Absence/Lateness) will be recorded as unexcused.
- **Failure to clock in and/or out will result in the day being recorded as an unexcused absence.**

Bereavement

- In the event of the death of an immediate family member, **three (3) consecutive days** of excused absence will be granted for **bereavement**. "Immediate family" is defined as parent, spouse, child, brother, or sister. In the event of the death of a mother-in-law, father-in-law, grandparent, aunt, uncle, or cousin, **one day (1)** of excused absence will be granted for **bereavement**. If time is missed from classes, students should consult appropriate faculty. Documentation of family relation (e.g., obituary, funeral service card) must be submitted to College faculty. Absences in excess of the excused bereavement time will be deducted from the student's bank in accordance with the clinical attendance polices.

Jury Duty/Court Subpoenas

- Absence due to **jury duty summonses or court subpoenas** may be excused once proper documentation is submitted to the College faculty for review. Absences in excess of the excused time will be deducted from the student's bank in accordance with the clinical attendance polices.

Interviews/New Hire Orientation

- During the **first year** of the Program, students will be excused for two (2) days of absences to attend an interview and/or new hire orientation. The interview/new hire orientation must pertain to employment in Medical Imaging. Documentation of the event must be submitted to the Clinical Coordinator.
- During the **second year** of the Program, students will be excused for two (2) days of absences to attend an interview and/or new hire orientation. The interview/new hire orientation must pertain to employment in Medical Imaging. Documentation of the event must be submitted to the Clinical Coordinator.
- Absences in excess of the excused interview/new hire orientation days will be deducted from the student's bank in accordance with the clinical attendance polices.

Reporting and Recording of Absence/Lateness

- Students are required to clock in and out each day via eValue. **Failure to clock in and/or out will result in the day being recorded as an unexcused absence.** Additionally, clocking in and/or out on an unapproved device (e.g., cell phone or home computer) is a violation of the Clinical Code of Conduct. Logged IP addresses will be verified by Program officials on a regular basis.
- In the event of absence or lateness, the student-radiographer has the responsibility to contact the Program Clinical Coordinator, assigned College faculty and Clinical Preceptor at the respective site at least 15 minutes prior to clinical start time. **Failure to do so will result in disciplinary action according to the Clinical Code of Conduct and possible dismissal from the Program**. The absence will be documented as unexcused.
- **Absences will be recorded as follows:**
    - half day — arriving 4 hours late or leaving 4 hours early; 4 hours clinical logged (no lunch)
    - full day — absent for the entire 8 hours; 0 hours clinical logged (including lunch)
- **Hourly increments of time will not be permitted.**
- A student-radiographer arriving for Clinical Education at their scheduled time and leaving the clinical facility **before four hours of attendance is recorded** will be classified as being **absent the entire day** from Clinical Education.
- A student-radiographer arriving for Clinical Education at their scheduled time and leaving the clinical facility any time **after four hours of attendance is recorded** will be classified as being **absent one-half day** from Clinical Education.
- Lateness for Clinical Education is unprofessional and will NOT be tolerated. Lateness is defined by the Program as clocking-in past the scheduled clinical start time (e.g., clock-in log time of 8:31 when start time is 8:30).

Impact on Grade/Program Continuation

- **Five points** will be **subtracted** from the final clinical course grade **for each unexcused absence** documented in a particular course.
- A total number of late minutes is calculated per course. **One point** will be **subtracted** from the final clinical course grade **for each 5 minutes of lateness** throughout the course. (e.g., 10 total late minutes = 2-point reduction)
- A student arriving **more than one hour late** to clinical will potentially fail the clinical course due to the **point deductions for excessive late minutes**.
- A meeting with the Program Director will take place if a student exceeds the sixteen (16) days of sick or religious/holy day obligation absences. **Dismissal from the Program will result due to excessive absenteeism.**

Attendance – College Lecture/Laboratory Policies

Student-radiographers are responsible for ALL material covered or assigned in ALL classes. Regular class/lab attendance on College campus and respectable grades are related, therefore students cannot afford to be absent from classes. Absence from class lectures and/or lab sessions may contribute to course failure due to lack of mastering course material. Classroom and laboratory attendance will be kept by the faculty of course record.

Faculty has the academic freedom to establish attendance/lateness policies for their respective courses. The general Program attendance policy for class/lab is as follows:

- Classes will be conducted as scheduled, unless changed by the Program Director.
- Students are to be in their seats at the scheduled hour of class sessions. Lateness will not be tolerated and may affect final grades. Please see each faculty's course syllabus for details regard grade reductions due to tardiness.
- Students are to be present for all scheduled examinations during the semester.
- Students will be notified in advance of final laboratory and written examination schedules by their respective faculty. Students who are late for a scheduled final examination forfeit their right to take the examination, and faculty has the academic freedom to give the student a grade of "F" for that portion of the course.
- Faculty has the option to conduct oral or written examinations of previous lecture/laboratory material at their discretion during the semester. Makeup examinations are a faculty option. Please see each faculty's course syllabus for details.
- A student **absent** from **three (3) days** of College lecture classes from any DMI course during a semester will receive a **final grade reduction of one letter grade**.
- A student **absent** from **two (2) Patient Care & Procedures Laboratories** for a total of four (4) hours during a semester will receive an **automatic grade reduction to a "C".**
- A student **absent** from **three (3) Patient Care & Procedures Laboratories** for a total of six (6) hours during a semester will be **advised to withdraw** from the DMI Program **or receive a grade of "F".**

Campus Safety

Community College of Philadelphia is committed to providing a safe environment for students, employees, visitors, and persons using College facilities. A comprehensive safety program has been established to address the various threats to the safety of the College's constituents. Students can view the Safety Program and Tips at https://www.myccp.online/department-public-safety/campus-safety-program-safety-tips.

Community College of Philadelphia also provides an annual security report containing information and statistics of known and reported on-campus crime. Students can view the Annual Security Report at https://www.myccp.online/department-public-safety/annual-security-report.

Cell Phones and Electronic Devices

The use of cell phones and electronic devices is strictly prohibited while students are at the clinical site engaged in clinical education courses. **All devices must be turned off and left in the student locker during clinical hours.** Use of cell phones for clocking in and/or out is also strictly prohibited. Violation of this regulation will result in disciplinary action in accordance with the Code of Conduct. Additionally, telephones at the clinical affiliates are not to be used for making personal calls.

Cell phones should be turned off during on-campus classes, labs, meetings, conferences and in any circumstance where incoming calls/messages may be disruptive. If students have a family concern and would like to leave their cell phone on vibrate during class, they must notify faculty before class begins and let them know that they may have to step out to take an emergency call. Students are welcome to bring laptops or tablets to class/lab for academic purposes, however students found misusing devices during class (e.g., searching the web or posting on social networking sites) will be asked to remove the device and be subject to disciplinary action.

Under no circumstances may cell phones and/or personal electronic devices be used as calculators during exams.

Clinical Affiliate Employment

A student employed in any capacity (e.g., Radiologic Technologist Assistant) at an assigned clinical affiliate must keep clinical education and employment obligations separate at all times. Failure to do so may result in dismissal from the DMI Program. Additionally, students working in a radiology department outside of assigned Program clinical hours may not wear their student radiation monitor. Dose reports for exposure received during assigned clinical hours must be kept separate from exposure received as an employee.

Code of Conduct

Every student is expected to be fully acquainted with and comply with all policies, rules, and regulations outlined in the Student Code of Conduct. The Student Code of Conduct is contained in the *Student Handbook*, which is published and updated each year. Copies of the Student Handbook are available through the Student Life Center located in Room S1-19, the Regional Centers or online.

As a student in an Allied Health program, appropriate behavior and attitudes are expected while in the classroom, at the College, and in the clinical facilities. Clinical misconduct that endangers patient safety will not be tolerated and may result in immediate dismissal from the course and Program. The student must not threaten the physical and/or psychological well-being of a patient, a patient's family, an employee at the College or at the clinical site, faculty, or other student by their performance in the clinical area. If this occurs, the student may fail the course in which the student is currently enrolled or be removed from the Program.

Students are held accountable for unprofessional behavior and any real or potential threat to a patient, an employee at the College or at the clinical site, faculty or fellow student. Unprofessional conduct or consistent behavior that results in a threat to the patient's, employee's, faculty's or student's physical and/or psychological well-being is termed "at risk" behavior. Examples of "at risk" behavior(s) include, but are not limited to:

- Violating professional standards of practice.
- Practicing outside the legal and ethical framework of the profession.
- Performing procedures prior to faculty/clinical staff approval.
- Performing procedures other than those assigned by faculty/clinical staff.
- Refusal to carry out assignments or instructions provided by faculty/clinical staff.
- Violating HIPAA regulations regarding patient confidentiality and protected health information.
- Fabricating patient information in a patient's medical record, including, but not limited to forging signatures.
- Deliberate inattention to patient care.
- Using or displaying inappropriate verbal or non-verbal behavior in the presence of or directed toward the patient, the patient's family, an employee at the College or at the clinical site, or faculty.
- Administering the wrong medication or wrong dosage.
- Communicating negative value judgments to patients and/or employees at the College or at the clinical site.
- Failure to report an injury, accident, incident, or unsafe condition occurring or existing on clinical affiliate premises.
- Violating principles learned in previous semesters (e.g., breach in aseptic technique).
- Failure to adhere to radiation safety requirements.
- Demonstrating lack of progress in performing required skills.
- Demonstrating incompetence/lack of preparation for clinical assignments.
- Exceeding the absenteeism and/or punctuality policy established for clinical experience.
- Unauthorized absence from assigned clinical area.

- Use of cell phones, personal communication devices, computers or the internet during scheduled clinical education hours.
- Willful or negligent acts which cause damage to supplies, equipment, facilities or other property of the clinical affiliate.
- Theft of clinical affiliate property.
- Deliberate violation of a health, safety, fire prevention, or security rule.
- Stealing medication for personal use or for the benefit of others.
- Possession or use of an intoxicant or narcotic on clinical affiliate premises or reporting to clinical assignments under the influence of an intoxicant or narcotic.
- Possession of a lethal weapon on clinical affiliate property.
- Disorderly or immoral conduct on clinical affiliate premises.
- Violating the sexual harassment policy as defined in the College's Student Handbook with an employee of the clinical facility, College faculty and/or students.

One "at-risk" behavior may warrant immediate dismissal from the Program if the behavior poses a serious threat to the physical and/or psychological well-being of patients, employees at the College or at the clinical site, faculty and students.

Procedure for Violation of Code of Conduct

If an **"at risk" behavior** is determined to have occurred, the following procedures will occur:

1. The "at-risk" behavior(s) will be documented on the Program's Documented Counseling Form (**See Appendix N – Documented Counseling Form**). This form will include all pertinent information and specifically identify the "at-risk" behavior(s).
2. An investigation into the documented incident will be undertaken by the faculty member, Clinical Coordinator and/or Program Director.
3. If the faculty member, Clinical Coordinator and/or Program Director are/is in doubt or if there are extenuating circumstances involved, the faculty member will meet with the clinical site supervisor (if applicable) and one additional faculty member to make a decision regarding the "at-risk" behavior.
4. A student and faculty conference will be held after the "at-risk" behavior has been documented to review the behavior, counsel the student, and obtain the student's comments and signature. Documentation will be saved in Program Director files.
5. A copy of the completed/signed form will be given to the student.
6. **One or more of the following procedures may be implemented following the first violation:**
    - Oral warning
    - Written warning
    - Program dismissal
    - Removal of student from clinical affiliate
    - Removal of student from currently enrolled clinical course
    - Final grade of "F" in currently enrolled clinical course
7. A student disagreeing with the outcome may follow the Student Appeals Procedure as outlined in the College's *Student Handbook*.

Communicable Diseases

All students in the Community College of Philadelphia's Health Career Programs must be in compliance with health clearance policies as required. The student is responsible for providing evidence of immunity and health status. Students are required to have their health care provider complete the Health Clearance Forms and certify that the student is free of contagious disease and may participate in all learning. Students are discouraged from engaging in clinical education activities when an active contagious illness is present. The student has the responsibility to protect vulnerable individuals, including patients and clinical staff.

Health Career students have clinical learning experiences where patient contact takes place and therefore are at risk for both exposures to and transmission of communicable diseases and blood-borne pathogens. Therefore, specific procedures are needed to (1) decrease health risks to students, (2) protect patients and other health care professionals with whom students interact, and (3) comply with Community College of Philadelphia's healthcare agency contracts. Any course that includes a clinical experience has mandatory health clearance requirements. Health clearance must be met no later than two (2) weeks prior to the first day of class or continuation in the program will be prohibited.

Prior to clinical education, students are educated regarding disease transmission and infection control techniques. All policies regarding standard precautions must be followed according to Program and hospital affiliate guidelines. Students may be exposed to infectious diseases during clinical education. This exposure may occur prior to the awareness that such an infectious disease situation exists in a patient, employee or visitor. Students may also be exposed to blood or bodily fluids. Students exposed to an infectious agent or bloodborne pathogen must comply with the College's Infectious Agent and Bloodborne Pathogen Exposure Policy (**See Appendix O**). An exposure to an infectious agent will be managed according to this policy.

Refusing to participate in the care of a patient based solely on the patient's diagnosis is not acceptable in accordance with the ARRT Standards of Ethics ("The radiologic technologist delivers patient care and service unrestricted by the concerns of personal attributes or the nature of the disease or illness"). Students who have questions regarding communicable diseases are advised to contact the Program Director and/or Clinical Coordinator.

Computer/Technology Usage

The College computers located in the DMI classroom/laboratory are for faculty and student use within the rules as set forth in the College policies and procedures. These computers are not to be used for personal use. Abuse of the College's technology is prohibited. Violations consist of theft and/or other abuse of computer time, including but not limited to:

- Unauthorized entry into a file to use, read, or change the contents, or for any other purpose.
- Unauthorized transfer of a file.
- Unauthorized use of another individual's identification and/or password.
- Use of computing facilities to interfere with the work of another student, faculty member, or College official.
- Use of computing facilities to send obscene, abusive, or threatening messages.
- Use of College computers to visit lewd and indecent web sites except for educational purposes. Use of computing facilities to interfere with normal operation of the College computing system.

Consensual Sexual or Romantic Relationships

Consensual relationships occurring between supervisors and subordinates or faculty and students can lead to circumstances which may be interpreted as sexual harassment. Consensual relationships may also be viewed as causing a hostile or offensive work or academic environment when other staff or students believe that the person(s) involved in the relationship(s) is/are receiving favorable treatment in employment or educational decisions and actions.

The College strongly discourages any sexual or romantic relationship between a faculty member and a student where the faculty member has authority or influence over, or responsibility for, that student. Similarly, the College discourages any sexual or romantic relationship between a supervisor and a staff employee, where the supervisor has authority or influence over, or responsibility for, that employee. Consensual relationships among faculty and students or supervisors and staff where such authority, influence or responsibility exists are strongly discouraged.

CPR Certification

All students are required obtain and maintain **BLS for Healthcare Providers** (adult, child, and infant CPR/AED) certification. Proof of certification is required prior to the commencement of Clinical Education I. Clinical education will not be permitted if a student is deemed noncompliant. Each student is responsible for their certification and/or re-certification.

Discrimination/Harassment

The Community College of Philadelphia does not tolerate discrimination or harassment on the basis of age, color, disability, gender, gender identity, genetic information, national origin, marital status, political affiliation, race, religion, sex, sexual orientation, veteran status, or any other basis protected by law. Such behavior is inconsistent with the College's commitment to excellence and to a community in which mutual respect is a core value as articulated in the College's Mission, Vision, and Core Values Statements. The prohibition against unlawful discrimination and harassment applies to all levels and areas of College operations and programs, students, administrators, faculty, staff, volunteers, vendors, and contractors.

Dress Code Policies

Dress Code for Class/Lab

While attending classes and labs at the College, the DMI students must realize that they are a part of the Division of Math, Science and Health Careers and they are in the process of becoming an Allied Health professional. Proper attire should be worn for all classes and labs. Each student should always look neat and professional.

PLEASE NOTE:

- Baseball caps, berets, and non-religious head covers are not appropriate classroom/laboratory attire and will not be allowed or tolerated.
- Open toe/heel shoes or sandals are not to be worn in the classroom/laboratory.

Dress Code for Clinical Education

Students are held to very high professional standards during Clinical Education and the following dress code must be followed with no exceptions. **Any student not in proper uniform may be sent home by College faculty or Clinical Preceptors and charged with a full day absence.**

- Properly fitting regulation black scrub top with the College logo/DMI Program Radiography Student embroidery on left side. Black or white only tee shirt, turtleneck shirt, or long-sleeved shirt may be worn as needed underneath. No writing is permitted on the shirt and no thermal wear permitted.
- Properly fitting regulation black scrub pants.
- Properly fitting regulation black scrub jacket with the College logo/DMI Program Radiography Student embroidery on left side. No sweaters, sweatshirts or fleece jackets permitted.
- Hospital-owned scrubs are only permitted when the DMI student is assigned to the Operating Room or Interventional Radiology. The approved black jacket must be worn over the scrubs in order to maintain status as a DMI student for insurance purposes.
- All-black or all-white leather walking shoes, sneakers, or professional clogs. Clogs with holes or open heels/toes and canvas shoes may NOT be worn since they do not provide the needed protection to the student's feet.
- Black or white crew/mid-calf socks to protect ankles and legs.
- Hospital identification badge.
- Radiation dosimeter, as provided by Program Radiation Safety Officer.
- Right and left radiographic markers with the student's initials.
- Students are expected to be well groom and have good personal hygiene. Excessive use of cologne/perfume can be irritating to patients with fragrance sensitivity.
- Hair is to be kept neat, clean and off the collar. Long hair must be pulled back in a way that avoids falling over the shoulders. Hairstyles using beads and/or jewelry are NOT permitted. Only naturally occurring hair color will be permitted.
- Facial hair must always be neat and trimmed. Beards and/or mustaches may be no longer than 1 inch in length. Students are advised that some clinical affiliates will not allow beards at all.
- Fingernails must be kept neat, trim and at a respectable length so not to injure the patient. Only clear or nude nail polish is permitted. Artificial nails are prohibited due to hospital infection control policies.
- No gum chewing is allowed. Use of mints is suggested to freshen breath.
- No smoking allowed on any clinical affiliate property. Smokers are advised that coming back to the radiology department carrying the odor of smoke is offensive to patients.
- All visible tattoos must be covered.
- Jewelry must be limited. A wristwatch, engagement ring and/or wedding band, and one pair of stud earrings in the earlobe will be permitted. Necklaces, neck pendants, bracelets, and/or hoop/dangling earrings are NOT permitted in that they can be caught in the equipment and/or by the patient. Facial piercings are prohibited.
- No cell phone or smart watch usage.

Emergency Preparedness

Resources containing important information about emergencies at the College can be located on MyCCP. This includes crime reporting, emergency procedures (fire, bomb threat, severe weather, power outage, suspicious person, suspicious object, shooting assault, campus closures, and medical emergencies), emergency alert systems and emergency response plans.

Grading Policies

Academic Grading Policy

The grading policy for the Diagnostic Medical Imaging Program courses is a letter system with an associated percent. Final grades at the end of each semester become part of the student's permanent record.

Academic Grading System

A ……. 90% to 100%
B ……. 80% to 89%
C ……. **75%** to 79% ***(minimum didactic passing score)***
D ……. 70% to 74%
F ……. below 70%

Throughout the duration of the Program, **students are expected to maintain a 75% average on ALL unit exams and 75% on ALL cumulative final examinations.** Failure to do so may result in a final course grade of "D" or "F" and dismissal from the Program. Students are directed to pay close attention to each faculty syllabus for specific application of the grading policy. **The minimum passing grade in DMI is 75% with the exception of Clinical Education.** Failure to comply with the grading policy on faculty syllabi will prevent the student from continuing in the DMI Program.

To qualify for the ARRT's *Radiography* Examination, students must have a grade of "C" in ALL DMI courses and ALL General Education courses. Students must also be in compliance with all clinical requirements prior to the conclusion of DMI 299.

Clinical Grading Policy

The monitoring of a student's progress throughout the clinical experience is an essential part of the curriculum. Each semester, the clinical course grade is compiled by accumulating points earned from multiple factors, including clinical performance evaluations, clinical competency evaluations, and image analysis case presentation evaluations. Specific grading criteria will be provided in each clinical course syllabus.

Clinical Education is a highly regarded portion of the training. It sets the goals for students to achieve success in a very competitive job market. Therefore, **the Program has established a minimum grade of 85% for success in Clinical Education each semester**. Any student who fails to achieve this minimum grade will receive no better than a "D" for the respective course and therefore be dismissed from the DMI Program. Any student dismissed from the DMI Program due to Clinical Education failure will not be eligible to apply for readmission.

Clinical Grading System
A ……. 95% to 100%
B ……. 90% to 94%
C ……. **85%** to 89% ***(minimum clinical passing score)***
D ……. 75% to 84%
F ……. below 75%

Grievance Policy

A grievance is defined as a claim by a student that there has been a violation, misinterpretation, or inequitable application of any existing policy, procedure, or regulation.

Student Rights and Responsibilities
Students may appeal decisions regarding academic and disciplinary matters as per College policy. https://www.ccp.edu/college-catalog/college-policies-and-procedures/student-rights-and-responsibilities

Student Complaints
Comments, suggestions, or complaints regarding an Allied Health program should follow the chain of command and must be made to the respective faculty member initially.

Academic Course Chain of Command	Clinical Course Chain of Command
Lab Assistant (if pertains to lab/COEs)	Clinical Faculty
Faculty of Course Record	DMI Clinical Coordinator
DMI Program Director	DMI Program Director
Allied Health Department Head	Allied Health Department Head
Dean of Math, Science and Health Careers	Dean of Math, Science and Health Careers

Students must follow the College's Appeal Process as outlined in the College's Student Handbook. If the issue cannot be resolved between the student and the faculty member, the student must meet with the Program Director to attempt to resolve the concern/complaint. Subsequent steps in the process include meeting with the Department Head of Allied Health and the Dean of Math, Science and Health Careers.

Individuals wishing to make a complaint or comment about the program, its faculty or students may do so following these procedures:

- Detail your complaint in a written narrative. Identify all the important details and identify those individuals involved.
- Provide dates when applicable
- Provide details regarding your role in the complaint/comment.
- Provide suggestions as to how you believe the complaint/comment should be resolved.
- Provide steps that you have taken to resolve the issue
- Provide contact information so that the Program Director, Department Head, and/or Dean of Math, Science and Health Careers can respond to you. Whenever possible, your identity will be kept confidential.

A record is maintained for all formal student complaints and their resolve in the Department Head's office. This information is presented to the Vice President of Academic Affairs on an annual basis.

Complaints against a Program's Non-compliance with Accreditation Standards
Students accepted and enrolled in one of Community College of Philadelphia's select allied health programs are provided with their respective program's accrediting agency's contact information which includes: name, address, email address, and phone number. This information is also provided in the College catalog.

Programs must require their students to "visit" the accrediting agency's website to read and/or download its *Standards*. The Program Directors are required to maintain a copy of the current accreditation *Standards* in their office files and the Department Head also maintains a record of each program's accreditation *Standards*. This information is made accessible to students upon request.

If a student wishes to file a complaint to the accrediting agency against a program's non-compliance with accreditation *Standards*, they must have first addressed the concern(s) in writing with the Program Director and Department Head. The concern must be specifically related to a *Standard* and the documentation linked to the *Standard.*

If the Program Director, Department Head and Dean cannot resolve the complaint to the student's satisfaction, the student will be directed to address their concern(s) to the accreditation agency of the program.

Student Appeals Procedures
A student may lodge a complaint about any matter in which he or she feels unjustly treated by following the College's appeals procedures, details of which are available in the *Student Handbook* or in the Counseling Center located in Room BG-7.

Inclement Weather and Emergency Closures

In the event of inclement weather or emergency, classes and clinical assignments will resume as scheduled **unless** the College is officially closed. The academic and clinical attendance policies are set forth for students who are absent when the College is not officially closed due to inclement weather or emergency.

In the event of inclement weather or emergency on days that the student is scheduled for Clinical Education, the following policy is in effect:

- If the College is **closed due to inclement weather or emergency** and the student is unable to get to the clinical facility, the day of absence **will not** be counted.
- If the College is **closed due to inclement weather or emergency** and the student gets to the clinical facility, the day will be **credited** towards the student's sick/religious/holy day allotment.
- If the College is open for classes, students are to report for Clinical Education as scheduled.

In the event that snow or other weather emergencies make it necessary for the College to close, the following steps will be taken to communicate with staff and students about the College closing:

1. Media announcements will be made on the following television stations: ABC (Channel 6), CBS (Channel 3), NBC (Channel 10) and Fox (Channel 29). School closing information is also available on each network's website.
2. The College closing numbers will be available on KYW Newsradio and at https://kywnewsradio.radio.com. The KYW Newsradio closing number is 238 for day classes and 2238 for evening classes. You can also contact KYW 1060 for school closing information at 215.925.1060.
3. Emergency notifications will be sent via email and text using emergency messaging system.
4. A notice of the College closing will be placed on each of the individual phone extensions in the College. All staff can access voice messages from home by dialing 215-751-8999. (You will be asked to enter your extension to access your messages.)
5. An announcement will be placed on both of the College's main switchboard numbers (215-751-8000 and 215-751-8010).
6. The notice of College closing will be placed on the College's website, www.ccp.edu, and on the College's portal login page, myccp.ccp.edu.
7. A notice of the College closing will be placed on CCPTV, Comcast Channel 53 and Verizon FIOS Channel 21

Insurance/Injuries

Malpractice/Liability Insurance
Students are covered by the malpractice/liability insurance carried by the College.

Medical Insurance
All student-radiographers are required to have personal medical insurance coverage. Neither the College nor the clinical affiliates are liable for injury to individual students. If a student-radiographer does not have standard personal medical insurance coverage, there is a plan offered through the College. Information regarding this insurance may be obtained through the Student Life Center. Students must present photocopied documentation of personal medical insurance coverage **prior to** beginning Clinical Education and upon demand at any other time.

Reporting of Injuries
If a student-radiographer is injured during classroom, laboratory, or clinical education activities, the student should follow the injury protocol outlined in **Appendix O**.

- An injury occurring on campus during class/lab must be immediately reported to the supervising faculty
- An injury occurring off campus during clinical education must be immediately reported to the supervising staff technologist, department manager, assigned Clinical Faculty, and the Clinical Coordinator
- The student must use personal medical insurance if seeking care outside of WorkNet coverage outlined in the College policy (**Appendix O**)

Magnetic Resonance Imaging Safety

Magnetic resonance (MR) is a medical imaging system in the radiology department that uses a magnetic field and radio waves. Exposure to magnetic fields can occur during clinical education and MRI safety is covered as part of the new student orientation. This magnetic field could potentially be hazardous to students entering the environment if they have specific metallic, electronic, magnetic, and/or mechanical devices. Students are screened for magnetic field/radiofrequency hazards in accordance with the American College of Radiology MR safety guidelines to identify any potential hazards of entering the magnetic resonance environment before beginning clinical rotations (**See Appendix P– MRI Safety Screening Questionnaire**). Specific devices such cardiac pacemakers, hearing aids, aneurysm clips, implants, and insulin pumps may preclude students from participating in some clinical experiences but will not affect Program completion.

Introductory lectures for the advanced imaging modalities, including MRI, take place during the first year of the Program. Scheduling of introductory student rotations through MRI begins in the first early summer term (Clinical Education III). Prior to a rotation through Magnetic Resonance Imaging (MRI), students must:

- Complete an up-to-date required screening questionnaire provided by the Program
- Review MRI rotation objectives
- Review MRI safety videos
- Submit to any protocols determined by the MRI department at the assigned clinical affiliate

Minors on Campus

The presence of minors on campus, other than Community College of Philadelphia students, is strongly discouraged because of important safety and liability issues. To ensure the safety of children, those under the age of 18 must not be left unattended on College property.
To prevent disruption of the learning process, children are not permitted in classrooms or laboratories when classes are in session. However, with regard to classrooms (but not laboratories), faculty members instructing a class may make exceptions in individual cases, provided that the learning process is not disrupted. Under no circumstances are minors other than Community College of Philadelphia students allowed in the Athletics Center, instructional laboratories, laboratory prep areas, library and/or learning commons, student academic computer centers, learning laboratories, or administrative service areas, such as duplicating, mail room and craft shops. This policy does not preclude children's participation in events sanctioned by the College or the involvement of children in educational activities specific to a curriculum. The College assumes no liability for any injury incurred by minors who are not registered Community College of Philadelphia students while they are on College property.

Pregnancy Policy

If a student becomes pregnant while enrolled in the Diagnostic Medical Imaging Program, disclosure of the pregnancy is entirely voluntary. However, since radiation to the unborn child could be harmful, the student is strongly encouraged to notify the Program Director in writing once confirmation of the pregnancy has occurred. Upon notification, the student will be scheduled to meet with the Radiation Safety Officer or Radiology Department Physicist at the appointed clinical education setting. During the meeting, the student will be provided with potential risks and consequences of prenatal radiation exposure.

See Appendix Q – NRC Instruction Concerning Prenatal Radiation Exposure

The student may then choose to do one of the following:

1. **Withdraw immediately from the Program in good standing.** A student who withdraws from the Diagnostic Medical Imaging Program because of pregnancy can gain readmission to the Program by following the established readmission procedure.
2. **Remain in the Program without modification.** If the student chooses to do so, the following will occur:
    - The student will provide documentation to the Program Director of conception date and expected delivery date.
    - The student will sign a "Pregnancy Declaration" as required by the clinical affiliate.
    - The student will be provided with ALARA training at the clinical education setting to ensure the monthly embryo-fetal dose does not exceed the NCRP recommendation of 0.5 mSv (5.0 mSv for the entire pregnancy). Neither the College nor the clinical affiliate can assume responsibility for any harm that might occur to an embryo or fetus as a result of exposure to ionizing radiation.
    - Depending upon clinical affiliate policy, the student may be provided with a monthly fetal badge. The badge must be worn at waist level, under the lead apron.
3. **Withdraw the declaration of pregnancy.** The declaration of pregnancy may be withdrawn at any time by contacting the Program Director in writing.

MRI Pregnancy Notice: The declared pregnant student who continues to work in and around the MR environment should not remain within the MR scanner room or Zone IV during actual data acquisition or scanning.

Radiation Safety Policies

Radiation Safety Rules for Clinical Education

The following rules have been established for the student-operator's protection against ionizing radiation based on the ALARA principles during hospital and clinical observation and procedures. These rules are established for student-operator's good and MUST be strictly observed.

1. At any time during activation of the x-ray tube (when x-rays are being generated) the operator should place their body completely behind or within the control booth and observe through the protective window.
2. **Students are not allowed to hold or support a patient during exposure or hold or support an image receptor during exposure at any time while enrolled in the Program.**
3. During an exposure or procedure, students must not stand in direct line with the central ray even when wearing a lead apron and a lead shield is interposed between the tube and the student-operator. The tube must in all cases be pointing away from the operator's body.
4. During fluoroscopic and mobile procedures, the student-operator must not be in direct visual line with the tube and must be more than 6 feet from the patient, maintaining line of sight with the patient but maintaining a safe distance.
5. Under no circumstances will anyone be permitted to use another worker, student, or any other human being to serve as a model for test exposures or experimentation.
6. **Protective lead apparel MUST be worn at all times during fluoroscopic and mobile procedures.**
7. **Radiation monitoring devices MUST be worn at all times when working with diagnostic imaging equipment.** Loss or damage of the radiation monitoring device must be reported immediately to College faculty, the Clinical Coordinator, or Program Director. Initiating the process of replacement ASAP is mandatory.
8. Radiation monitoring devices shall be worn at or near thyroid level on the outside of the uniform top unless the student is wearing a lead apron, at which time the monitoring device should be worn at the level of the thyroid *outside* the apron to monitor dosage close to the eyes.
9. Students will not operate fluoroscopic units by themselves. This includes but is not limited to spot imaging the terminal ileum and the operation of remote-control fluoroscopic units for positioning.
10. **Students should abide by the as low as reasonably achievable (ALARA) principle** to minimize radiation exposure to themselves and patients. High radiation monitor readings will result in counseling from Program faculty and may result in the student being removed from clinical education.

Radiation Safety Rules for the Energized Lab

The DMI Program has the following radiographic equipment located on the second floor of the West Building (W2-14 classroom/laboratory) on the College's main campus.

- Energized DR unit (Ceiling-mount, W2-14A)
- Non-energized CR unit (Floor-stand, W2-14B)
- Non-energized mobile C-arm
- Energized portable unit

In addition to the aforementioned radiation safety rules for clinical education**, students must abide by the following when working in the on-campus energized lab**:

- Radiation monitoring devices must be worn at all times. Students will not be able to participate in class/lab activities unless they are wearing their assigned monitor.
- Supervision by DMI Program faculty is required at all times. Students may not enter the energized lab without faculty approval/presence.
- Only x-ray exposures approved by DMI Program faculty will be permitted (e.g., phantom imaging, QC testing) and students MUST be directly supervised by program faculty during permitted exposures.
- Students are strictly prohibited from irradiating any animate object. Students must follow DMI Program faculty guidelines and manipulate energized equipment without exposing oneself, fellow classmates, or faculty to the primary beam of ionizing radiation at any time.
- Students must follow radiation safety policies and may only observe through the protective window/behind the lead lined wall during x-ray activation.

See Appendix R – DMI Energized Lab Rules

Personnel Monitoring and Exposure Reports

Students will receive a personnel monitoring device to wear in the energized lab on campus and in the clinical education setting. The purpose of this monitor is to record the occupational radiation exposure received throughout the Program. The Program will provide students with a quarterly report of their radiation dosage in compliance with federal and state regulations. Students are required to review their reports within 30 days. Documentation of report reviewing will be maintained by the Program Director. If a student has any questions regarding their radiation exposure report, they may discuss it with the Program Director.

DMI Program Action Limits

Whole body dose equal to or above 50 mrem (0.5 mSv)/month *or* 75 mrem (0.75 mSv)/quarter will result in investigation by the Program Director. This investigation will include, but not be limited to:

1. Investigation and documentation of the details of the incident in question
2. Consultation with the Radiology Department Physicist or Radiation Safety Officer at the clinical affiliate
3. Re-education to change the behavior that might have led to the incident in question
4. Notification of the monitoring company as necessary

Accidental Over-Exposure

In the event that the dosimeter is accidentally exposed to radiation between badge reporting periods, the student must immediately report the incident to the Program Director who will document the potential over-exposure incident.

Solicitation

Students are prohibited from soliciting on the College campus and at the clinical education affiliates. Solicitation refers to the act of approaching another, be it in person, by mail, by telephone or through electronic medium with the intent to: (1) buy or sell goods or services, take orders or collect money from other than members of a sponsoring organization; or (2) distribute political or other types of information; or (3) proselytize religious beliefs. This policy does not address the posting of flyers, literature, etc., the Posting Policy addresses this.

Student Records

Post-secondary schools allow students the privilege to inspect and review their educational records. Records kept in the office of the Program Director include, but are not limited to:

- Admissions documents
- Advising documents
- Health forms and immunization records
- Conference sheets/incident reports
- Signed release forms
- Letters written by Program Director on student's behalf to insurance companies, unions, etc. documenting Program attendance

A student desiring to gain access to records kept in the Program Director's office must submit a **written request** for an appointment to discuss their files. This request must include the student's name, College ID number, and the request **must be signed by the student**
The Program Director will comply with this request within 15 days.

Student Supervision Policies

Clinical Supervision by Radiographer

Policy: All student activity in radiographic examinations or procedures shall take place under the supervision of **qualified radiographers**. A qualified radiographer is an experienced technologist who is actively registered by the American Registry of Radiologic Technologists.

Procedure: Until a student is able to demonstrate complete proficiency in a given procedure and document the competency with College faculty, all clinical assignments must be carried out under the **direct supervision** of qualified radiographers. After competency has been documented, procedures may be performed under the **indirect supervision** of a qualified radiographer. Repeating of unsatisfactory radiographic images must always be carried out under the **direct supervision** of qualified radiographers, regardless of the student's competency level.

Direct Supervision

Students must be directly supervised until competency is achieved. According to the **JRCERT Standards of an Accredited Educational Program in Radiography, direct supervision** involves four parameters:

1. A qualified radiographer reviews the request for examination in relation to the student's achievement.
2. A qualified radiographer evaluates the condition of the patient in relation to the student's knowledge.
3. A qualified radiographer is physically present in the room during the conduct of the examination.
4. A qualified radiographer reviews and approves the procedure and/or images.

Supervision of students who have not yet achieved competency in a given examination or procedure is limited to **ONE** student per qualified radiographer.

Indirect Supervision

After a student has documented competency in a given procedure, direct supervision is usually no longer necessary. This does **NOT** mean that the student no longer requires supervision.

Students who have successfully completed competency evaluations must remain under **indirect** supervision at all times. The JRCERT Standards define **indirect supervision** as "that supervision provided by a qualified radiographer **immediately** available to assist students regardless of the level of student achievement."

Immediately available to assist students means that the radiographer is **physically adjacent to the room or location where a radiographic procedure is being performed.** Calling a radiographer for help on a telephone does **NOT** qualify under this definition. Consequently, students may **NOT** perform mobile procedures or go into surgery unless a qualified radiographer accompanies them. **Performance of mobile and surgical procedures requires direct supervision at all times** regardless of the student's skill level.

Accepting and Rejecting Images
Direct supervision is required when students are accepting or rejecting images. At no time are students allowed to accept or reject images without the approval of a qualified radiographer.

Repeating Unsatisfactory Images
Radiographs that are unsatisfactory due to errors by students shall be repeated only under the **direct supervision** of a radiographer.

If a student has attempted an examination or procedure independently and must repeat radiographs for any reason, a supervising radiographer must accompany the student. This is to ensure that the repeated exposure is properly completed and that further exposures will not be necessary. This policy applies to all students regardless of level of education. Additionally, **students are required to log all repeats** via the eValue **Case Logs** option.

Performance of Clinical Procedures
Students are expected to work with a variety of qualified radiographers each semester. This allows each student to benefit from the diversity of technical backgrounds and experiences that different technologists have to offer. It also provides a broad base of supervision observations for which more accurate evaluations of student performance can be derived.

Policy: Students shall **NOT** attempt to position patients for any examination at a clinical affiliate until they have successfully completed appropriate classroom and/or laboratory requirements.

Procedure: In accordance with the Program's Master Plan of Education, the clinical activities of students each semester are specified on a course syllabus. The syllabus identifies the examinations that are most important for that particular session. Generally, the focus of student practice each semester is directed toward mastering the listed examinations while maintaining competency on those already completed. However, before students can begin practicing any examination, they must first have completed the study of the examination in a radiographic positioning class and successfully passed initial competency tests under simulated conditions. Students are taught positioning skills according to Bontrager's Positioning Textbook and/or Merrill's Positioning Atlas, are graded performing Clinical Objective Evaluations (COEs) in the DMI laboratory and the clinical affiliate is notified of each completion in writing.
See Appendix S – Competency Eligibility Verification Form

During the first year, student activities are limited, but gradually increase as more and more examinations are learned. This policy serves to protect patients from unnecessary exposure and promotes higher quality patient care. It is important that the student adapt to department protocol using the skills they have mastered in the laboratory. Positioning is not always "by the book", but it is the best place for new students to begin.

Substance Abuse

Student use of alcohol or any drug, including prescription medication used in an unauthorized manner while in the classroom, lab, or clinical education setting is strictly prohibited. Suspected impairment may result in the request of a drug test and possible dismissal from the Program pending the results.

Community College of Philadelphia is dedicated to providing a quality comprehensive educational program designed to meet and balance the diverse and changing educational, social, economic, and cultural needs of the community while providing a safe and healthful environment. The College is committed not only to learning and to the advancement of knowledge but also to the education of ethically sensitive and responsible persons. The College seeks to achieve these goals through a sound educational program and through rules and regulations governing student life that encourage responsibility and respect for the rights and viewpoints of others. **Therefore, the use, sale, distribution, possession of alcohol or any drug, including prescription medication used in an unauthorized manner, is strictly prohibited and may result in disciplinary action up to, and including, expulsion.**

The College believes that students are adults who are responsible for their own actions, and who should be free to pursue their educational objectives in an environment that promotes learning, protects the integrity of the academic process, and protects the learning community.

The College's rules and regulations concerning student conduct may be found within the *Student Code of Conduct*. These rules and regulations are in effect when attending or participating in any class or activity sponsored by the College either on campus or at an off-campus event.

Withdrawal Policy

Any student wishing to, or required to, withdraw from the DMI Program during an academic semester must comply with the following procedures:

- Meet with the Program Director to obtain a "Drop" form
- Submit the "Drop" form to the Admissions Office in the Bonnell Building

If these procedures are not followed, the student will remain on the DMI Program attendance lists and will receive a grade of "F" for the courses in which they are registered during the respective semester.

DISCLAIMER

The DMI Program policies and procedures are subject to change at the discretion of the Program Director and faculty. Should changes be required, they will not be made capriciously, but for valid and necessary reasons.

Appendices

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Assessment Plan (Class of 2024 – Class of 2029)

MISSION STATEMENT: The mission of the Diagnostic Medical Imaging Program is to prepare individuals in the judicious use of ionizing radiation in both diagnostic radiographic and fluoroscopic procedures. This is accomplished by the application of knowledge in anatomy, physiology, and osteology; in the skillful positioning of the client-patient; the selection of correct technical factors; the proper handling and manipulation of radiation producing equipment; the utilization of accepted radiation protection procedures; and the processing of the image in preparation for diagnostic interpretation.

GOAL 1: Upon completion of the Program, students will competently and safely perform radiographic and fluoroscopic procedures.

Outcome	Assessment Tool(s)	Benchmark	Course	Schedule/ Responsible Party	Sample Size/ Result	Benchmark Met or Unmet? Analysis/Action
Goal 1/Outcome 1 Students will perform routine radiographic procedures.	Clinical Competency Evaluation	Students will avg. ≥ 90% Students will avg. ≥ 93%	DMI 197 DMI 298	Spring Semester Year I (Clinical Education II) *Clinical Faculty/ Clinical Coordinator* Spring Semester Year II (Clinical Education VI) *Clinical Faculty/ Clinical Coordinator*		
	Lab Clinical Objective Evaluation	Students will avg. ≥ 90% on the first attempt	DMI 132 DMI 231	Spring Semester Year I *Faculty of Course Record* Fall Semester Year II *Faculty of Course Record*		
Goal 1/Outcome 2 Students will demonstrate quality patient care.	Weekly Clinical Evaluation Patient Management section (items 1-4)	Students will avg. ≥ 90% Students will avg. ≥ 93%	DMI 196 DMI 297	Fall Semester Year I (Clinical Education I) *Clinical Faculty/ Clinical Coordinator* Fall Semester Year II (Clinical Education V) *Clinical Faculty/ Clinical Coordinator*		

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	Patient Care Competency Evaluations: Assisted Patient Transfer Care of Med Equipment	Students will avg. ≥ 90%	DMI 196	Fall Semester Year I (Clinical Education I) *Clinical Faculty/* *Clinical Coordinator*		
	Patient Care Simulations: Surgical Asepsis Venipuncture	Students will avg. ≥ 90%	DMI 132	Spring Semester Year I *Faculty of Course Record*		
Goal 1/Outcome 3 Students will apply appropriate radiation protection to patients, themselves and others.	Weekly Clinical Evaluation Radiation Protection section (items 21-24)	Students will avg. ≥ 90%	DMI 197	Spring Semester Year I (Clinical Education II) *Clinical Faculty/* *Clinical Coordinator*		
		Students will avg. ≥ 93%	DMI 298	Spring Semester Year II (Clinical Education VI) *Clinical Faculty/* *Clinical Coordinator*		
	Lab Clinical Objective Evaluation (items 9, 10, 19 & 20)	Students will avg. ≥ 93%	DMI 131	Fall Semester Year I *Faculty of Course Record*		
			DMI 231	Fall Semester Year II *Faculty of Course Record*		

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Assessment Plan (Class of 2024 – Class of 2029)

GOAL 2: Upon completion of the Program, students will communicate effectively.

Outcome	Assessment Tool(s)	Benchmark	Course	Schedule/ Responsible Party	Sample Size/ Result	Benchmark Met or Unmet? Analysis/Action
Goal 2/Outcome 1 Students will demonstrate effective oral communication skills.	Image Analysis Case Presentation Evaluation	Students will avg. ≥ 90% Students will avg. ≥ 93%	DMI 196 DMI 298	Fall Semester Year I (Clinical Education I) *Clinical Faculty/ Clinical Coordinator* Spring Semester Year II (Clinical Education VI) *Clinical Faculty/ Clinical Coordinator*		
	Pathology Group Oral Presentation	Students will avg. ≥ 95%	DMI 182	Spring Semester Year I *Faculty of Course Record*		
	Oral Presentation	Students will avg. ≥ 95%	DMI 232	Spring Semester Year II *Faculty of Course Record*		
Goal 2/ Outcome 2 Students will demonstrate effective written communication skills.	Living Old Reflection Paper Professional Journal Article Report	Students will avg. ≥ 90% Students will avg. ≥ 95%	DMI 132 DMI 232	Spring Semester Year I *Faculty of Course Record* Spring Semester Year II *Faculty of Course Record*		

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Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Assessment Plan (Class of 2024 – Class of 2029)

GOAL 3: Upon completion of the Program, students will think critically and problem solve in various patient care situations.

Outcome	Assessment Tool(s)	Benchmark	Course	Schedule/ Responsible Party	Sample Size/ Result	Benchmark Met or Unmet? Analysis/Action
Goal 3/Outcome 1 Students will demonstrate the ability to perform non-routine procedures.	Cross-Table Lateral Hip and Spine COEs	Students will avg. ≥ 90% on the first attempt	DMI 132	Spring Semester Year I *Faculty of Course Record*		
	Trauma, Pediatric & Geriatric Competency Evaluations	Students will avg. ≥ 93%	DMI 298	Spring Semester Year II (Clinical Education VI) *Clinical Faculty/ Clinical Coordinator*		
Goal 3/Outcome 2 Students will demonstrate knowledge of C-arm equipment and OR procedures.	Basic C-Arm Equipment Operation Evaluation	Students will avg. ≥ 90%	DMI 198	Early Summer Term Year I (Clinical Education III) *Clinical Faculty/ Clinical Coordinator*		
	Mobile C-Arm Competency Evaluation	Students will avg. ≥ 93%	DMI 299	Early Summer Term Year II (Clinical Education VII) *Clinical Faculty/ Clinical Coordinator*		
Goal 3/Outcome 3 Students will identify diagnostic quality images and correct non-quality images accordingly.	Weekly Clinical Evaluations Image Analysis Section (items 25 & 26)	Students will avg. ≥ 90%	DMI 198	Early Summer Term Year I (Clinical Education III) *Clinical Faculty/ Clinical Coordinator*		
		Students will avg. ≥ 93%	DMI 299	Early Summer Term Year II (Clinical Education VII) *Clinical Faculty/ Clinical Coordinator*		

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	Clinical Competency Evaluations Image Analysis section (items 21-25)	Students will avg. ≥ 90%	DMI 197	Spring Semester Year I (Clinical Education II) *Clinical Faculty/ Clinical Coordinator*		
		Students will avg. ≥ 93%	DMI 298	Spring Semester Year II (Clinical Education VI) *Clinical Faculty/ Clinical Coordinator*		

GOAL 4: Upon completion of the Program, students will demonstrate professionalism.

Outcome	**Assessment Tool(s)**	**Benchmark**	**Course**	**Schedule/ Responsible Party**	**Sample Size/ Result**	**Benchmark Met or Unmet? Analysis/Action**
Goal 4/Outcome 1 Students will demonstrate professional behavior in delivering patient care.	Monthly Clinical Evaluations (Items 9 & 10)	Students will avg. ≥ 93%	DMI 199	Late Summer Year II (Clinical Education IV) *Clinical Faculty/ Clinical Coordinator*		
	Weekly Clinical Evaluations Professionalism Section	Students will avg. ≥ 93%	DMI 298	Spring Semester Year II (Clinical Education VI) *Clinical Faculty/ Clinical Coordinator*		
Goal 4/Outcome 2 Students will demonstrate professional characteristics in the clinical education setting.	Professional Characteristics Evaluation	Students will avg. ≥ 93%	DMI 299	Early Summer Term Year II (Clinical Education VII) *Clinical Faculty/ Clinical Coordinator*		
	Interviewing Skills Assignment	Students will avg. ≥ 95%	DMI 232	Spring Semester Year II *Faculty of Course Record*		

Appendix A

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Assessment Plan (Class of 2024 – Class of 2029)

Programmatic Effectiveness Measures

Outcome	Assessment Tool(s)	Benchmark	Schedule/ Responsible Party	Sample Size/ Result	Benchmark Met or Unmet? Analysis/Action
Credentialing Exam Pass Rate	ARRT Radiography Exam Results	90% of graduates will pass the ARRT Radiography examination on the first attempt within 6 months of graduation	Annually in January *Program Director*		
Job Placement Rate	Graduate Survey Results	90% of graduates actively seeking employment in the radiologic sciences will be employed within 12 months of graduation	Annually in June *Program Director*		
Program Completion Rate	Program Completion Data	80% of students who begin the DMI program will complete it within the stated program length	Annually in June *Program Director*		
Graduate Satisfaction	Student Exit Evaluations (Student Section Question 4)	90% of DMI Program graduates will be satisfied with their education	Annually in June *Program Director*		
	Graduate Survey (Program Evaluation Questions 1 & 2)	90% of DMI Program graduates will be satisfied with their education	Annually in June *Program Director*		
Employer Satisfaction	Employer Survey	90% of employers will be satisfied with graduate performance (average rating of 4 or higher on survey)	Annually in August *Program Director*		

Appendix A

Performance Standards for Allied Health Programs

The Community College of Philadelphia's Department of Allied Health has adopted the following Core Performance Standards for all applicants to the Allied Health degree and certificate programs. These standards are based upon required abilities that are compatible with effective performance in allied health programs. If an applicant is not able to meet the Core Performance Standards, they are responsible for **identifying** their inability to perform the required tasks, **with or without accommodation**. If while in the program, a student fails to meet the Core Performance Standards, **with or without accommodation**, the student will be removed from the program as the Performance Standards are considered Essential Functions for health care professionals.

All students are required to meet these performance standards. Allowing for individual differences, and encouraging program completion for students with a documented disability, the allied health programs will work with the student and the Center on Disability to provide any reasonable accommodation to meet these performance standards when appropriate.

Capability	Standard	Examples of Activities (Not All Inclusive)
Cognitive-Perception	The ability to perceive events realistically, to think clearly and rationally, and to function appropriately and efficiently in routine and stressful situations	Identify changes in patient/client health status. Handle multiple priorities in stressful situations and remain calm.
Critical Thinking	Critical thinking ability sufficient for sound clinical judgment	Identify cause-effect relationships in clinical situations. Develop plans of care Respond competently within scope of practice. Interpret patient condition and apply appropriate intervention.
Interpersonal	Interpersonal abilities sufficient to interact with individuals, families, and groups from a variety of social, emotional, cultural, and intellectual backgrounds.	Establish rapport with patients/ clients and colleagues appropriately. Demonstrate high degree of patience. Manage a variety of patient/client expressions (anger, fear, hostility) in a calm and professional manner. React appropriately to constructive criticism.
Communication	Communication abilities in English sufficient for appropriate interaction with others in verbal and written form.	Read, understand, write and speak English competently. Explain treatment procedures. Initiate health teaching. Document patient/client responses. Validate responses/messages with others. Obtain medical history accurately and document clearly. Read (decode), write, and understand on demand.
Mobility	Ambulatory capability to sufficiently maintain a center of gravity when met with an opposing force as in lifting, supporting and/or transferring a patient/client.	The ability to propel wheelchairs, stretchers, etc., alone or with assistance as available. Ability to ambulate without assistive devices in confined areas.
Motor Skills	Gross and fine motor abilities sufficient to provide safe and effective care and documentation.	Position patients/clients Reach, manipulate, and operate equipment, instruments, and supplies. Document information electronically and in writing. Lift 25 pounds, carry, and push and pull using proper body mechanics. Perform CPR.
Hearing	Auditory ability sufficient to monitor and assess, or document health needs/information.	Hear monitor alarms, emergency signals, ausculatory sounds, and cries for help. Hear telephone interactions. Hear dictation being given from multiple directions and when facemasks are being used.

Visual	Visual ability sufficient for observation and assessment necessary in patient/client care, and perform accurate color discrimination.	Observe patient/client responses. Discriminate color changes. Accurately read measurement on patient/client related equipment. Visual dexterity with eye/hand coordination.
Tactile	Tactile ability sufficient for physical assessment, inclusive of size, shape, temperature, and texture.	Performs palpation. Performs functions of examination and/or those related to physical therapeutic intervention, (e.g., insertion of a needle) safely and competently.
Activity Tolerance	The ability to tolerate lengthy periods of physical activity.	Move quickly and/or tolerate long periods of standing and/or sitting. Perform tasks accurately under time constraints.
Environmental	Ability to tolerate environmental stressors.	Adapt to rotating shifts. Work with chemicals and detergents. Tolerate exposure to fumes and odors. Work in areas that are close and crowded. Perform with minimal supervision. React quickly to emergency situations and control emotions.

These are the essential skills that a student must possess in order to progress satisfactorily through an allied health program. Should a prospective student have a preexisting condition, which prohibits their ability to perform one or more of these skills, it is highly advised that the student pursue professional assistance for an evaluation of career suitability. Campus resources are available to assist with this process. For more information, contact the Career Services Center (CI-34). Students who have a disability, which may impact upon the ability to provide patient care, may want to contact the Center on Disabilities (BG-39).

Upon admission, a candidate who discloses a disability and requests accommodation will be asked to provide documentation of their disability for the purpose of determining appropriate accommodations, including modification to the program. The College will provide reasonable accommodations, but is not required to make modifications that would substantially alter the nature or requirements of the program or provide auxiliary aids that present an undue burden to the College. To matriculate or continue in the curriculum, the candidate must be able to perform all of the essential functions with or without accommodations.

In compliance with the Americans with Disabilities Act, student must be, with or without reasonable accommodations, physically and mentally capable of performing the essential functions of the program. If a student believes that they cannot meet one or more of the essential functions without accommodations or modifications, the allied health program, along with a counselor from the Center on Disability, will determine, on an individual basis, whether or not the necessary accommodations or modifications can reasonably be made.

Occasionally, a student may experience a change in the status of these requirements while progressing through the program. Should this occur, the student is required to notify the Program Director. The student will be provided with referrals for professional assistance. Each student will be given the opportunity to meet clinical objectives within a reasonable amount of time as determined by the respective program director in consultation with the Center on Disability. However, a student may be denied continued enrollment in an allied health program until any identified issue is resolved. Should the issue remain unresolved after a reasonable period of time, the student may be dropped from the course.

Standards for an Accredited Educational Program in Radiography

Effective January 1, 2021

Adopted April 2020

JRCERT

Excellence in Education

Appendix C

Introductory Statement

The Joint Review Committee on Education in Radiologic Technology (JRCERT) **Standards for an Accredited Educational Program in Radiography** are designed to promote academic excellence, patient safety, and quality healthcare. The **Standards** require a program to articulate its purposes; to demonstrate that it has adequate human, physical, and financial resources effectively organized for the accomplishment of its purposes; to document its effectiveness in accomplishing these purposes; and to provide assurance that it can continue to meet accreditation standards.

The JRCERT is recognized by both the United States Department of Education (USDE) and the Council for Higher Education Accreditation (CHEA). The JRCERT **Standards** incorporate many of the regulations required by the USDE for accrediting organizations to assure the quality of education offered by higher education programs. Accountability for performance and transparency are also reflected in the **Standards** as they are key factors for CHEA recognition.

The JRCERT accreditation process offers a means of providing assurance to the public that a program meets specific quality standards. The process not only helps to maintain program quality but stimulates program improvement through outcomes assessment.

There are six (6) standards. Each standard is titled and includes a narrative statement supported by specific objectives. Each objective, in turn, includes the following clarifying elements:

- **Explanation** - provides clarification on the intent and key details of the objective.

- **Required Program Response** - requires the program to provide a brief narrative and/or documentation that demonstrates compliance with the objective.

- **Possible Site Visitor Evaluation Methods** - identifies additional materials that may be examined and personnel who may be interviewed by the site visitors at the time of the on-site evaluation in determining compliance with the particular objective. Review of supplemental materials and/or interviews is at the discretion of the site visit team.

Regarding each standard, the program must:

- Identify strengths related to each standard
- Identify opportunities for improvement related to each standard
- Describe the program's plan for addressing each opportunity for improvement
- Describe any progress already achieved in addressing each opportunity for improvement
- Provide any additional comments in relation to each standard

The self-study report, as well as the results of the on-site evaluation conducted by the site visit team, will determine the program's compliance with the Standards by the JRCERT Board of Directors.

Standards for an Accredited Educational Program in Radiography

Table of Contents

Standard One: Accountability, Fair Practices, and Public Information

The sponsoring institution and program promote accountability and fair practices in relation to students, faculty, and the public. Policies and procedures of the sponsoring institution and program must support the rights of students and faculty, be well-defined, written, and readily available.

Objectives:

1.1 The sponsoring institution and program provide students, faculty, and the public with policies, procedures, and relevant information. Policies and procedures must be fair, equitably applied, and readily available.

1.2 The sponsoring institution and program have faculty recruitment and employment practices that are nondiscriminatory.

1.3 The sponsoring institution and program have student recruitment and admission practices that are nondiscriminatory and consistent with published policies.

1.4 The program assures the confidentiality of student educational records.

1.5 The program assures that students and faculty are made aware of the JRCERT **Standards for an Accredited Educational Program in Radiography** and the avenue to pursue allegations of noncompliance with the **Standards**.

1.6 The program publishes program effectiveness data (credentialing examination pass rate, job placement rate, and program completion rate) on an annual basis.

1.7 The sponsoring institution and program comply with the requirements to achieve and maintain JRCERT accreditation.

1.1 The sponsoring institution and program provide students, faculty, and the public with policies, procedures, and relevant information. Policies and procedures must be fair, equitably applied, and readily available.

Explanation:
Institutional and program policies and procedures must be fair, equitably applied, and promote professionalism. Policies, procedures, and relevant information must be current, accurate, published, and made readily available to students, faculty, staff, and the public on the institution's or program's website to assure transparency and accountability of the educational program. For example, requiring the public to contact the institution or program to request program information is not fully transparent. Policy changes must be made known to students, faculty, and the public in a timely fashion. It is recommended that revision dates be identified on program publications.

At a minimum, the sponsoring institution and/or program must publish policies, procedures, and/or relevant information related to the following:

- ☐ admission and transfer of credit policies;
- ☐ tuition, fees, and refunds;
- ☐ graduation requirements;
- ☐ grading system;
- ☐ program mission statement, goals, and student learning outcomes;
- ☐ accreditation status;
- ☐ articulation agreement(s);
- ☐ academic calendar;
- ☐ clinical obligations;
- ☐ grievance policy and/or procedures.

Any policy changes to the above must be made known to students, faculty, and the public in a timely fashion.

In addition, programs must develop a contingency plan that addresses any type of catastrophic event that could affect student learning and program operations. Although the contingency plan does not need to be made readily available to the public, program faculty must be made aware of the contingency plan.

Required Program Response:

- Describe how institutional and program policies, procedures, and relevant information are made known to students, faculty, staff, and the public.
- Describe how policies and procedures are fair, equitably applied, and promote professionalism.
- Describe the nature of any formal grievance(s) and/or complaints(s) and their resolution.
- Provide publications that include the aforementioned policies, procedures, and relevant information, including the hyperlink for each.
- Provide a copy of the resolution of any formal grievance(s).

Possible Site Visitor Evaluation Methods:

- Review of institutional and program website
- Review of institutional and program materials
- Review of student handbook
- Review of student records
- Review of formal grievance(s) record(s), if applicable
- Interviews with institutional administration
- Interviews with faculty
- Interviews with staff
- Interviews with students

1.2 The sponsoring institution and program have faculty recruitment and employment practices that are nondiscriminatory.

Explanation:

Nondiscriminatory recruitment and employment practices assure fairness and integrity. Equal opportunity for employment must be offered to each applicant with respect to any legally protected status such as race, color, gender, age, disability, national origin, or any other protected class. Employment practices must be equitably applied.

Required Program Response:

- Describe how nondiscriminatory recruitment and employment practices are assured.
- Provide copies of employment policies and procedures that assure nondiscriminatory practices.

Possible Site Visitor Evaluation Methods:

- Review of employee/faculty handbook
- Review of employee/faculty application form
- Review of institutional catalog
- Interviews with faculty

1.3 The sponsoring institution and program have student recruitment and admission practices that are nondiscriminatory and consistent with published policies.

Explanation:

Nondiscriminatory recruitment practices assure applicants have equal opportunity for admission. Defined admission practices facilitate objective student selection. In considering applicants for admission, the program must follow published policies and procedures. Statistical information such as race, color, religion, gender, age, disability, national origin, or any other protected class may be collected; however, the student must voluntarily provide this information. Use of this information in the student selection process is discriminatory.

Required Program Response:

- Describe how institutional and program admission policies are implemented.
- Describe how admission practices are nondiscriminatory.
- Provide institutional and program admission policies.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of student records
- Interviews with faculty
- Interviews with admissions personnel, as appropriate
- Interviews with students

1.4 The program assures the confidentiality of student educational records.

Explanation:
Maintaining the confidentiality of educational records protects students' right to privacy. Educational records must be maintained in accordance with the Family Educational Rights and Privacy Act (FERPA). If educational records contain students' social security numbers, this information must be maintained in a secure and confidential manner. Space should be made available for the secure storage of files and records.

Required Program Response:
Describe how the program maintains the confidentiality of students' educational records.

Possible Site Visitor Evaluation Methods:

- Review of institution's/program's published policies/procedures
- Review of student academic and clinical records, including radiation monitoring reports
- Tour of program offices
- Tour of clinical setting(s)
- Interviews with faculty
- Interviews with clerical staff, if applicable
- Interviews with clinical preceptor(s)
- Interviews with clinical staff
- Interviews with students

1.5 The program assures that students and faculty are made aware of the JRCERT **Standards for an Accredited Educational Program in Radiography** and the avenue to pursue allegations of noncompliance with the **Standards**.

Explanation:
The program must assure students and faculty are cognizant of the **Standards** and must provide contact information for the JRCERT.

Any individual associated with the program has the right to submit allegations against a JRCERT-accredited program if there is reason to believe that the program has acted contrary to JRCERT accreditation standards and/or JRCERT policies. Additionally, an individual has the right to submit allegations against the program if the student believes that conditions at the program appear to jeopardize the quality of instruction or the general welfare of its students.

Contacting the JRCERT must not be a step in the formal institutional or program grievance policy/procedure. The individual must first attempt to resolve the complaint directly with institutional/program officials by following the grievance policy/procedures provided by the institution/program. If the individual is unable to resolve the complaint with institutional/program officials or believes that the concerns have not been properly addressed, the individual may submit allegations of noncompliance directly to the JRCERT.

Required Program Response:

- Describe how students and faculty are made aware of the **Standards**.
- Provide documentation that the **Standards** and JRCERT contact information are made known to students and faculty.

Possible Site Visitor Evaluation Methods:

- Review of program publications
- Review of program website
- Interviews with faculty
- Interviews with students

1.6 The program publishes program effectiveness data (credentialing examination pass rate, job placement rate, and program completion rate) on an annual basis.

Explanation:
Program accountability is enhanced, in part, by making its program effectiveness data available to the program's communities of interest, including the public. In an effort to increase accountability and transparency, the program must publish, at a minimum, its most recent five-year average credentialing examination pass rate data, five-year average job placement rate data, and annual program completion rate data on its website to allow the public access to this information. If the program cannot document five years of program effectiveness data, it must publish its available effectiveness data.

The program effectiveness data must clearly identify the sample size associated with each measure (i.e., number of first-time test takers, number of graduates actively seeking employment, and number of graduates).

Program effectiveness data is published on the JRCERT website. Programs must publish a hyperlink to the JRCERT website to allow students and the public access to this information.

Required Program Response:
- Provide the hyperlink for the program's effectiveness data webpage.
- Provide samples of publications that document the availability of program effectiveness data via the JRCERT URL address from the program's website.

Possible Site Visitor Evaluation Methods:
- Review of program website
- Review of program publications
- Interviews with faculty
- Interviews with students

1.7 The sponsoring institution and program comply with requirements to achieve and maintain JRCERT accreditation.

Explanation:
Programs must comply with all JRCERT policies and procedures to maintain accreditation. JRCERT policies are located at www.jrcert.org. In addition, substantive changes must be reviewed and approved by the JRCERT prior to implementation, with the exception of a change of ownership.

JRCERT accreditation requires that the sponsoring institution has the primary responsibility for the educational program and grants the terminal award. Sponsoring institutions may include educational programs established in colleges, universities, vocational/technical schools, hospitals, or military facilities. The JRCERT does not recognize a healthcare system as the program sponsor. A healthcare system consists of multiple institutions operating under a common governing body or parent corporation. A specific facility within the healthcare system must be identified as the sponsor. The JRCERT requires each program to have a separate accreditation award and does not recognize branch campuses. The JRCERT recognizes a consortium as an appropriate sponsor of an educational program.

The JRCERT requires programs to maintain a current and accurate database. The program must maintain documentation of all program official qualifications, including updated curricula vitae and current ARRT certification and registration, or equivalent documentation. This documentation is not required to be entered into the Accreditation Management System (AMS). Newly appointed institutional administrators, program officials, and clinical preceptors must be updated through the AMS within thirty (30) days of appointment.

No Required Program Response

Possible Site Visitor Evaluation Method:
Review of a representative sample of program official qualifications

Standard Two: Institutional Commitment and Resources

The sponsoring institution demonstrates a sound financial commitment to the program by assuring sufficient academic, fiscal, personnel, and physical resources to achieve the program's mission.

Objectives:

2.1 The sponsoring institution provides appropriate administrative support and demonstrates a sound financial commitment to the program.

2.2 The sponsoring institution provides the program with the physical resources needed to support the achievement of the program's mission.

2.3 The sponsoring institution provides student resources.

2.4 The sponsoring institution and program maintain compliance with United States Department of Education (USDE) Title IV financial aid policies and procedures, if the JRCERT serves as gatekeeper.

2.1 The sponsoring institution provides appropriate administrative support and demonstrates a sound financial commitment to the program.

Explanation:

The program must have sufficient institutional support and ongoing funding to operate effectively. The program's relative position in the organizational structure helps facilitate appropriate resources and enables the program to meet its mission.

The sponsoring institution should provide the program with administrative/clerical services as needed to assist in the achievement of its mission.

Required Program Response:

- Describe the sponsoring institution's level of commitment to the program.
- Describe the program's position within the sponsoring institution's organizational structure and how this supports the program's mission.
- Describe the adequacy of financial resources.
- Describe the availability and functions of administrative/clerical services, if applicable.
- Provide institutional and program organizational charts.

Possible Site Visitor Evaluation Methods:

- Review of organizational charts of institution and program
- Review of published program materials
- Review of meeting minutes
- Interviews with institutional administration
- Interviews with faculty
- Interviews with clerical staff, if applicable

2.2 The sponsoring institution provides the program with the physical resources needed to support the achievement of the program's mission.

Explanation:
Physical resources include learning environments necessary to conduct teaching and facilitate learning. The sponsoring institution must provide faculty with adequate office and classroom space needed to fulfill their responsibilities. Faculty office space should be conducive to course development and scholarly activities. Space must be made available for private student advisement and program meetings. Classrooms must be appropriately designed to meet the needs of the program's curriculum delivery methods.

Resources include, but are not limited to, access to computers, reliable and secure Internet service, instructional materials (computer hardware and/or software, technology-equipped classrooms, simulation devices, and other instructional aides), and library resources.

Laboratories must be conducive to student learning and sufficient in size. The sponsoring institution must provide the program with access to a fully energized laboratory. An energized laboratory on campus is recommended. The program may utilize laboratory space that is also used for patient care. In the event patient flow disallows use of the laboratory space, the program must assure that laboratory courses are made up in a timely manner. A mobile unit and/or simulation software cannot take the place of a stationary/fixed energized laboratory.

The JRCERT does not endorse any specific physical resources.

Required Program Response:
Describe how the program's physical resources, such as offices, classrooms, and laboratories, facilitate the achievement of the program's mission.

Possible Site Visitor Evaluation Methods:
- Tour of the classroom, laboratories, and faculty offices
- Review of learning resources
- Interviews with faculty
- Interviews with students

2.3 The sponsoring institution provides student resources.

Explanation:
Student resources refer to the variety of services and programs offered to promote academic success. The institution and/or program must provide access to information for personal counseling, requesting accommodations for disabilities, and financial aid.

The JRCERT does not endorse any specific student resources.

Required Program Response:

- Describe how students are provided with access to information on personal counseling, disability services, and financial aid.
- Describe how the program utilizes other student resources to promote student success.

Possible Site Visitor Evaluation Methods:

- Tour of facilities
- Review of published program materials
- Review of surveys
- Interviews with faculty
- Interviews with students

2.4 The sponsoring institution and program maintain compliance with United States Department of Education (USDE) Title IV financial aid policies and procedures, if the JRCERT serves as gatekeeper.

Explanation:
If the program has elected to participate in Title IV financial aid and the JRCERT is identified as the gatekeeper, the program must:

- maintain financial documents including audit and budget processes confirming appropriate allocation and use of financial resources;
- have a monitoring process for student loan default rates;
- have an appropriate accounting system providing documentation for management of Title IV financial aid and expenditures; and
- inform students of responsibility for timely repayment of Title IV financial aid.

The program must comply with all USDE requirements to participate in Title IV financial aid.

Required Program Response:

- Describe how the program informs students of their responsibility for timely repayment of financial aid.
- Provide evidence that Title IV financial aid is managed and distributed according to the USDE regulations to include:
    - recent student loan default data and
    - results of financial or compliance audits.

Possible Site Visitor Evaluation Methods:

- Review of records
- Interviews with administrative personnel
- Interviews with faculty
- Interviews with students

Standard Three: Faculty and Staff

The sponsoring institution provides the program adequate and qualified faculty that enable the program to meet its mission and promote student learning.

Objectives:

3.1 The sponsoring institution provides an adequate number of faculty to meet all educational, accreditation, and administrative requirements.

3.2 The sponsoring institution and program assure that all faculty and staff possess the academic and professional qualifications appropriate for their assignments.

3.3 The sponsoring institution and program assure the responsibilities of faculty and clinical staff are delineated and performed.

3.4 The sponsoring institution and program assure program faculty performance is evaluated and results are shared regularly to assure responsibilities are performed.

3.5 The sponsoring institution and/or program provide faculty with opportunities for continued professional development.

3.1 The sponsoring institution provides an adequate number of faculty to meet all educational, accreditation, and administrative requirements.

Explanation:

An adequate number of faculty promotes sound educational practices. Full- and part-time status is determined by, and consistent with, the sponsoring institution's definition. Institutional policies and practices for faculty workload and release time must be consistent with faculty in other comparable health sciences programs in the same institution. Faculty workload and release time practices must include allocating time and/or reducing teaching load for educational, accreditation, and administrative requirements expected of the program director and clinical coordinator.

A full-time program director is required. A full-time equivalent clinical coordinator is required if the program has more than fifteen (15) students enrolled in the clinical component of the program. The clinical coordinator position may be shared by no more than four (4) appointees. If a clinical coordinator is required, the program director may not be identified as the clinical coordinator. The clinical coordinator may not be identified as the program director.

A minimum of one clinical preceptor must be designated at each recognized clinical setting. The same clinical preceptor may be identified at more than one site as long as a ratio of one full-time equivalent clinical preceptor for every ten (10) students is maintained. The program director and clinical coordinator may perform clinical instruction; however, they may not be identified as clinical preceptors.

Required Program Response:

- Describe faculty workload and release time in relation to institutional policies/practices and comparable health sciences programs within the sponsoring institution.
- Describe the adequacy of the number of faculty and clinical preceptors to meet identified accreditation requirements and program needs.
- Provide institutional policies for faculty workload and release time.

Possible Site Visitor Evaluation Methods:

- Review institutional policies for faculty workload and release time
- Review of faculty position descriptions, if applicable
- Review of clinical settings
- Interviews with faculty
- Interviews with clinical preceptor(s)
- Interviews with students

3.2 The sponsoring institution and program assure that all faculty and staff possess the academic and professional qualifications appropriate for their assignments.

Position	Qualifications
Program Director	Holds, at a minimum, a master's degree; For master's degree programs, a doctoral degree is preferred;
	Proficient in curriculum design, evaluation, instruction, program administration, and academic advising;
	Documents three years' clinical experience in the professional discipline;
	Documents two years' experience as an instructor in a JRCERT-accredited program;
	Holds current American Registry of Radiologic Technologists (ARRT) certification and registration, or equivalent[1], in radiography.
Clinical Coordinator	Holds, at a minimum, a bachelor's degree; For master's degree programs, holds, at a minimum, a master's degree;
	Proficient in curriculum development, supervision, instruction, evaluation, and academic advising;
	Documents two years' clinical experience in the professional discipline;
	Documents one year's experience as an instructor in a JRCERT-accredited program;
	Holds current American Registry of Radiologic Technologists (ARRT) certification and registration, or equivalent[1], in radiography.
Full-time Didactic Faculty	Holds, at a minimum, a bachelor's degree;
	Is qualified to teach the subject;
	Proficient in course development, instruction, evaluation, and academic advising;
	Documents two years' clinical experience in the professional discipline;
	Holds current American Registry of Radiologic Technologists (ARRT) certification and registration, or equivalent[1], in radiography.
Adjunct Faculty	Holds academic and/or professional credentials appropriate to the subject content area taught;
	Is knowledgeable of course development, instruction, evaluation, and academic advising.
Clinical Preceptor	Is proficient in supervision, instruction, and evaluation;
	Documents two years' clinical experience in the professional discipline;
	Holds current American Registry of Radiologic Technologists (ARRT) certification and registration, or equivalent[2], in radiography.
Clinical Staff	Holds current American Registry of Radiologic Technologists (ARRT) certification and registration, or equivalent[2], in radiography.

[1] Equivalent: an unrestricted state license for the state in which the program is located.

[2] Equivalent: an unrestricted state license for the state in which the clinical setting is located.

Explanation:
Faculty and clinical staff must possess academic and professional qualifications appropriate for their assignment. Clinical preceptors and clinical staff supervising students' performance in the clinical component of the program must document American Registry of Radiologic Technologists (ARRT) certification and registration (or equivalent) or other appropriate credentials. Health care professionals with credentials other than ARRT certification and registration (or equivalent) may supervise students in specialty areas (e.g., Registered Nurse supervising students performing patient care skills, phlebotomist supervising students performing venipuncture, etc.).

No Required Program Response.

3.3 The sponsoring institution and program assure the responsibilities of faculty and clinical staff are delineated and performed.

Position	Responsibilities must, at a minimum, include:
Program Director	Assuring effective program operations;
	Overseeing ongoing program accreditation and assessment processes;
	Participating in budget planning;
	Participating in didactic and/or clinical instruction, as appropriate;
	Maintaining current knowledge of the professional discipline and educational methodologies through continuing professional development;
	Assuming the leadership role in the continued development of the program.
Clinical Coordinator	Correlating and coordinating clinical education with didactic education and evaluating its effectiveness;
	Participating in didactic and/or clinical instruction;
	Supporting the program director to assure effective program operations;
	Participating in the accreditation and assessment processes;
	Maintaining current knowledge of the professional discipline and educational methodologies through continuing professional development;
	Maintaining current knowledge of program policies, procedures, and student progress.
Full-Time Didactic Faculty	Preparing and maintaining course outlines and objectives, instructing, and evaluating student progress;
	Participating in the accreditation and assessment process;
	Supporting the program director to assure effective program operations;
	Participating in periodic review and revision of course materials;
	Maintaining current knowledge of professional discipline;
	Maintaining appropriate expertise and competence through continuing professional development.
Adjunct Faculty	Preparing and maintaining course outlines and objectives, instructing and evaluating students, and reporting progress;
	Participating in the assessment process, as appropriate;
	Participating in periodic review and revision of course materials;
	Maintaining current knowledge of the professional discipline, as appropriate;
	Maintaining appropriate expertise and competence through continuing professional development.

Position	Responsibilities must, at a minimum, include:
Clinical Preceptor	Maintaining knowledge of program mission and goals;
	Understanding the clinical objectives and clinical evaluation system and evaluating students' clinical competence;
	Providing students with clinical instruction and supervision;
	Participating in the assessment process, as appropriate;
	Maintaining current knowledge of program policies, procedures, and student progress and monitoring and enforcing program policies and procedures.
Clinical Staff	Understanding the clinical competency system;
	Understanding requirements for student supervision;
	Evaluating students' clinical competence, as appropriate;
	Supporting the educational process;
	Maintaining current knowledge of program clinical policies, procedures, and student progress.

Explanation:

Faculty and clinical staff responsibilities must be clearly delineated and support the program's mission. The program director and clinical coordinator may have other responsibilities as defined by the sponsoring institution; however, these added responsibilities must not compromise the ability, or the time allocated, to perform the responsibilities identified in this objective. For all circumstances when a program director's and/or clinical coordinator's appointment is less than 12 months and students are enrolled in didactic and/or clinical courses, the program director and/or clinical coordinator must assure that all program responsibilities are fulfilled.

Required Program Response:

- Describe how faculty and clinical staff responsibilities are delineated.
- Describe how the delegation of responsibilities occurs to assure continuous coverage of program responsibilities, if appropriate.
- Provide documentation that faculty and clinical staff positions are clearly delineated.
- Provide assurance that faculty responsibilities are fulfilled throughout the year.

Possible Site Visitor Evaluation Methods:

- Review of position descriptions
- Review of handbooks
- Interviews with institutional administration
- Interviews with faculty
- Interviews with clinical preceptors
- Interviews with clinical staff
- Interviews with students

3.4 The sponsoring institution and program assure program faculty performance is evaluated and results are shared regularly to assure responsibilities are performed.

Explanation:

Evaluating program faculty, including but not limited to program directors and clinical coordinators, assures that responsibilities are performed, promotes proper teaching methodology, and increases program effectiveness. The performance of program faculty must be evaluated and shared minimally once per year. Any evaluation results that identify concerns must be discussed with the respective individual(s) as soon as possible.

It is the prerogative of the program to evaluate the performance of clinical preceptors who are employees of clinical settings. If the program elects to evaluate the clinical preceptors, a description of the evaluation process should be provided to the clinical preceptors, along with the mechanism to incorporate feedback into professional growth and development.

Required Program Response:

- Describe the evaluation process.
- Describe how evaluation results are shared with program faculty.
- Describe how evaluation results are shared with clinical preceptors, if applicable.
- Provide samples of evaluations of program faculty.
- Provide samples of evaluations of clinical preceptors, if applicable.

Possible Site Visitor Evaluation Methods:

- Review of program evaluation materials
- Review of faculty evaluation(s)
- Review of clinical preceptor evaluation(s), if applicable
- Interviews with institutional administration
- Interviews with faculty
- Interviews with clinical preceptor(s), if applicable
- Interviews with students

3.5 The sponsoring institution and/or program provide faculty with opportunities for continued professional development.

Explanation:

Opportunities that enhance and advance educational, technical, and professional knowledge must be available to program faculty. Faculty should take advantage of the available resources provided on an institutional campus. Program faculty should not be expected to use personal leave time in order to attend professional development activities external to the sponsoring institution.

Required Program Response:

- Describe how professional development opportunities are made available to faculty.
- Describe how professional development opportunities have enhanced teaching methodologies.

Possible Site Visitor Evaluation Methods:

- Review of institutional and/or program policies for professional development
- Interviews with institutional administration
- Interviews with faculty

Standard Four: Curriculum and Academic Practices

The program's curriculum and academic practices prepare students for professional practice.

Objectives:

4.1 The program has a mission statement that defines its purpose.

4.2 The program provides a well-structured curriculum that prepares students to practice in the professional discipline.

4.3 All clinical settings must be recognized by the JRCERT.

4.4 The program provides timely, equitable, and educationally valid clinical experiences for all students.

4.5 The program provides learning opportunities in advanced imaging and/or therapeutic technologies.

4.6 The program assures an appropriate relationship between program length and the subject matter taught for the terminal award offered.

4.7 The program measures didactic, laboratory, and clinical courses in clock hours and/or credit hours through the use of a consistent formula.

4.8 The program provides timely and supportive academic and clinical advisement to students enrolled in the program.

4.9 The program has procedures for maintaining the integrity of distance education courses.

4.1 The program has a mission statement that defines its purpose.

Explanation:

The program's mission statement should clearly define the purpose or intent toward which the program's efforts are directed. The mission statement should support the mission of the sponsoring institution. The program must evaluate the mission statement, at a minimum every three years, to assure it is effective. The program should engage faculty and other communities of interest in the reevaluation of its mission statement.

Required Program Response:

- Describe how the program's mission supports the mission of the sponsoring institution.
- Describe how the program reevaluates its mission statement.
- Provide documentation of the reevaluation of the mission statement.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of meeting minutes
- Interviews with institutional administration
- Interviews with faculty

4.2 The program provides a well-structured curriculum that prepares students to practice in the professional discipline.

Explanation:

A well-structured curriculum must be comprehensive, current, appropriately sequenced, and provide for evaluation of student achievement. This allows for effective student learning by providing a knowledge foundation in didactic and laboratory courses prior to competency achievement. Continual refinement of the competencies achieved is necessary so that students can demonstrate enhanced performance in a variety of situations and patient conditions. The well-structured curriculum is guided by a master plan of education.

At a minimum, the curriculum should promote qualities that are necessary for students/graduates to practice competently, make ethical decisions, assess situations, provide appropriate patient care, communicate effectively, and keep abreast of current advancements within the profession. Expansion of the curricular content beyond the minimum is required of programs at the bachelor's degree or higher levels.

Use of a standard curriculum promotes consistency in radiography education and prepares the student to practice in the professional discipline. All programs must follow a JRCERT-adopted curriculum. An adopted curriculum is defined as:

- the most recent American Society of Radiologic Technologists (ASRT) Radiography curriculum and/or
- another professional curriculum adopted by the JRCERT Board of Directors.

The JRCERT encourages innovative approaches to curriculum delivery methods that provide students with flexible and creative learning opportunities. These methods may include, but are not limited to, distance education courses, part-time/evening curricular tracks, service learning, and/or interprofessional development.

Required Program Response:

- Describe how the program's curriculum is structured.
- Describe the program's clinical competency-based system.
- Describe how the program's curriculum is delivered, including the method of delivery for distance education courses. Identify which courses, if any, are offered via distance education.
- Describe alternative learning options, if applicable (e.g., part-time, evening and/or weekend curricular track(s)).
- Describe any innovative approaches to curriculum delivery methods.
- Provide the Table of Contents from the master plan of education.
- Provide current curriculum analysis grid.
- Provide samples of course syllabi.

Possible Site Visitor Evaluation Methods:

- Review of the master plan of education
- Review of didactic and clinical curriculum sequence
- Review of input from communities of interest
- Review of part-time, evening and/or weekend curricular track(s), if applicable
- Review of course syllabi
- Observation of a portion of any course offered via distance delivery
- Interviews with faculty
- Interviews with students

4.3 All clinical settings must be recognized by the JRCERT.

Explanation:

All clinical settings must be recognized by the JRCERT. Clinical settings must be recognized prior to student assignment. Ancillary medical facilities and imaging centers that are owned, operated, and on the same campus of a recognized setting do not require JRCERT recognition. A minimum of one (1) clinical preceptor must be identified for each recognized clinical setting.

If a facility is used as an observation site, JRCERT recognition is not required. An observation site is used for student observation of equipment operation and/or procedures that may not be available at recognized clinical settings. Students may not assist in, or perform, any aspects of patient care during observational assignments. Facilities where students participate in community-based learning do not require recognition.

Required Program Response:

- Assure all clinical settings are recognized by the JRCERT.
- Provide a listing of ancillary facilities under one clinical setting recognition.
- Describe how observation sites, if used, enhance student clinical education.

Possible Site Visitor Evaluation Methods:

- Review of JRCERT database
- Review of clinical records
- Interviews with faculty
- Interviews with clinical preceptors
- Interviews with clinical staff
- Interviews with students

4.4 The program provides timely, equitable, and educationally valid clinical experiences for all students.

Explanation:

Programs must have a process in place to assure timely, appropriate, and educationally valid clinical experiences to all admitted students. A meaningful clinical education plan assures that activities are equitable, as well as prevents the use of students as replacements for employees. Students must have sufficient access to clinical settings that provide a wide range of procedures for competency achievement, including mobile, surgical, and trauma examinations. The maximum number of students assigned to a clinical setting must be supported by sufficient human and physical resources. The number of students assigned to the clinical setting must not exceed the number of assigned clinical staff. The student to clinical staff ratio must be 1:1; however, it is acceptable that more than one student may be temporarily assigned to one technologist during infrequently performed procedures.

Clinical placement must be nondiscriminatory in nature and solely determined by the program. Students must be cognizant of clinical policies and procedures including emergency preparedness and medical emergencies.

Programs must assure that clinical involvement for students is limited to not more than ten (10) hours per day. If the program utilizes evening and/or weekend assignments, these assignments must be equitable, and program total capacity must not be increased based on these assignments. Students may not be assigned to clinical settings on holidays that are observed by the sponsoring institution. Programs may permit students to make up clinical time during the term or scheduled breaks; however, appropriate supervision must be maintained. Program faculty need not be physically present; however, students must be able to contact program faculty during makeup assignments. The program must also assure that its liability insurance covers students during these makeup assignments.

Required Program Response:

- Describe the process for student clinical placement including, but not limited to:
    - assuring equitable learning opportunities,
    - assuring access to a sufficient variety and volume of procedures to achieve program competencies, and
    - orienting students to clinical settings.
- Describe how the program assures a 1:1 student to radiography clinical staff ratio at all clinical settings.
- Provide current clinical student assignment schedules in relation to student enrollment.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of clinical placement process
- Review of course objectives
- Review of student clinical assignment schedules
- Review of clinical orientation process/records
- Review of student records
- Interviews with faculty
- Interviews with clinical preceptors
- Interviews with clinical staff
- Interviews with students

4.5 The program provides learning opportunities in advanced imaging and/or therapeutic technologies.

Explanation:
The program must provide learning opportunities in advanced imaging and/or therapeutic technologies. It is the program's prerogative to decide which advanced imaging and/or therapeutic technologies should be included in the didactic and/or clinical curriculum.

Programs are not required to offer clinical rotations in advanced imaging and/or therapeutic technologies; however, these clinical rotations are strongly encouraged to enhance student learning.

Students assigned to imaging modalities such as computed tomography, magnetic resonance, interventional procedures, and sonography, are not included in the calculation of the approved clinical capacity unless the clinical setting is recognized exclusively for advanced imaging modality rotations. Once the students have completed the imaging assignments, the program must assure that there are sufficient physical and human resources to support the students upon reassignment to the radiography department.

Required Program Response:
Describe how the program provides opportunities in advanced imaging and/or therapeutic technologies in the didactic and/or clinical curriculum.

Possible Site Visitor Evaluation Methods:
- Review of clinical rotation schedules, if applicable
- Interviews with faculty
- Interviews with students

4.6 The program assures an appropriate relationship between program length and the subject matter taught for the terminal award offered.

Explanation:
Program length must be consistent with the terminal award. The JRCERT defines program length as the duration of the program, which may be stated as total academic or calendar year(s), total semesters, trimesters, or quarters.

Required Program Response:
Describe the relationship between the program length and the terminal award offered.

Possible Site Visitor Evaluation Methods:

- Review of course catalog
- Review of published program materials
- Review of class schedules
- Interviews with faculty
- Interviews with students

4.7 The program measures didactic, laboratory, and clinical courses in clock hours and/or credit hours through the use of a consistent formula.

Explanation:

Defining the length of didactic, laboratory, and clinical courses facilitates the transfer of credit and the awarding of financial aid. The formula for calculating assigned clock/credit hours must be consistently applied for all didactic, laboratory, and clinical courses, respectively.

Required Program Response:

- Describe the method used to award credit hours for didactic, laboratory, and clinical courses.
- Provide a copy of the program's policies and procedures for determining credit hours and an example of how such policies and procedures have been applied to the program's coursework.
- Provide a list of all didactic, laboratory, and clinical courses with corresponding clock or credit hours.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of class schedules
- Interviews with institutional administration
- Interviews with faculty
- Interviews with students

4.8 The program provides timely and supportive academic and clinical advisement to students enrolled in the program.

Explanation:

Appropriate academic and clinical advisement promotes student achievement and professionalism. Student advisement should be both formative and summative and must be shared with students in a timely manner. Programs are encouraged to develop written advisement procedures.

Required Program Response:

- Describe procedures for student advisement.
- Provide sample records of student advisement.

Possible Site Visitor Evaluation Methods:

- Review of students' records
- Interviews with faculty
- Interviews with clinical preceptor(s)
- Interviews with students

4.9 The program has procedures for maintaining the integrity of distance education courses.

Explanation:

Programs that offer distance education courses must have processes in place that assure that the students who register in the distance education courses are the same students that participate in, complete, and receive the credit. Programs must verify the identity of students by using methods such as, but not limited to, secure logins, passcodes, proctored exams, and/or video monitoring. These processes must protect the student's privacy.

Required Program Response:

- Describe the process for assuring the integrity of distance education courses.
- Provide published institutional/program materials that outline procedures for maintaining the integrity of distance education courses.

Possible Site Visitor Evaluation Methods:

- Review of published institutional/program materials
- Review the process of student identification
- Review of student records
- Interviews with institutional administration
- Interviews with faculty
- Interviews with students

Standard Five: Health and Safety

The sponsoring institution and program have policies and procedures that promote the health, safety, and optimal use of radiation for students, patients, and the public.

Objectives:

5.1 The program assures the radiation safety of students through the implementation of published policies and procedures.

5.2 The program assures each energized laboratory is in compliance with applicable state and/or federal radiation safety laws.

5.3 The program assures that students employ proper safety practices.

5.4 The program assures that medical imaging procedures are performed under the appropriate supervision of a qualified radiographer.

5.5 The sponsoring institution and/or program have policies and procedures that safeguard the health and safety of students.

5.1 The program assures the radiation safety of students through the implementation of published policies and procedures.

Explanation:
Appropriate policies and procedures help assure that student radiation exposure is kept as low as reasonably achievable (ALARA). The program must monitor and maintain student radiation exposure data. All students must be monitored for radiation exposure when using equipment in energized laboratories as well as in the clinical environment during, but not limited to, simulation procedures, image production, or quality assurance testing.

Students must be provided their radiation exposure report within thirty (30) school days following receipt of the data. The program must have a published protocol that identifies a threshold dose for incidents in which student dose limits are exceeded. Programs are encouraged to identify a threshold dose below those identified in federal regulations.

The program's radiation safety policies must also include provisions for the declared pregnant student in an effort to assure radiation exposure to the student and fetus are kept as low as reasonably achievable (ALARA). The pregnancy policy must be made known to accepted and enrolled female students, and include:

- a written notice of voluntary declaration,
- an option for written withdrawal of declaration, and
- an option for student continuance in the program without modification.

The program may offer clinical component options such as clinical reassignments and/or leave of absence. Pregnancy policies should also be in compliance with Title IX regulations. The program should work with the Title IX coordinator and/or legal counsel to discuss and resolve any specific circumstances.

Required Program Response:

- Describe how the policies and procedures are made known to enrolled students.
- Describe how the radiation exposure report is made available to students.
- Provide copies of appropriate policies.
- Provide copies of radiation exposure reports.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of student records
- Review of student radiation exposure reports
- Interviews with faculty
- Interviews with clinical preceptor(s)
- Interviews with students

5.2 The program assures each energized laboratory is in compliance with applicable state and/or federal radiation safety laws.

Explanation:
Compliance with applicable laws promotes a safe environment for students and others. Records of compliance must be maintained for the program's energized laboratories.

Required Program Response:
Provide certificates and/or letters for each energized laboratory documenting compliance with state and/or federal radiation safety laws.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of compliance records
- Interviews with faculty

5.3 The program assures that students employ proper safety practices.

Explanation:
The program must assure that students are instructed in the utilization of imaging equipment, accessories, optimal exposure factors, and proper patient positioning to minimize radiation exposure to patients, selves, and others. These practices assure radiation exposures are kept as low as reasonably achievable (ALARA).

Students must understand basic safety practices prior to assignment to clinical settings. As students progress in the program, they must become increasingly proficient in the application of radiation safety practices.

- Students must not hold image receptors during any radiographic procedure.
- Students should not hold patients during any radiographic procedure when an immobilization method is the appropriate standard of care.
- Programs must develop policies regarding safe and appropriate use of energized laboratories by students. Students' utilization of energized laboratories must be under the supervision of a qualified radiographer who is available should students need assistance. If a qualified radiographer is not readily available to provide supervision, the radiation exposure mechanism must be disabled.

Programs must establish a magnetic resonance imaging (MRI) safety screening protocol and students must complete MRI orientation and screening which reflect current American College of Radiology (ACR) MR safety guidelines prior to the clinical experience. This assures that students are appropriately screened for magnetic field or radiofrequency hazards. Policies should reflect that students are mandated to notify the program should their status change.

Required Program Response:
- Describe how the curriculum sequence and content prepares students for safe radiation practices.
- Describe how the program prepares students for magnetic resonance safe practices.
- Provide the curriculum sequence.
- Provide policies/procedures regarding radiation safety.
- Provide the MRI safety screening protocol and screening tool.

Possible Site Visitor Evaluation Methods:
- Review of program curriculum
- Review of radiation safety policies/procedures
- Review of magnetic resonance safe practice and/or screening protocol
- Review of student handbook
- Review of student records
- Interviews with faculty
- Interviews with clinical preceptor(s)
- Interviews with clinical staff
- Interviews with students

5.4 The program assures that medical imaging procedures are performed under the appropriate supervision of a qualified radiographer.

Explanation:
Appropriate supervision assures patient safety and proper educational practices. The program must develop and publish supervision policies that clearly delineate its expectations of students, clinical preceptors, and clinical staff.

The JRCERT defines direct supervision as student supervision by a qualified radiographer who:

- reviews the procedure in relation to the student's achievement,
- evaluates the condition of the patient in relation to the student's knowledge,
- is physically present during the conduct of the procedure, and
- reviews and approves the procedure and/or image.

Students must be directly supervised until competency is achieved. Once students have achieved competency, they may work under indirect supervision. The JRCERT defines indirect supervision as student supervision provided by a qualified radiographer who is immediately available to assist students regardless of the level of student achievement.

Repeat images must be completed under direct supervision. The presence of a qualified radiographer during the repeat of an unsatisfactory image assures patient safety and proper educational practices.

Students must be directly supervised during surgical and all mobile, including mobile fluoroscopy, procedures regardless of the level of competency.

Required Program Response:

- Describe how the supervision policies are made known to students, clinical preceptors, and clinical staff.
- Describe how supervision policies are enforced and monitored in the clinical setting.
- Provide policies/procedures related to supervision.
- Provide documentation that the program's supervision policies are made known to students, clinical preceptors, and clinical staff.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of student records
- Review of meeting minutes
- Interviews with faculty
- Interviews with clinical preceptor(s)
- Interviews with clinical staff
- Interviews with students

5.5 The sponsoring institution and/or program have policies and procedures that safeguard the health and safety of students.

Explanation:

Appropriate health and safety policies and procedures assure that students are part of a safe, protected environment. These policies must, at a minimum, address campus safety, emergency preparedness, harassment, communicable diseases, and substance abuse. Enrolled students must be informed of policies and procedures.

Required Program Response:

- Describe how institutional and/or program policies and procedures are made known to enrolled students.
- Provide institutional and/or program policies and procedures that safeguard the health and safety of students.

Possible Site Visitor Evaluation Methods:

- Review of published program materials
- Review of student records
- Interviews with faculty
- Interviews with students

Standard Six: Programmatic Effectiveness and Assessment:
Using Data for Sustained Improvement

The extent of a program's effectiveness is linked to the ability to meet its mission, goals, and student learning outcomes. A systematic, ongoing assessment process provides credible evidence that enables analysis and critical discussions to foster ongoing program improvement.

Objectives:

6.1 The program maintains the following program effectiveness data:

- five-year average credentialing examination pass rate of not less than 75 percent at first attempt within six months of graduation,
- five-year average job placement rate of not less than 75 percent within twelve months of graduation, and
- annual program completion rate.

6.2 The program analyzes and shares its program effectiveness data to facilitate ongoing program improvement.

6.3 The program has a systematic assessment plan that facilitates ongoing program improvement.

6.4 The program analyzes and shares student learning outcome data to facilitate ongoing program improvement.

6.5 The program periodically reevaluates its assessment process to assure continuous program improvement.

6.1 The program maintains the following program effectiveness data:

- **five-year average credentialing examination pass rate of not less than 75 percent at first attempt within six months of graduation,**
- **five-year average job placement rate of not less than 75 percent within twelve months of graduation, and**
- **annual program completion rate.**

Explanation:
Program effectiveness outcomes focus on issues pertaining to the overall curriculum such as admissions, retention, completion, credentialing examination performance, and job placement.

The JRCERT has developed the following definitions and criteria related to program effectiveness outcomes:

Credentialing examination pass rate: The number of graduates who pass, on first attempt, the American Registry of Radiologic Technologists (ARRT) certification examination, or an unrestricted state licensing examination, compared with the number of graduates who take the examination within six months of graduation.

Job placement rate: The number of graduates employed in the radiologic sciences compared to the number of graduates actively seeking employment in the radiologic sciences. The JRCERT has defined not actively seeking employment as: 1) graduate fails to communicate with program officials regarding employment status after multiple attempts, 2) graduate is unwilling to seek employment that requires relocation, 3) graduate is unwilling to accept employment, for example, due to salary or hours, 4) graduate is on active military duty, and/or 5) graduate is continuing education.

Program completion rate: The number of students who complete the program within the stated program length. The program specifies the entry point (e.g., required orientation date, final drop/add date, final date to drop with 100% tuition refund, official class roster date, etc.) used in calculating the program's completion rate. When calculating the total number of students enrolled in the program (denominator), programs need not consider students who attrite due to nonacademic reasons such as: 1) financial, medical/mental health, or family reasons, 2) military deployment, 3) a change in major/course of study, and/or 4) other reasons an institution may classify as a nonacademic withdrawal.

Credentialing examination, job placement, and program completion data must be reported annually via the JRCERT Annual Report.

No Required Program Response.

Possible Site Visitor Evaluation Methods:

- Review of program effectiveness data
- Interviews with faculty

6.2 The program analyzes and shares its program effectiveness data to facilitate ongoing program improvement.

Explanation:

Analysis of program effectiveness data allows the program to determine if it is meeting its mission. This analysis also provides a means of accountability to faculty, students, and other communities of interest. Faculty should assure all data have been analyzed and discussed prior to sharing results with an assessment committee or other communities of interest. Sharing the program effectiveness data results should take place in a timely manner.

Programs must use assessment results to promote student success and maintain and improve program effectiveness outcomes. Analysis of program effectiveness data must occur at least annually, and results of the evidence-based decisions must be documented.

In sum, the data analysis process must, at a minimum, include:

- program effectiveness data that is compared to expected achievement; and
- documentation of discussion(s) of data analysis including trending/comparing of results over time to maintain and improve student learning.
    - If the program does not meet its benchmark for a specific program effectiveness outcome, the program must implement an action plan that identifies the issue/problem, allows for data trending, and identifies areas for improvement. The action plan must be reassessed annually until the performance concern(s) is/are appropriately addressed.

Required Program Response:

- Describe examples of evidence-based changes that have resulted from the analysis of program effectiveness data and discuss how these changes have maintained or improved program effectiveness outcomes.
- Provide actual program effectiveness data since the last accreditation award.
- Provide documentation of an action plan for any unmet benchmarks.
- Provide documentation that program effectiveness data is shared in a timely manner.

Possible Site Visitor Evaluation Methods:

- Review of aggregated data
- Review of data analysis and actions taken
- Review of documentation that demonstrates the sharing of results with communities of interest
- Review of representative samples of measurement tools used for data collection
- Interviews with faculty
- Interview with institutional assessment coordinator, if applicable

6.3 The program has a systematic assessment plan that facilitates ongoing program improvement.

Explanation:

A formalized written assessment plan allows programs to gather useful data to measure the goals and student learning outcomes to facilitate program improvement. Student learning outcomes must align with the goals and be explicit, measurable, and state the learning expectations. The development of goals and student learning outcomes allows the program to measure the attainment of its mission. It is important for the program to engage faculty and other communities of interest in the development or revision of its goals and student learning outcomes.

The program must have a written systematic assessment plan that, at a minimum, contains:

- goals in relation to clinical competency, communication, and critical thinking;
- two student learning outcomes per goal;
- two assessment tools per student learning outcome;
- benchmarks for each assessment method to determine level of achievement; and
- timeframes for data collection.

Programs may consider including additional goals in relation to ethical principles, interpersonal skills, professionalism, etc.

Programs at the bachelor's and higher degree levels should consider the additional professional content when developing their goals and student learning outcomes.

The program must also assess graduate and employer satisfaction. Graduate and employer satisfaction may be measured through a variety of methods. The methods and timeframes for collection of the graduate and employer satisfaction data are the prerogatives of the program.

Required Program Response:

- Describe how the program determined the goals and student learning outcomes to be included in the systematic assessment plan.
- Describe the program's cycle of assessment.
- Describe how the program uses feedback from communities of interest in the development of its assessment plan.
- Provide a copy of the program's current assessment plan.

Possible Site Visitor Evaluation Methods:

- Review of assessment plan
- Review of assessment methods
- Interviews with faculty
- Interview with institutional assessment coordinator, if applicable

6.4 The program analyzes and shares student learning outcome data to facilitate ongoing program improvement.

Explanation:
Analysis of student learning outcome data allows the program to determine if it is meeting its mission, goals, and student learning outcomes. This analysis also provides a means of accountability to faculty, students, and other communities of interest. Faculty should assure all data have been analyzed and discussed prior to sharing results with an assessment committee or other communities of interest. Sharing the student learning data results must take place in a timely manner.

Programs must use assessment results to promote student success and maintain and improve student learning outcomes. Analysis of student learning outcome data must occur at least annually, and results of the evidence-based decisions must be documented.

In sum, the data analysis process must, at a minimum, include:

- student learning outcome data that is compared to expected achievement; and
- documentation of discussion(s) of data analysis including trending/comparing of results over time to maintain and improve student learning.
    - If the program does meet its benchmark for a specific student learning outcome, the program should identify how student learning was maintained or improved and describe how students achieved program-level student learning outcomes.
    - If the program does not meet its benchmark for a specific student learning outcome, the program must implement an action plan that identifies the issue/problem, allows for data trending, and identifies areas for improvement. The action plan must be reassessed annually until the performance concern(s) is/are appropriately addressed.

Required Program Response:

- Describe examples of changes that have resulted from the analysis of student learning outcome data and discuss how these changes have maintained or improved student learning outcomes.
- Describe the process and timeframe for sharing student learning outcome data results with its communities of interest.
- Provide actual student learning outcome data and analysis since the last accreditation award.
- Provide documentation of an action plan for any unmet benchmarks.
- Provide documentation that student learning outcome data and analysis is shared in a timely manner.

Possible Site Visitor Evaluation Methods:

- Review of aggregated/disaggregated data
- Review of data analysis and actions taken
- Review of documentation that demonstrates the sharing of results with communities of interest
- Review of representative samples of measurement tools used for data collection
- Interviews with faculty
- Interview with institutional assessment coordinator, if applicable

6.5 The program periodically reevaluates its assessment process to assure continuous program improvement.

Explanation:
Identifying and implementing needed improvements in the assessment process leads to program improvement and renewal. As part of the assessment process, the program must review its mission statement, goals, student learning outcomes, and assessment plan to assure that assessment methods are providing credible information to make evidence-based decisions.

The program must assure the assessment process is effective in measuring student learning outcomes. At a minimum, this evaluation must occur at least every three years and be documented. In order to assure that student learning outcomes have been achieved and that curricular content is well-integrated across the curriculum, programs may consider the development and evaluation of a curriculum map. Programs may wish to utilize assessment rubrics to assist in validating the assessment process.

Required Program Response:

- Describe how assessment process reevaluation has occurred.
- Discuss changes to the assessment process that have occurred since the last accreditation award.
- Provide documentation that the assessment process is evaluated at least once every three years.

Possible Site Visitor Evaluation Methods:

- Review of documentation related to the assessment process reevaluation
- Review of curriculum mapping documentation, if applicable
- Interviews with faculty
- Interview with institutional assessment coordinator, if applicable

Glossary of Terms

Academic calendar: the official institutional/program document that, at a minimum, identifies specific start and end dates for each term, holidays recognized by the sponsoring institution, and breaks.

Accreditation status: a statement of the program's current standing with the JRCERT. Per JRCERT Policies 10.000 and 10.700, accreditation status is categorized as one of the following: Accredited, Probationary Accreditation, and Administrative Probationary Accreditation. The program must also identify its current length of accreditation award (i.e., 8-year, 5-year, 3-year, probation). The JRCERT publishes each program's current accreditation status at www.jrcert.org.

Administrator: individual(s) that oversee student activities, academic personnel, and programs.

Campus: the buildings and grounds of a school, college, university, or hospital. A campus does not include geographically dispersed locations.

Clinical capacity: the maximum number of students that can partake in clinical experiences at a clinical setting at any given time. Clinical capacity is determined by the availability of human and/or physical resources. Students assigned to imaging modalities such as computed tomography, magnetic resonance, interventional procedures, and sonography, are not included in the calculation of the approved clinical capacity unless the clinical setting is recognized exclusively for advanced imaging modality rotations.

Clinical obligations: relevant requirements for completion of a clinical course including, but not limited to, background checks, drug screening, travel to geographically dispersed clinical settings, evening and/or weekend clinical assignments, and documentation of professional liability.

Communities of interest: the internal and external stakeholders, as defined by the program, who have a keen interest in the mission, goals, and outcomes of the program and the subsequent program effectiveness. The communities of interest may include current students, faculty, graduates, institutional administration, employers, clinical staff, or other institutions, organizations, regulatory groups, and/or individuals interested in educational activities in medical imaging and radiation oncology.

Comparable health sciences programs: health science programs established in the same sponsoring institution that are similar to the radiography program in curricular structure as well as in the number of faculty, students, and clinical settings.

Consortium: two or more academic or clinical institutions that have formally agreed to sponsor the development and continuation of an education program. A consortium must be structured to recognize and perform the responsibilities and functions of a sponsoring institution.

Curriculum map (-ping): process/matrix used to indicate where student learning outcomes are covered in each course. Level of instructional emphasis or assessment of where the student learning outcome takes place may also be indicated.

Distance education: refer to the Higher Education Opportunity Act of 2008, Pub. L. No. 110-315, §103(a)(19) and JRCERT Policy 10.800 - Alternative Learning Options.

> **Asynchronous distance learning:** learning and instruction that do not occur in the same place or at the same time.

Distance education: an educational process characterized by the separation, in time and/or place, between instructor and student. Distance education supports regular and substantive interaction synchronously or asynchronously between the instructor and student through one or more interactive distance delivery technologies.

Distance (Delivery) technology: instructional/delivery methods that may include the use of TV, audio, or computer transmissions (broadcast, closed-circuit, cable, microwave, satellite transmissions); audio, computer, or Internet-based conferencing; and/or methodologies.

Hybrid radiography course: a professional level radiography course that uses a mix of face-to-face traditional classroom instruction along with synchronous or asynchronous distance education instruction. Regardless of institutional definition, the JRCERT defines a hybrid radiography course as one that utilizes distance education for more than 50% of instruction and learning.

Online radiography course: a professional level radiography course that primarily uses asynchronous distance education instruction. Typically, the course instruction and learning is 100% delivered via the Internet. Often used interchangeably with Internet-based learning, web-based learning, or distance learning.

Synchronous distance learning: learning and instruction that occur at the same time and in the same place.

[Definitions based on Accrediting Commission of Education in Nursing (ACEN) Accreditation Manual glossary]

Equivalent: with regards to certification and registration, an unrestricted state license for the state in which the program and/or clinical setting is located.

Faculty: the teaching staff for didactic and clinical instruction. These individuals may also be known as academic personnel.

Faculty workload: contact/credit hours or percentages of time that reflect the manner in which the sponsoring institution characterizes, structures, and documents the nature of faculty members' teaching and non-teaching responsibilities. Workload duties include, but are not limited to, teaching, advisement, administration, committee activity, service, clinical practice, research, and other scholarly activities.

Gatekeeper: the agency responsible for oversight of the distribution, record keeping, and repayment of Title IV financial aid.

Master plan of education: an overview of the program and documentation of all aspects of the program. In the event of new faculty and/or leadership to the program, a master plan of education provides the information needed to understand the program and its operations. At a minimum, a master plan of education must include course syllabi (didactic and clinical courses), program policies and procedures, and the curricular sequence calendar. If the program utilizes an electronic format, the components must be accessible by all program faculty.

Meeting minutes: a tangible record of a meeting of individuals, groups, and/or boards that serve as a source of attestation of a meeting's outcome(s) and a reference for members who were unable to attend. The minutes should include decisions made, next steps planned, and identification and tracking of action plans.

Program effectiveness outcomes/data: the specific program outcomes established by the JRCERT. The JRCERT has developed the following definitions and criteria related to program effectiveness outcomes:

> **Credentialing examination pass rate:** the number of graduates who pass, on first attempt, the American Registry of Radiologic Technologists (ARRT) certification examination, or an unrestricted state licensing examination, compared with the number of graduates who take the examination within six months of graduation.
>
> **Job placement rate**: the number of graduates employed in the radiologic sciences compared to the number of graduates actively seeking employment in the radiologic sciences. The JRCERT has defined not actively seeking employment as: 1) graduate fails to communicate with program officials regarding employment status after multiple attempts, 2) graduate is unwilling to seek employment that requires relocation, 3) graduate is unwilling to accept employment due to salary or hours, 4) graduate is on active military duty, and/or 5) graduate is continuing education.
>
> **Program completion rate:** the number of students who complete the program within the stated program length. The program specifies the entry point (e.g., required orientation date, final drop/add date, final date to drop with 100% tuition refund, official class roster date, etc.) used in calculating the program's completion rate. When calculating the total number of students enrolled in the program (denominator), programs need not consider graduates who attrite due to nonacademic reasons such as: 1) financial, medical/mental health, or family reasons, 2) military deployment, 3) a change in major/course of study, and/or 4) other reasons an institution may classify as a nonacademic withdrawal.

Program total capacity: the maximum number of students that can be enrolled in the educational program at any given time. Program total capacity is dependent on the availability of human and physical resources of the sponsoring institution. It is also dependent on the program's clinical rotation schedule and the clinical capacities of recognized clinical settings.

Release time (reassigned workload): a reduction in the teaching workload to allow for the administrative functions associated with the responsibilities of the program director or clinical coordinator or other responsibilities as assigned.

Sponsoring institution: the facility or organization that has primary responsibility for the educational program and grants the terminal award. A recognized institutional accreditor must accredit a sponsoring institution. Educational programs may be established in: community and junior colleges; senior colleges and universities; hospitals; medical schools; postsecondary vocational/technical schools and institutions; military/governmental facilities; proprietary schools; and consortia. Consortia must be structured to recognize and perform the responsibilities and functions of a sponsoring institution.

Awarding, Maintaining, and Administering Accreditation

A. Program/Sponsoring Institution Responsibilities

1. Applying for Accreditation

The accreditation review process conducted by the Joint Review Committee on Education in Radiologic Technology (JRCERT) is initiated by a program through the written request for accreditation sent to the JRCERT, on program/institutional letterhead. The request must include the name of the program, the type of program, and the address of the program. The request is to be submitted, with the applicable fee, to:

Joint Review Committee on Education in Radiologic Technology
20 North Wacker Drive, Suite 2850
Chicago, IL 60606-3182

Submission of such information will allow the program access to the JRCERT's Accreditation Management System (AMS). The initial application and self-study report will then be available for completion and submission through the AMS.

2. Administrative Requirements for Maintaining Accreditation

a. Submitting the self-study report or a required progress report within a reasonable period of time, as determined by the JRCERT.

b. Agreeing to a reasonable site visit date before the end of the period for which accreditation was awarded.

c. Informing the JRCERT, within a reasonable period of time, of changes in the institutional or program officials, program director, clinical coordinator, full-time didactic faculty, and clinical preceptor(s).

d. Paying JRCERT fees within a reasonable period of time. Returning, by the established deadline, a completed Annual Report.

e. Returning, by the established deadline, any other information requested by the JRCERT.

Programs are required to comply with these and other administrative requirements for maintaining accreditation. Additional information on policies and procedures is available at www.jrcert.org.

Program failure to meet administrative requirements for maintaining accreditation will lead to Administrative Probationary Accreditation and potentially result in Withdrawal of Accreditation.

B. JRCERT Responsibilities

1. Administering the Accreditation Review Process

The JRCERT reviews educational programs to assess compliance with the **Standards for an Accredited Educational Program in Radiography**.

The accreditation process includes a site visit.

Before the JRCERT takes accreditation action, the program being reviewed must respond to the report of findings.

The JRCERT is responsible for recognition of clinical settings.

2. Accreditation Actions

Consistent with JRCERT policy, the JRCERT defines the following as accreditation actions:

> Accreditation, Probationary Accreditation, Administrative Probationary Accreditation, Withholding Accreditation, and Withdrawal of Accreditation (Voluntary and Involuntary).

For more information regarding these actions, refer to JRCERT Policy 10.200.

A program or sponsoring institution may, at any time prior to the final accreditation action, withdraw its request for initial or continuing accreditation.

Educators may wish to contact the following organizations for additional information and materials:

Accreditation:
Joint Review Committee on Education in Radiologic Technology
20 North Wacker Drive, Suite 2850
Chicago, IL 60606-3182
(312) 704-5300
www.jrcert.org

Curriculum:
American Society of Radiologic Technologists
15000 Central Avenue, S.E.
Albuquerque, NM 87123-3909
(505) 298-4500
www.asrt.org

Certification:
American Registry of Radiologic Technologists
1255 Northland Drive
St. Paul, MN 55120-1155
(651) 687-0048
www.arrt.org

JRCERT
20 North Wacker Drive
Suite 2850
Chicago, IL 60606-3182
(312) 704-5300
(312) 704-5304 (fax)
mail@jrcert.org (e-mail)
www.jrcert.org

JRCERT

Excellence in Education

ARRT® STANDARDS OF ETHICS

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PREAMBLE

The *Standards of Ethics* of The American Registry of Radiologic Technologists (ARRT) shall apply solely to persons that are either currently certified and registered by ARRT or that were formerly certified and registered by ARRT, and to persons applying for certification and registration by ARRT (including persons who submit an Ethics Review Preapplication) in order to become Candidates. Radiologic Technology is an umbrella term that is inclusive of the disciplines of radiography, nuclear medicine technology, radiation therapy, cardiovascular-interventional radiography, mammography, computed tomography, magnetic resonance imaging, quality management, sonography, bone densitometry, vascular sonography, cardiac-interventional radiography, vascular-interventional radiography, breast sonography, and radiologist assistant. The *Standards of Ethics* are intended to be consistent with the Mission Statement of ARRT, and to promote the goals set forth in the Mission Statement.

STATEMENT OF PURPOSE

The purpose of the ethics requirements is to identify individuals who have internalized a set of professional values that cause one to act in the best interests of patients. This internalization of professional values and the resulting behavior is one element of ARRT's definition of what it means to be qualified. Exhibiting certain behaviors as documented in the *Standards of Ethics* is evidence of the possible lack of appropriate professional values.

The *Standards of Ethics* provides proactive guidance on what it means to be qualified and to motivate and promote a culture of ethical behavior within the profession. The ethics requirements support ARRT's mission of promoting high standards of patient care by removing or restricting the use of the credential by those who exhibit behavior inconsistent with the requirements.

A. CODE OF ETHICS

The Code of Ethics forms the first part of the *Standards of Ethics*. The Code of Ethics shall serve as a guide by which Registered Technologists and Candidates may evaluate their professional conduct as it relates to patients, healthcare consumers, employers, colleagues, and other members of the healthcare team. The Code of Ethics is intended to assist Registered Technologists and Candidates in maintaining a high level of ethical conduct and in providing for the protection, safety, and comfort of patients. The Code of Ethics is aspirational.

1. The Registered Technologist acts in a professional manner, responds to patient needs, and supports colleagues and associates in providing quality patient care.
2. The Registered Technologist acts to advance the principal objective of the profession to provide services to humanity with full respect for the dignity of mankind.
3. The Registered Technologist delivers patient care and service unrestricted by the concerns of personal attributes or the nature of the disease or illness, and without discrimination on the basis of race, color, creed, religion, national origin, sex, marital status, status with regard to public assistance, familial status, disability, sexual orientation, gender identity, veteran status, age, or any other legally protected basis.
4. The Registered Technologist practices technology founded upon theoretical knowledge and concepts, uses equipment and accessories consistent with the purposes for which they were designed, and employs procedures and techniques appropriately.
5. The Registered Technologist assesses situations; exercises care, discretion, and judgment; assumes responsibility for professional decisions; and acts in the best interest of the patient.
6. The Registered Technologist acts as an agent through observation and communication to obtain pertinent information for the physician to aid in the diagnosis and treatment of the patient and recognizes that interpretation and diagnosis are outside the scope of practice for the profession.

7. The Registered Technologist uses equipment and accessories, employs techniques and procedures, performs services in accordance with an accepted standard of practice, and demonstrates expertise in minimizing radiation exposure to the patient, self, and other members of the healthcare team.
8. The Registered Technologist practices ethical conduct appropriate to the profession and protects the patient's right to quality radiologic technology care.
9. The Registered Technologist respects confidences entrusted in the course of professional practice, respects the patient's right to privacy, and reveals confidential information only as required by law or to protect the welfare of the individual or the community.
10. The Registered Technologist continually strives to improve knowledge and skills by participating in continuing education and professional activities, sharing knowledge with colleagues, and investigating new aspects of professional practice.
11. The Registered Technologist refrains from the use of illegal drugs and/or any legally controlled substances which result in impairment of professional judgment and/or ability to practice radiologic technology with reasonable skill and safety to patients.

B. RULES OF ETHICS

The Rules of Ethics form the second part of the *Standards of Ethics*. They are mandatory standards of minimally acceptable professional conduct for all Registered Technologists and Candidates. ARRT certification and registration demonstrates to the medical community and the public that an individual is qualified to practice within the profession. The Rules of Ethics are intended to promote the protection, safety, and comfort of patients. Accordingly, it is essential that Registered Technologists and Candidates act consistently with these Rules.

The Rules of Ethics are enforceable. Registered Technologists are required to notify ARRT of any ethics violation, including state licensing issues and criminal charges and convictions, within 30 days of the occurrence or during their annual renewal of certification and registration, whichever comes first. Applicants for certification and registration are required to notify ARRT of any ethics violation, including state licensing issues and criminal charges and convictions, within 30 days of the occurrence.

Registered Technologists and Candidates engaging in any of the following conduct or activities, or who permit the occurrence of the following conduct or activities with respect to them, have violated the Rules of Ethics and are subject to sanctions as described hereunder:

The titles and headings are for convenience only, and shall not be used to limit, alter or interpret the language of any Rule.

Fraud or Deceptive Practices

Fraud Involving Certification and Registration

1. Employing fraud or deceit in procuring or attempting to procure, maintain, renew, or obtain or reinstate certification and registration as issued by ARRT; employment in radiologic technology; or a state permit, license, or registration certificate to practice radiologic technology. This includes altering in any respect any document issued by ARRT or any state or federal agency, or by indicating in writing certification and registration with ARRT when that is not the case.

Fraudulent Communication Regarding Credentials

2. Engaging in false, fraudulent, deceptive, or misleading communications to any person regarding any individual's education, training, credentials, experience, or qualifications, or the status of any individual's state permit, license, or registration certificate in radiologic technology or certification and registration with ARRT.

Fraudulent Billing Practices

3. Knowingly engaging or assisting any person to engage in, or otherwise participating in, abusive or fraudulent billing practices, including violations of federal Medicare and Medicaid laws or state medical assistance laws.

Subversion

Examination / CQR Subversion

4. Subverting or attempting to subvert ARRT's examination process, and/or ARRT's Education Requirements, including the Structured Self-Assessments (SSA) that are part of the Continuing Qualifications Requirements (CQR) process. Conduct that subverts or attempts to subvert ARRT's examination, Education Requirements and/or CQR or SSA processes, includes but is not limited to:

i. disclosing examination and/or CQR SSA information using language that is substantially similar to that used in questions and/or answers from ARRT examinations and/or CQR SSA when such information is gained as a direct result of having been an examinee or a participant in a CQR SSA or having communicated with an examinee or a CQR participant; this includes, but is not limited to, disclosures to students in educational programs, graduates of educational programs, educators, anyone else involved in the preparation of Candidates to sit for the examinations, or CQR participants; and/or

ii. soliciting and/or receiving examination and/or CQR SSA information that uses language that is substantially similar to that used in questions and/or answers on ARRT examinations or CQR SSA from an examinee, or a CQR participant, whether requested or not; and/or

iii. copying, publishing, reconstructing (whether by memory or otherwise), reproducing or transmitting any portion of examination and/or CQR SSA materials by any means, verbal or written, electronic or mechanical, without the prior express written permission of ARRT or using professional, paid or repeat examination takers and/or CQR SSA participants, or any other individual for the purpose of reconstructing any portion of examination and/or CQR SSA materials; and/or

iv. using or purporting to use any portion of examination and/or CQR SSA materials that were obtained improperly or without authorization for the purpose of instructing or preparing any Candidate for examination or participant for CQR SSA; and/or

v. selling or offering to sell, buying or offering to buy, or distributing or offering to distribute any portion of examination and/or CQR SSA materials without authorization; and/or

vi. removing or attempting to remove examination and/or CQR SSA materials from an examination or SSA room; and/or

vii. having unauthorized possession of any portion of or information concerning a future, current, or previously administered examination or CQR SSA of ARRT; and/or

viii. disclosing what purports to be, or what you claim to be, or under all circumstances is likely to be understood by the recipient as, any portion of or "inside" information concerning any portion of a future, current, or previously administered examination or CQR SSA of ARRT; and/or

ix. communicating with another individual during administration of the examination or CQR SSA for the purpose of giving or receiving help in answering examination or CQR SSA questions, copying another Candidate's or CQR participant's answers, permitting another Candidate or a CQR participant to copy one's answers, or possessing or otherwise having access to unauthorized materials including, but not limited to, notes, books, mobile devices, computers and/or tablets during administration of the examination or CQR SSA; and/or

x. impersonating a Candidate, or a CQR participant, or permitting an impersonator to take or attempt to take the examination or CQR SSA on one's own behalf; and/or

xi. using any other means that potentially alters the results of the examination or CQR SSA such that the results may not accurately represent the professional knowledge base of a Candidate, or a CQR participant.

Education Requirements Subversion

5. Subverting, attempting to subvert, or aiding others to subvert or attempt to subvert ARRT's *Education Requirements for Obtaining and Maintaining Certification and Registration* ("Education Requirements"), including but not limited to, continuing education (CE), clinical experience and competency requirements, structured education activities, and/or Continuing Qualifications Requirements (CQR). Conduct that subverts or attempts to subvert ARRT's Education Requirements or CQR Requirements includes, but is not limited to:

   i. providing false, inaccurate, altered, or deceptive information related to CE, clinical experience or competency requirements, structured education or CQR activities to ARRT or an ARRT recognized recordkeeper; and/or

   ii. assisting others to provide false, inaccurate, altered, or deceptive information related to education requirements or CQR activities to ARRT or an ARRT recognized recordkeeper; and/or

   iii. conduct that results or could result in a false or deceptive report of CE, clinical experience or competency requirements, structured education activities or CQR completion; and/or

   iv. conduct that in any way compromises the integrity of ARRT's education requirements, including, but not limited to, CE, clinical experience and competency requirements, structured education activities, or CQR Requirements such as sharing answers to the post-tests or self-learning activities, providing or using false certificates of participation, or verifying credits that were not earned or clinical procedures that were not performed.

Failure to Cooperate with ARRT Investigation

6. Subverting or attempting to subvert ARRT's certification and registration processes by:
    i. making a false statement or knowingly providing false information to ARRT; or
    ii. failing to cooperate with any investigation by ARRT in full or in part.

Unprofessional Conduct

Failure to Conform to Minimal Acceptable Standards

7. Engaging in unprofessional conduct, including, but not limited to:
    i. a departure from or failure to conform to applicable federal, state, or local governmental rules regarding radiologic technology practice or scope of practice; or, if no such rule exists, to the minimal standards of acceptable and prevailing radiologic technology practice.
    ii. any radiologic technology practice that may create unnecessary danger to a patient's life, health, or safety.

Actual injury to a patient or the public need not be established under this clause.

Sexual Misconduct

8. Engaging in conduct with a patient that is sexual or may reasonably be interpreted by the patient as sexual, or in any verbal behavior that is seductive or sexually demeaning to a patient; or engaging in sexual exploitation of a patient or former patient. This also applies to any unwanted sexual behavior, verbal or otherwise.

Unethical Conduct

9. Engaging in any unethical conduct, including, but not limited to, conduct likely to deceive, defraud, or harm the public; or demonstrating a willful or careless disregard for the health, welfare, or safety of a patient. Actual injury need not be established under this clause.

Scope of Practice

Technical Incompetence

10. Performing procedures which the individual is not competent to perform through appropriate training and/or education or experience unless assisted or personally supervised by someone who is competent (through training and/or education or experience).

Improper Supervision in Practice

11. Knowingly assisting, advising, or allowing a person without a current and appropriate state permit, license, registration, or ARRT certification and registration to engage in the practice of radiologic technology, in a jurisdiction that mandates such requirements.

Improper Delegation or Acceptance of a Function

12. Delegating or accepting the delegation of a radiologic technology function or any other prescribed healthcare function when the delegation or acceptance could reasonably be expected to create an unnecessary danger to a patient's life, health, or safety. Actual injury to a patient need not be established under this clause.

Fitness to Practice

Actual or Potential Inability to Practice

13. Actual or potential inability to practice radiologic technology with reasonable skill and safety to patients by reason of illness; use of alcohol, drugs, chemicals, or any other material; or as a result of any mental or physical condition.

Inability to Practice by Judicial Determination

14. Adjudication as mentally incompetent, mentally ill, chemically dependent, or dangerous to the public, by a court of competent jurisdiction.

Improper Management of Patient Records

False or Deceptive Entries

15. Improper management of records, including failure to maintain adequate patient records or to furnish a patient record or report required by law; or making, causing, or permitting anyone to make false, deceptive, or misleading entry in any patient record and/or any quality control record.

Failure to Protect Confidential Patient Information

16. Revealing a privileged communication from or relating to a former or current patient, except when otherwise required or permitted by law, or viewing, using, releasing, or otherwise failing to adequately protect the security or privacy of confidential patient information.

Knowingly Providing False Information

17. Knowingly providing false or misleading information that is directly related to the care of a former or current patient.

Violation of State or Federal Law or Regulatory Rule

Narcotics or Controlled Substances Law

18. Violating a state or federal narcotics or controlled substance law, even if not charged or convicted of a violation of law.

Regulatory Authority or Certification Board Rule

19. Violating a rule adopted by a state or federal regulatory authority or certification board resulting in the individual's professional license, permit, registration or certification being denied, revoked, suspended, placed on probation or a consent agreement or order, voluntarily surrendered, subjected to any conditions, or failing to report to ARRT any of the violations or actions identified in this Rule.

Criminal Proceedings

20. Convictions, criminal proceedings, or military courts-martial as described below:
    i. conviction of a crime, including, but not limited to, a felony, a gross misdemeanor, or a misdemeanor; and/or
    ii. criminal proceeding where a finding or verdict of guilt is made or returned but the adjudication of guilt is either withheld, deferred, or not entered or the sentence is suspended or stayed; or a criminal proceeding where the individual enters an Alford plea, a plea of guilty or nolo contendere (no contest); or where the individual enters into a pre-trial diversion activity; and/or
    iii. military courts-martial related to any offense identified in these Rules of Ethics; and/or
    iv. required sex offender registration.

Duty to Report

Failure to Report Violation

21. Knowing of a violation or a probable violation of any Rule of Ethics by any Registered Technologist or Candidate and failing to promptly report in writing the same to ARRT.

Failure to Report Error

22. Failing to immediately report to the Registered Technologist's or Candidate's supervisor information concerning an error made in connection with imaging, treating, or caring for a patient. For purposes of this rule, errors include any departure from the standard of care that reasonably may be considered to be potentially harmful, unethical, or improper (commission). Errors also include behavior that is negligent or should have occurred in connection with a patient's care, but did not (omission). The duty to report under this rule exists whether or not the patient suffered any injury.

C. ADMINISTRATIVE PROCEDURES

These Administrative Procedures provide for the structure and operation of the Ethics Committee; they detail procedures followed by the Ethics Committee and by the Board of Trustees of ARRT in administering challenges raised under the Rules of Ethics, and in handling matters relating to the denial of an application for certification and registration (for reasons other than failure to meet the criteria as stated in Article II, Sections 2.03 and 2.04 of the *Rules and Regulations* of ARRT, in which case, there is no right to a hearing) or the denial of renewal or reinstatement of certification and registration. All Registered Technologists and Candidates are required to comply with these Administrative Procedures. All Registered Technologists and Candidates are expected to conduct themselves in a professional and respectful manner in their interactions with the ARRT Board of Trustees, Ethics Committee and/or staff. Failure to cooperate with the Ethics Committee or the Board of Trustees may be considered by the Ethics Committee and by the Board of Trustees according to the same procedures and with the same sanctions as failure to observe the Rules of Ethics.

1. Ethics Committee

(a) Membership and Responsibilities of the Ethics Committee

The President, with the approval of the Board of Trustees, appoints three Trustees to serve as members of the Ethics Committee, each such person to serve on the Committee until removed and replaced by the President, with the approval of the Board of Trustees, at any time, with or without cause. The President, with the approval of the Board of Trustees, will also appoint a fourth, alternate member to the Committee. In the event that the full Committee is not available for a meeting, an alternate member may participate on the Committee. If an alternate member is not available, the remaining members of the Committee will hold the meeting and act irrespective of the composition of the Committee. The Ethics Committee is responsible for: (1) investigating and reviewing each alleged violation of the Rules of Ethics and determining whether a Registered Technologist or Candidate has failed to observe the Rules of Ethics and determining an appropriate sanction; and (2) periodically assessing the Code of Ethics, Rules of Ethics, and Administrative Procedures and recommending any amendments to the Board of Trustees.

(b) The Chair of the Ethics Committee

The President, with the approval of the Board of Trustees, appoints one member of the Ethics Committee as the Committee's Chair to serve for a maximum term of two years as the principal administrative officer responsible for management of the promulgation, interpretation, and enforcement of the *Standards of Ethics*. In the event that the Chair is not available for a meeting, the Chair may appoint any remaining member to act as Chair. The President may remove and replace the Chair of the Committee, with the approval of the Board of Trustees, at any time, with or without cause. The Chair presides at and participates in meetings of the Ethics Committee and is responsible directly and exclusively to the Board of Trustees, using staff, legal counsel, and other resources necessary to fulfill the responsibilities of administering the *Standards of Ethics*.

(c) Preliminary Screening of Potential Violations of the Rules of Ethics

The Chair of the Ethics Committee shall review each alleged violation of the Rules of Ethics that is brought to the attention of the Ethics Committee. If, in the sole discretion of the Chair: (1) there is insufficient information upon which to base a charge of a violation of the Rules of Ethics; or (2) the allegations against the Registered Technologist or Candidate are patently frivolous or inconsequential; or (3) the allegations, if true, would not constitute a violation of the Rules of Ethics, the Chair may summarily dismiss the matter. The Chair may be assisted by staff and/or legal counsel of ARRT. The Chair shall report each such summary dismissal to the Ethics Committee.

At the Chair's direction and upon request, the Chief Executive Officer of ARRT shall have the power to investigate allegations regarding the possible settlement of an alleged violation of the Rules of Ethics. The Chief Executive Officer may be assisted by staff members and/or legal counsel of ARRT. The Chief Executive Officer is not empowered to enter into a binding settlement, but rather may convey and/or recommend proposed settlements to the Ethics Committee. The Ethics Committee may accept the proposed settlement, make a counterproposal to the Certificate Holder or Candidate, or reject the proposed settlement and proceed under these Administrative Procedures.

2. Hearings

Whenever ARRT proposes to take action in respect to the denial of an application for certification and registration (for reasons other than failure to meet the criteria as stated in Article II, Sections 2.03 and 2.04 of the *Rules and Regulations* of ARRT, in which case there is no right to a hearing) or of an application for renewal or reinstatement of certification and registration, or in connection with the revocation or suspension of certification and registration, or the censure of a Registered Technologist or Candidate for an alleged violation of the Rules of Ethics, it shall give written notice thereof to such person, specifying the reasons for such proposed action. A Registered

Technologist or Candidate to whom such notice is given shall have 30 days from the date the notice of such proposed action is mailed to make a written request for a hearing. The written request for a hearing must be accompanied by a nonrefundable hearing fee in an amount to be determined by ARRT. In rare cases, the hearing fee may be waived, in whole or in part, at the sole discretion of ARRT.

Failure to make a written request for a hearing and to remit the hearing fee (unless the hearing fee is waived in writing by ARRT) within such period or submission of a properly executed Hearing Waiver form within such period shall constitute consent to the action taken by the Ethics Committee or the Board of Trustees pursuant to such notice. A Registered Technologist or Candidate who requests a hearing in the manner prescribed above shall advise the Ethics Committee of the intention to appear at the hearing. A Registered Technologist or Candidate who requests a hearing may elect to appear in person, via teleconference, videoconference, or by a written submission which shall be verified or acknowledged under oath.

A Registered Technologist or Candidate may waive the 30 day timeframe to request a hearing. To request a waiver of the 30 day timeframe, the Registered Technologist or Candidate must complete a Hearing Waiver form that is available on the ARRT website at www.arrt.org. The Hearing Waiver form must be signed by the Registered Technologist or Candidate, notarized, and submitted to ARRT. The Chief Executive Officer of ARRT shall have the authority to receive, administer, and grant the Hearing Waiver form and may be assisted by staff members and/or legal counsel of ARRT. Any sanction proposed by the Ethics Committee would become effective on the date the hearing waiver is processed.

Failure to appear at the hearing in person or via teleconference, videoconference, or to supply a written submission in response to the charges shall be deemed a default on the merits and shall be deemed consent to whatever action or disciplinary measures that the Ethics Committee determines to take. Hearings shall be held at such date, time, and place as shall be designated by the Ethics Committee or the Chief Executive Officer. The Registered Technologist or Candidate shall be given at least 30 days notice of the date, time, and place of the hearing. The hearing is conducted by Ethics Committee members other than any members of the Ethics Committee who believe for any reason that they would be unable to render an objective and unbiased decision. In the event of such disqualification, the President may appoint Trustees to serve on the Ethics Committee for the sole purpose of participating in the hearing and rendering a decision. At the hearing, ARRT shall present the charges against the Registered Technologist or Candidate in question, and the facts and evidence of ARRT in respect to the basis or bases for the proposed action or disciplinary measure. The Ethics Committee may be assisted by legal counsel. The Registered Technologist or Candidate in question, by legal counsel or other representative (at the sole expense of the Registered Technologist or Candidate in question), shall have up to 30 minutes to present testimony, and be heard in the Registered Technologist's or Candidate's own defense; to call witnesses; hear the testimony of and to cross-examine any witnesses appearing at such hearing; and to present such other evidence or testimony as the Ethics Committee shall deem appropriate to do substantial justice. Any information may be considered that is relevant or potentially relevant. The Ethics Committee will be afforded 15 minutes in addition to any unused time remaining from the Registered Technologist's or Candidate's time allotment, to ask questions and shall not be bound by any state or federal rules of evidence. The Registered Technologist or Candidate in question shall have the right to make a closing statement before the close of the hearing. A transcript or an audio recording of the hearing testimony is made for in person, teleconference, and videoconference hearings only. Ethics Committee deliberations are not recorded.

In the case where ARRT proposes to take action in respect to the denial of an application for certification and registration (for reasons other than failure to meet the criteria as stated in Article II, Sections 2.03 and 2.04 of the *Rules and Regulations* of ARRT) or the denial of renewal or reinstatement of certification and registration, the Ethics Committee shall assess the evidence presented at the hearing, or continue the matter and request the Registered Technologist or Candidate provide additional evidentiary information prior to making its decision, and shall subsequently prepare written findings of fact and its determination as to whether grounds exist for the denial of an application for certification and registration or renewal or reinstatement of certification and registration, and shall promptly transmit the same to the Registered Technologist or Candidate in question and to the Board of Trustees at the next Board of Trustees meeting.

In the case of alleged violations of the Rules of Ethics by a Registered Technologist or Candidate, the Ethics Committee shall assess the evidence presented at the hearing, or continue the matter and request the Certificate Holder or Candidate provide additional evidentiary information prior to making its decision, and shall subsequently prepare written findings of fact and its determination as to whether there has been a violation of the Rules of Ethics and, if so, the appropriate sanction, and shall promptly transmit the same to the Registered Technologist or Candidate in question and to the Board of Trustees at the next Board of Trustees meeting.

Potential actions available to the Ethics Committee are set forth in Section 4 (Range of Actions). Unless a timely appeal from any findings of fact and determination by the Ethics Committee is taken to the Board of Trustees in accordance with Section 3 below (Appeals), the Ethics Committee's findings of fact and determination in any matter (including the specified sanction) shall be final and binding upon the Registered Technologist or Candidate in question.

3. Appeals

Except as otherwise noted in these Administrative Procedures, the Registered Technologist or Candidate may appeal any decision of the Ethics Committee to the Board of Trustees by submitting a written request for an appeal within 30 days after the decision of the Ethics Committee is mailed. The written request for an appeal must be accompanied by a nonrefundable appeal fee in an amount to be determined by ARRT. In rare cases, the appeal fee may be waived, in whole or in part, at the sole discretion of ARRT.

Failure to make a written request for an appeal and to remit the appeal fee (unless the appeal fee is waived in writing by ARRT) within such period or submission of a properly executed Appeal Waiver form within such period shall constitute consent to the action taken by the Ethics Committee or Board of Trustees pursuant to such notice.

A Registered Technologist or Candidate may waive the 30 day timeframe to request an appeal. To request a waiver of the 30 day timeframe, the Registered Technologist or Candidate must complete an Appeal Waiver form that is available on the ARRT website at www.arrt.org. The Appeal Waiver form must be signed by the Registered Technologist or Candidate, notarized, and submitted to ARRT. The Chief Executive Officer of ARRT shall have the authority to receive, administer, and grant the Appeal Waiver form and may be assisted by staff members and/or legal counsel of ARRT. Any sanction proposed by the Ethics Committee would become effective on the date the appeal waiver is processed.

In the event of an appeal, those Trustees who participated in the hearing of the Ethics Committee shall not participate in the appeal. The remaining members of the Board of Trustees, other than any members who believe for any reason that they would be unable to render an objective and unbiased decision, shall consider the decision of the Ethics Committee, the files and records of ARRT applicable to the case at issue, and any written appellate submission of the Registered Technologist or Candidate in question, and shall determine whether to affirm or to modify the decision of the Ethics Committee or to remand the matter to the Ethics Committee for further consideration. In making such determination to affirm or to modify, findings of fact made by the Ethics Committee shall be conclusive if supported by any evidence. The Board of Trustees may grant re-hearings, hear additional evidence, or request that ARRT or the Registered Technologist or Candidate in question provide additional information in such manner, on such issues, and within such time as it may prescribe.
All hearings and appeals provided for herein shall be private at all stages. It shall be considered an act of professional misconduct for any Registered Technologist or Candidate to make an unauthorized publication or revelation of the same, except to the Registered Technologist's or Candidate's attorney or other representative, immediate superior, or employer.

4. Range of Actions

(a) No Action

A determination of no action means that there is little or no evidence to substantiate that a violation even occurred. In a situation lacking even a preponderance of evidence, the complaint is determined to be unsubstantiated.

(b) Clear

A determination that there was a violation of the Rules of Ethics but that no further action will be taken against a person's eligibility for certification and registration or for continued certification and registration. The determination of cleared/eligible can be made administratively by staff, by the Chair, or by the Committee depending on the nature of the violation and existing policies addressing authority for taking action. After a violation has been cleared, the applicant or registrant will not be required to report the violation in the future.

(c) Private Reprimands

A private reprimand is a reprimand that is between the individual and ARRT and is not reported to the public. Private reprimands allow for continued certification and registration.

(d) Public Reprimands

A public reprimand is a sanction that is published on ARRT's website for a period of one year. Public reprimands allow for continued certification and registration.

(e) Conditional

Conditional status may be given for continued certification and registration in those cases where there are additional requirements that need to be met before the ethics file can be closed (e.g., conditions mandated by the court, regulatory authority and/or Ethics Committee).

(f) Suspensions

Suspension is the temporary removal of an individual's certification and registration in all categories for up to one year.

(g) Summary Suspensions

Summary suspension is an immediate suspension of an individual's certification and registration in all categories. If an alleged violation of the Rules of Ethics involves the occurrence, with respect to a Registered Technologist, of an event described in the Rules of Ethics, or any other event that the Ethics Committee determines would, if true, potentially pose harm to the health, safety, or well-being of any patient or the public, then, notwithstanding anything apparently or expressly to the contrary contained in these Administrative Procedures, the Ethics Committee may, without prior notice to the Registered Technologist and without a prior hearing, summarily suspend the certification and registration of the individual pending a final determination under these Administrative Procedures with respect to whether the alleged violation of the Rules of Ethics in fact occurred. Within five working days after the Ethics Committee summarily suspends the certification and registration of an individual in accordance with this provision, the Ethics Committee shall, by expedited delivery or certified mail, return receipt requested, give to the individual written notice that describes: (1) the summary suspension; (2) the reason or reasons for it; and (3) the right of the individual to request a hearing with respect to the summary suspension by written notice to the Ethics Committee, which written notice must be received by the Ethics Committee not later than 15 days after the date of the written notice of summary suspension by the Ethics Committee to the individual. If the individual requests a hearing in a timely manner with respect to the summary suspension, the hearing shall be held before the Ethics Committee or a panel comprised of no fewer than two members of the Ethics Committee as promptly as practicable, but in any event within 30 days after the Ethics Committee's receipt of the individual's request for the hearing, unless both the individual and the Ethics Committee agree to a postponement beyond the 30 day period. The Ethics Committee has the absolute discretion to deny any request for a postponement and to proceed to a hearing with or without the participation of the individual. The applicable provisions of Section 2 (Hearings) of these Administrative Procedures shall govern all hearings with respect to summary suspensions, except that neither a determination of the Ethics Committee, in the absence of a timely request for a hearing by the affected individual, nor a determination by the Ethics Committee or a panel, following a timely requested hearing, is appealable to the Board of Trustees.

(h) Ineligible

An individual may be determined ineligible to obtain or renew certification and registration or ineligible for reinstatement of certification and registration. The time frame may be time limited or permanent.

(i) Revocation

Revocation removes the individual's certification and registration in all categories. The time frame may be time limited or permanent.

(j) Alternative Dispositions

An Alternative Disposition ("AD") is a contract between an individual and the ARRT (as represented by the Ethics Committee) that allows for continued certification and registration in lieu of revocation, provided the individual performs certain requirements, including, but not limited to, providing documentation, attending counseling and/or submitting to random drug and/or alcohol screening. A Registered Technologist or Candidate who voluntarily enters into an Alternative Disposition Agreement agrees to waive all rights set forth in these Administrative Procedures.

(k) Deny Removal of a Sanction

After a predetermined time, an individual may request removal of a sanction that had been previously imposed by the Committee. Sufficient compelling evidence must be provided to convince the Committee the sanction should be removed or modified. If evidence is not provided, the Committee may deny removal of the sanction. Situations that may result in denial of a sanction removal request include: additional violations of the Rules of Ethics after the sanction was imposed, failure to demonstrate that there has been adequate rehabilitation, and/or continued denial of responsibility.

(l) Civil or Criminal Penalties

Conduct that violates ARRT's Rules of Ethics may also violate applicable state or federal law. In addition to the potential sanctions under the *Standards of Ethics*, ARRT may, without giving prior notice, pursue civil and/or criminal penalties.

5. Publication of Adverse Decisions

Summary suspensions and final decisions (other than private reprimands, Alternative Dispositions and conditional statuses) that are adverse to a Registered Technologist or Candidate will be communicated to the appropriate authorities of certification organizations and state licensing agencies and provided in response to written inquiries into an individual's certification and registration status. The ARRT shall also have the right to publish any final adverse decisions and summary suspensions and the reasons therefore. For purposes of this paragraph, a "final decision" means and includes: a determination of the Ethics Committee relating to an adverse decision if the affected individual did not request a hearing in a timely manner; a non-appealable decision of the Ethics Committee; an appealable decision of the Ethics Committee from which no timely appeal is taken; and, the decision of the Board of Trustees in a case involving an appeal of an appealable decision of the Ethics Committee.

6. Procedure to Request Removal of a Sanction

A sanction imposed by ARRT, including a sanction specified in a Settlement Agreement, specifically provides a sanction time frame and it shall be presumed that a sanction may only be reconsidered after the time frame has elapsed. At any point after a sanction first becomes eligible for reconsideration, the individual may submit a written request ("Request") to ARRT asking the Ethics Committee to remove the sanction. The Request must be accompanied by a nonrefundable fee in an amount to be determined by ARRT. A Request that is not accompanied by the fee will be returned to the individual and will not be considered. In rare cases, the fee may be waived, in whole or in part, at the sole discretion of ARRT. The individual is not entitled to make a personal appearance before the Ethics Committee in connection with a Request to remove a sanction or to modify a Settlement Agreement.

Although there is no required format, Requests for both sanction removal and Settlement Agreement modification must include compelling reasons justifying the removal of the sanction or modification of the Settlement Agreement. It is recommended that the individual demonstrate at least the following: (1) an understanding of the reasons for the sanction; (2) an understanding of why the action leading to the sanction was felt to warrant the sanction imposed; and (3) detailed information demonstrating that the individual's behavior has improved and similar activities will not be repeated. Letters of recommendation from individuals, who are knowledgeable about the person's sanction imposed; and current character and behavior, including efforts at rehabilitation, are advised. If a letter of recommendation is not on original letterhead or is not duly notarized, the Ethics Committee shall have the discretion to ignore that letter of recommendation.

Removal of the sanction is a prerequisite to apply for certification and registration. If, at the sole discretion of the Ethics Committee, the sanction is removed, the individual will be allowed to pursue certification and registration via the policies and procedures in place at that time as stated in Section 6.05 of the *ARRT Rules and Regulations*.

If the Ethics Committee denies a Request for removal of the sanction or modification of a Settlement Agreement, the decision is not subject to a hearing or to an appeal, and the Committee will not reconsider removal of the sanction or modification of the Settlement Agreement for as long as is directed by the Committee.

7. Amendments to the Standards of Ethics

The ARRT reserves the right to amend the *Standards of Ethics* following the procedures under Article XII, Section 12.02 of the *ARRT Rules and Regulations*.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
*DMI Program Expenses**

Tuition & Fees	**DMI Only**	**DMI & Gen Ed**
https://www.ccp.edu/paying-college/tuition-and-fees	**(47 credits)**	**(73 credits)**
Philadelphia Resident	$10,941	$15,959
PA Resident	$18,884	$28,296
Non-PA Resident	$26,827	$40,633

Clinical Clearances/Requirements	
Health Insurance Coverage	Variable
Physical Exam	Variable
Lab Titers/Immunizations	Variable
Basic Life Support (BLS) for Healthcare Providers	$60-$200 (Certification & Renewal)

DMI Textbooks	**New**	**Used**
Year 1	$1,130	$850
Year 2	$125	$90

DMI Uniforms	
Tops (4 total)	$170
Bottoms (4 total)	$125
Jackets (4 total)	$220
Clogs/Sneakers (2 pair)	$250

Radiographic Lead Markers	
(2) R & L Sets with 2-3 Initials	$50-70

ARRT Registry Examination	
Radiography Exam Application Fee	$225

***The above numbers are estimates as tuition and fees are subject to change at any time.** Although the tuition for Philadelphia residents is relatively low, students need to plan ahead and anticipate all costs for the period of enrollment. The **basic budget for one semester** at the College should include, in addition to the appropriate tuition and fees, the following estimates:

Books (General Education Courses) and Supplies	$1,200
Transportation (Gas, Public Transit, Parking)	$1,500
Meals	$1,300

Updated 5-23-23 RP

Radiography

The purpose of the exam is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of the staff technologist at entry into the profession. The tasks typically performed were determined by administering a comprehensive practice analysis survey to a nationwide sample of radiographers.[1] An advisory committee then determined the knowledge and cognitive skills needed to perform the tasks on the task inventory and these are organized into the content categories within this document. Every content category can be linked to one or more tasks on the task inventory. The document is used to develop the examination. The *Task Inventory for Radiography* may be found on the ARRT's website (www.arrt.org).

The ARRT avoids content when there are multiple resources with conflicting perspectives. Educational programs accredited by a mechanism acceptable to ARRT offer education and experience beyond the minimum requirements specified in the content specifications and clinical competency requirements documents.

This document is not intended to serve as a curriculum guide. Although ARRT programs for certification and registration and educational programs may have related purposes, their functions are clearly different. Educational programs are generally broader in scope and address the subject matter that is included in these content specifications, but do not limit themselves to only this content.

The table below presents the major content categories and subcategories covered on the examination. The number of test questions in each category are listed in bold and the number of test questions in each subcategory in parentheses. Specific topics within each category are addressed in the content outline, which makes up the remaining pages of this document.

Content Category	**Number of Scored Questions[2]**
Patient Care	**33**
Patient Interactions and Management (33)	
Safety	**50**
Radiation Physics and Radiobiology[3] (21)	
Radiation Protection (29)	
Image Production	**51**
Image Acquisition and Evaluation (26)	
Equipment Operation and Quality Assurance (25)	
Procedures	**66**
Head, Spine and Pelvis Procedures (18)	
Thorax and Abdomen Procedures (20)	
Extremity Procedures (28)	
Total	**200**

[1] A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.
[2] Each exam includes an additional 30 unscored (pilot) questions.
[3] SI units are the primary (principle) units of radiation measurement used on the radiography examination.

Patient Care

1. Patient Interactions and Management

A. Ethical and Legal Aspects
   1. patients' rights
      a. consent (*e.g., informed, oral, implied)
      b. confidentiality (HIPAA)
      c. American Hospital Association (AHA) Patient Care Partnership (Patients' Bill of Rights)
         1. privacy
         2. extent of care (e.g., DNR)
         3. access to information
         4. living will, health care proxy, advanced directives
         5. research participation
   2. legal issues
      a. verification (e.g., patient identification, compare order to clinical indication)
      b. common terminology (e.g., battery, negligence, malpractice, beneficence)
      c. legal doctrines (e.g., respondeat superior, res ipsa loquitur)
      d. restraints versus positioning aids used to eliminate motion artifact
      e. manipulation of electronic data (e.g., exposure indicator, processing algorithm, brightness and contrast, cropping or masking off anatomy)
      f. documentation (e.g., changes to order, medical event)
   3. ARRT Standards of Ethics

B. Interpersonal Communication
   1. modes of communication
      a. verbal/written
      b. nonverbal (e.g., eye contact, touching)
   2. challenges in communication
      a. interactions with others
         1. language barriers
         2. cultural and social factors
         3. physical, sensory, or cognitive impairments
         4. age
         5. emotional status, acceptance of condition (e.g., stage of grief)
      b. explanation of medical terms
      c. strategies to improve understanding
   3. patient education
      a. explanation of current procedure (e.g., purpose, length of time, radiation dose)
      b. pre- and post-examination instructions (e.g., preparation, diet, medications and discharge instructions)
      c. respond to inquiries about other imaging modalities (e.g., dose differences, types of radiation, patient preps)

C. Ergonomics and Monitoring
   1. body mechanics (e.g., balance, alignment, movement)
      a. patient transfer techniques
      b. safe patient handling devices (e.g., transfer board, Hoyer lift, gait belt)
   2. assisting patients with medical equipment
      a. infusion catheters and pumps
      b. oxygen delivery systems
      c. other (e.g., nasogastric tubes, urinary catheters, tracheostomy tubes)
   3. patient monitoring and documentation
      a. vital signs
      b. physical signs and symptoms (e.g., motor control, severity of injury)
      c. fall prevention

D. Medical Emergencies
   1. non-contrast allergic reactions (e.g., latex)
   2. cardiac/respiratory arrest (e.g., CPR, AED)
   3. physical injury or trauma
   4. other medical disorders (e.g., seizures, diabetic reactions)

*The abbreviation "e.g.," is used to indicate that examples are listed in parentheses, but that it is not a complete list of all possibilities.

(Patient Care continues on the following page.)

Patient Care (continued)

E. Infection Control
   1. chain of infection (cycle of infection)
      a. pathogen
      b. reservoir
      c. portal of exit
      d. mode of transmission
         1. direct
            a. droplet
            b. direct contact
         2. indirect
            a. airborne
            b. vehicle borne (fomite)
            c. vector borne (mechanical or biological)
      e. portal of entry
      f. susceptible host
   2. asepsis
      a. equipment disinfection
      b. equipment sterilization
      c. medical aseptic technique
      d. sterile technique
   3. CDC Standard Precautions
      a. hand hygiene
      b. use of personal protective equipment (e.g., gloves, gowns, masks)
      c. safe handling of contaminated equipment/surfaces
      d. disposal of contaminated materials
         1. linens
         2. needles
         3. patient supplies
         4. blood and body fluids
      e. safe injection practices
   4. transmission-based precautions
      a. contact
      b. droplet
      c. airborne
   5. additional precautions
      a. neutropenic precautions (reverse isolation)
      b. healthcare-associated (nosocomial) infections

F. Handling and Disposal of Toxic or Hazardous Material
   1. types of materials
      a. chemicals
      b. chemotherapy
   2. safety data sheet (material safety data sheet)

G. Pharmacology
   1. patient history
      a. medication reconciliation (current medications)
      b. premedications
      c. contraindications
      d. scheduling and sequencing examinations
   2. administration
      a. routes (e.g., IV, oral)
      b. supplies (e.g., enema kits, needles)
      c. procedural technique (e.g., venipuncture)
      d. contrast media dose calculation
   3. contrast media types and properties (e.g., iodinated, water soluble, barium, ionic versus non-ionic)
   4. appropriateness of contrast media to examination
      a. patient condition (e.g., perforated bowel)
      b. patient age and weight
      c. laboratory values (e.g., BUN, creatinine, eGFR)
   5. complications/reactions
      a. local effects (e.g., extravasation/infiltration, phlebitis)
      b. systemic effects
         1. mild
         2. moderate
         3. severe
      c. emergency medications
      d. radiographer's response and documentation

Safety

1. Radiation Physics and Radiobiology

A. Principles of Radiation Physics
   1. x-ray production
      a. source of free electrons (e.g., thermionic emission)
      b. acceleration of electrons
      c. focusing of electrons
      d. deceleration of electrons
   2. target interactions
      a. bremsstrahlung
      b. characteristic
   3. x-ray beam
      a. frequency and wavelength
      b. beam characteristics
         1. quality
         2. quantity
         3. primary versus remnant (exit)
      c. inverse square law
      d. fundamental properties (e.g., travel in straight lines, ionize matter)
   4. photon interactions with matter
      a. photoelectric
      b. Compton
      c. coherent (classical)
      d. attenuation by various tissues
         1. thickness of body part
         2. type of tissue (atomic number)

B. Biological Effects of Radiation
   1. SI units of measurement (NCRP #160)
      a. absorbed dose (Gy)
      b. dose equivalent (Sv)
      c. exposure (C/kg)
      d. effective dose (Sv)
      e. air kerma (Gy)
   2. radiosensitivity
      a. dose-response relationships
      b. relative tissue radiosensitivities (e.g., LET, RBE)
      c. cell survival and recovery (LD_{50})
      d. oxygen effect
   3. somatic effects
      a. cells
      b. tissue (e.g., eye, thyroid, breast, skin, marrow, gonad)
      c. embryo and fetus
      d. carcinogenesis
      e. early versus late or acute versus chronic
      f. deterministic (tissue reactions) versus stochastic
      g. short-term versus long-term exposure
      h. acute radiation syndromes
         1. hemopoietic
         2. gastrointestinal (GI)
         3. central nervous system (CNS)

(Safety continues on the following page.)

Safety (continued)

2. Radiation Protection

A. Minimizing Patient Exposure
   1. exposure factors
      a. kVp
      b. mAs
      c. automatic exposure control (AEC)
   2. beam restriction
      a. purpose of primary beam restriction
      b. types (e.g., collimators)
   3. patient considerations
      a. positioning
      b. communication
      c. pediatric
      d. morbid obesity
   4. filtration
      a. effect on skin and organ exposure
      b. effect on average beam energy
      c. NCRP recommendations (NCRP #102, minimum filtration in useful beam)
   5. radiographic dose documentation
   6. image receptors
   7. grids
   8. fluoroscopy
      a. pulsed
      b. exposure factors
      c. grids
      d. positioning
      e. fluoroscopy time
      f. automatic brightness control (ABC) or automatic exposure rate control (AERC)
      g. receptor positioning
      h. magnification mode
      i. air kerma display
      j. last image hold
      k. dose or time documentation
      l. minimum source-to-skin distance (21 CFR)
   9. dose area product (DAP) meter

B. Personnel Protection (ALARA)*
   1. sources of radiation exposure
      a. primary x-ray beam
      b. secondary radiation
         1. scatter
         2. leakage
      c. patient as source
   2. basic methods of protection
      a. time
      b. distance
      c. shielding
   3. protective devices
      a. types (e.g., aprons, barriers)
      b. attenuation properties
      c. minimum lead equivalent (NCRP #102)
   4. special considerations
      a. mobile units
      b. fluoroscopy
         1. protective drapes
         2. protective Bucky slot cover
         3. cumulative timer
         4. remote-controlled fluoroscopy
      c. guidelines for fluoroscopy and mobile units (NCRP #102, 21 CFR)
         1. fluoroscopy exposure rates (normal and high-level control)
         2. exposure switch guidelines
   5. radiation exposure and monitoring
      a. dosimeters
         1. types
         2. proper use
      b. NCRP recommendations for personnel monitoring (NCRP #116)
         1. occupational exposure
         2. public exposure
         3. embryo/fetus exposure
         4. dose equivalent limits
         5. evaluation and maintenance of personnel dosimetry records
   6. handling and disposal of radioactive material

* (August 24, 2016) Note: Although it is the radiographer's responsibility to apply radiation protection principles to minimize bioeffects for both patients and personnel, the ALARA concept is specific to personnel protection and is listed only for that section.

Image Production

1. Image Acquisition and Evaluation

A. Factors Affecting Radiographic Quality
(X indicates topics covered on the examination.)

	1. Receptor Exposure	2. Spatial Resolution	3. Distortion
a. mAs	X		
b. kVp	X		
c. OID		X	X
d. SID	X	X	X
e. focal spot size		X	
f. grids*	X		
g. tube filtration	X		
h. beam restriction	X		
i. motion		X	
j. anode heel effect	X		
k. patient factors (size, pathology)	X	X	X
l. angle (tube, part, or receptor)		X	X

* Includes conversion factors for grids

B. Technique Charts
   1. anatomically programmed technique
   2. fixed versus variable kVp
   3. special considerations
      a. casts
      b. pathologic factors
      c. age (e.g., pediatric, geriatric)
      d. body mass index (BMI)
      e. contrast media
      f. grids
      g. OID

C. Automatic Exposure Control (AEC)
   1. effects of changing exposure factors on radiographic quality
   2. detector selection
   3. anatomic alignment
   4. exposure adjustment (e.g., density, +1 or –1)

D. Digital Imaging Characteristics
   1. spatial resolution
      a. pixel characteristics (e.g., size, pitch)
      b. detector element (DEL) (e.g., size, pitch, fill factor) CCD, CMOS (e.g., size, pitch)
      c. sampling frequency (CR)
      d. matrix size
      e. modulation transfer function (MTF)
   2. contrast resolution
      a. bit depth
      b. detective quantum efficiency (DQE)
      c. grids
   3. image signal
      a. dynamic range
      b. quantum noise (quantum mottle)
      c. signal to noise ratio (SNR)

E. Image Identification
   1. methods (e.g., radiographic, electronic)
   2. legal considerations (e.g., patient data, examination data)

F. Criteria for Image Evaluation
   1. exposure indicator
   2. quantum noise (quantum mottle)
   3. gross exposure error (e.g., loss of contrast, saturation)
   4. contrast
   5. spatial resolution
   6. distortion (e.g., size, shape)
   7. identification markers (e.g., anatomical side, patient, date)
   8. image artifacts
   9. radiation fog (CR)

Image Production (continued)

2. Equipment Operation and Quality Assurance

A. Imaging Equipment
1. x-ray generator, transformers and rectification system
   a. basic principles
   b. phase, pulse and frequency
   c. tube loading
2. components of radiographic unit (fixed or mobile)
   a. operating console
   b. x-ray tube construction
      1. electron source
      2. target materials
      3. induction motor
      4. filtration
   c. automatic exposure control (AEC)
      1. radiation detectors
      2. back-up timer
      3. exposure adjustment (e.g., density, +1 or -1)
      4. minimum response time
   d. manual exposure controls
   e. image receptors
      1. computed radiography (CR)
         a. plate (e.g., photo-stimulable phosphor (PSP))
         b. plate reader
      2. digital radiography (DR)
         a. direct conversion
         b. indirect conversion
            1. amorphous silicon (a-Si)
            2. charge coupled device (CCD)
            3. complementary metal oxide semiconductor (CMOS)
   f. beam restriction
3. components of fluoroscopic unit (fixed or mobile)
   a. image receptors
      1. image intensifier
      2. flat panel
   b. viewing systems
   c. recording systems
   d. automatic brightness control (ABC) or automatic exposure rate control (AERC)
   e. magnification mode
   f. table
4. accessories
   a. stationary grids
   b. Bucky assembly
   c. compensating filters

B. Image Processing and Display
1. raw data (pre-processing)
   a. analog-to-digital converter (ADC)
   b. quantization
   c. corrections (e.g., rescaling, flat fielding, dead pixel correction)
   d. histogram
2. corrected data for processing
   a. grayscale
   b. edge enhancement
   c. equalization
   d. smoothing
3. data for display
   a. values of interest (VOI)
   b. look-up table (LUT)
4. post-processing
   a. brightness
   b. contrast
   c. region of interest (ROI)
   d. electronic cropping or masking
   e. stitching
5. display monitors
   a. viewing conditions (e.g., viewing angle, ambient lighting)
   b. spatial resolution (e.g., pixel size, pixel pitch)
   c. brightness and contrast
6. imaging informatics
   a. information systems, (e.g., HIS, RIS, EMR, EHR)
   b. networking
      1. PACS
      2. DICOM
   c. downtime procedures

Image Production (continued)

C. Quality Control of Imaging Equipment and Accessories
   1. beam restriction
      a. light field to radiation field alignment
      b. central ray alignment
   2. recognition and reporting of malfunctions
   3. digital imaging receptor systems
      a. maintenance (e.g., detector calibration, plate reader calibration)
      b. QC tests (e.g., erasure thoroughness, plate uniformity, spatial resolution)
      c. display monitor quality assurance (e.g., grayscale standard display function, luminance)
   4. shielding accessories (e.g., testing lead apron, gloves)

Procedures

This section addresses imaging procedures for the anatomic regions listed below. Questions will cover the following topics:

1. Positioning (e.g., topographic landmarks, body positions, path of central ray, positioning aids, respiration).
2. Anatomy (e.g., including physiology, basic pathology, related medical terminology).
3. Procedure adaptation (e.g., body habitus, body mass index, trauma, pathology, age, limited mobility).
4. Evaluation of displayed anatomical structures (e.g., patient positioning, tube-part-image receptor alignment).

The specific radiographic positions and projections within each anatomic region that may be covered on the examination are listed in *Attachment A*. A guide to positioning terminology appears in *Attachment B*.

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1. Head, Spine and Pelvis Procedures

A. Head
   1. skull
   2. facial bones
   3. mandible
   4. temporomandibular joints
   5. nasal bones
   6. orbits
   7. paranasal sinuses

B. Spine and Pelvis
   1. cervical spine
   2. thoracic spine
   3. scoliosis series
   4. lumbar spine
   5. sacrum and coccyx
   6. myelography
   7. sacroiliac joints
   8. pelvis and hip

2. Thorax and Abdomen Procedures

A. Thorax
   1. chest
   2. ribs
   3. sternum
   4. soft tissue neck
   5. sternoclavicular joints

B. Abdomen and GI Studies
   1. abdomen
   2. esophagus
   3. swallowing dysfunction study
   4. upper GI series, single or double contrast
   5. small bowel series
   6. contrast enema, single or double contrast
   7. surgical cholangiography
   8. ERCP

C. GU Studies
   1. cystography
   2. cystourethrography
   3. intravenous urography
   4. retrograde urography
   5. hysterosalpingography

3. Extremity Procedures

A. Upper Extremities
   1. fingers
   2. hand
   3. wrist
   4. forearm
   5. elbow
   6. humerus
   7. shoulder
   8. scapula
   9. clavicle
   10. acromioclavicular joints

B. Lower Extremities
   1. toes
   2. foot
   3. calcaneus
   4. ankle
   5. tibia/fibula
   6. knee/patella
   7. femur
   8. long bone measurement

C. Other
   1. bone age
   2. bone survey (e.g., metastatic, non-accidental trauma)
   3. arthrography

Attachment A

Radiographic Positions and Projections

1. Head, Spine and Pelvis

A. Head

1. Skull
   a. AP axial (Towne)
   b. lateral
   c. PA axial (Caldwell)
   d. PA
   e. submentovertex (full basal)
   f. trauma cross-table (horizontal beam) lateral
   g. trauma AP axial (reverse Caldwell)
   h. trauma AP
   i. trauma AP axial (Towne)
2. Facial Bones
   a. lateral
   b. parietoacanthial (Waters)
   c. PA axial (Caldwell)
   d. modified parietoacanthial (modified Waters)
3. Mandible
   a. axiolateral oblique
   b. PA
   c. AP axial (Towne)
   d. PA axial
   e. PA (modified Waters)
   f. submentovertex (full basal)
4. Temporomandibular Joints
   a. axiolateral oblique (modified Law)
   b. axiolateral (modified Schuller)
   c. AP axial (modified Towne)
5. Nasal Bones
   a. parietoacanthial (Waters)
   b. lateral
   c. PA axial (Caldwell)
6. Orbits
   a. parietoacanthial (Waters)
   b. lateral
   c. PA axial (Caldwell)
   d. modified parietoacanthial (modified Waters)
7. Paranasal Sinuses
   a. lateral, horizontal beam
   b. PA axial (Caldwell), horizontal beam
   c. parietoacanthial (Waters), horizontal beam
   d. submentovertex (full basal), horizontal beam

B. Spine and Pelvis

1. Cervical Spine
   a. AP axial
   b. AP open mouth
   c. lateral
   d. cross-table (horizontal beam) lateral
   e. PA axial obliques
   f. AP axial obliques
   g. lateral swimmers
   h. lateral flexion and extension
   i. AP dens (Fuchs)
2. Thoracic Spine
   a. AP
   b. lateral, breathing
   c. lateral, expiration
3. Scoliosis Series
   a. AP or PA
   b. lateral
4. Lumbar Spine
   a. AP
   b. PA
   c. lateral
   d. L5-S1 lateral spot
   e. posterior oblique
   f. anterior oblique
   g. AP axial L5-S1
   h. AP right and left bending
   i. lateral flexion and extension
5. Sacrum and Coccyx
   a. AP axial sacrum
   b. AP axial coccyx
   c. lateral sacrum and coccyx, combined
   d. lateral sacrum or coccyx, separate
6. Myelography
7. Sacroiliac Joints
   a. AP axial
   b. posterior oblique
   c. anterior oblique
8. Pelvis and Hip
   a. AP hip only
   b. cross-table (horizontal beam) lateral hip
   c. unilateral frog-leg, non-trauma
   d. axiolateral inferosuperior, trauma (Clements-Nakayama)
   e. AP pelvis
   f. AP pelvis, bilateral frog-leg
   g. AP pelvis, axial anterior pelvic bones (inlet, outlet)
   h. posterior oblique pelvis, acetabulum (Judet)

2. Thorax and Abdomen

A. Thorax

1. Chest
   a. PA or AP upright
   b. lateral upright
   c. AP lordotic
   d. AP supine
   e. lateral decubitus
2. Ribs
   a. AP and PA, above and below diaphragm
   b. anterior and posterior obliques
3. Sternum
   a. lateral
   b. RAO
4. Soft Tissue Neck
   a. AP upper airway
   b. lateral upper airway
5. Sternoclavicular joints
   a. PA
   b. LAO and RAO

B. Abdomen and GI Studies

1. Abdomen
   a. AP supine
   b. AP upright
   c. lateral decubitus
   d. dorsal decubitus
2. Esophagus
   a. RAO
   b. left lateral
   c. AP
   d. PA
   e. LAO
3. Swallowing Dysfunction Study
4. Upper GI series*
   a. AP or PA scout
   b. RAO
   c. PA
   d. right lateral
   e. LPO
   f. AP
5. Small Bowel Series
   a. PA scout
   b. PA (follow through)
   c. ileocecal spots
6. Contrast Enema*
   a. left lateral rectum
   b. left lateral decubitus
   c. right lateral decubitus
   d. LPO and RPO
   e. PA
   f. RAO and LAO
   g. AP axial (sigmoid)
   h. PA axial (sigmoid)
   i. PA or AP post-evacuation
7. Surgical Cholangiography
8. ERCP

*single or double contrast

C. GU Studies
1. Cystography
   a. AP
   b. LPO and RPO
   c. lateral
   d. AP axial
2. Cystourethrography
   a. AP voiding cystourethrogram female
   b. RPO voiding cystourethrogram male
3. Intravenous Urography
   a. AP, scout, and series
   b. RPO and LPO
   c. post-void
4. Retrograde Urography
   a. AP scout
   b. AP pyelogram
   c. AP ureterogram
5. Hysterosalpingography

3. Extremities

A. Upper Extremities

I. Fingers
   a. PA entire hand
   b. PA finger only
   c. lateral
   d. medial and/or lateral oblique
   e. AP thumb
   f. medial oblique thumb
   g. lateral thumb
2. Hand
   a. PA
   b. lateral
   c. lateral oblique
3. Wrist
   a. PA
   b. lateral oblique
   c. lateral
   d. PA–ulnar deviation
   e. PA axial (Stecher)
   f. tangential carpal canal (Gaynor-Hart)
4. Forearm
   a. AP
   b. lateral
5. Elbow
   a. AP
   b. lateral
   c. lateral oblique
   d. medial oblique
   e. AP partial flexion
   f. trauma axial laterals (Coyle)
6. Humerus
   a. AP
   b. lateral
   c. neutral
   d. transthoracic lateral
7. Shoulder
   a. AP internal and external rotation
   b. inferosuperior axial (Lawrence)
   c. posterior oblique (Grashey)
   d. AP neutral
   e. PA oblique (scapular Y)
   f. supraspinatus outlet (Neer)
8. Scapula
   a. AP
   b. lateral
9. Clavicle
   a. AP or PA
   b. AP axial
   c. PA axial
10. Acromioclavicular Joints – AP bilateral with and without weights

B. Lower Extremities

1. Toes
   a. AP, entire forefoot
   b. AP or AP axial toe
   c. oblique toe
   d. lateral toe
   e. sesamoids, tangential
2. Foot
   a. AP axial
   b. medial oblique
   c. lateral oblique
   d. lateral
   e. AP axial weight bearing
   f. lateral weight bearing
3. Calcaneus
   a. lateral
   b. plantodorsal, axial
   c. dorsoplantar, axial
4. Ankle
   a. AP
   b. mortise
   c. lateral
   d. medial oblique
   e. AP stress
   f. AP weight bearing
   g. lateral weight bearing
5. Tibia/Fibula
   a. AP
   b. lateral
6. Knee/patella
   a. AP
   b. lateral
   c. AP weight bearing
   d. lateral oblique
   e. medial oblique
   f. PA axial–intercondylar fossa (Holmblad)
   g. PA axial–intercondylar fossa (Camp Coventry)
   h. AP axial–intercondylar fossa (Béclère)
   i. PA patella
   j. tangential (Merchant)
   k. tangential (Settegast)
7. Femur
   a. AP
   b. lateral
8. Long Bone Measurement

C. Other
1. Bone Age
2. Bone Survey
3. Arthrography

Attachment B

Standard Terminology for Positioning and Projection

Radiographic View: Describes the body part as seen by the image receptor. Restricted to the discussion of a *radiograph* or *image*.

Radiographic Position: Refers to a specific body position, such as supine, prone, recumbent, erect or Trendelenburg. Restricted to the discussion of the *patient's physical position*.

Radiographic Projection: Restricted to the discussion of the *path of the central ray*.

POSITIONING TERMINOLOGY

A. Lying Down

1. *supine* – lying on the back
2. *prone* – lying face downward
3. *decubitus* – lying down with a horizontal x-ray beam
4. *recumbent* – lying down in any position

B. Erect or Upright

1. *anterior position* – facing the image receptor
2. *posterior position* – facing the radiographic tube

C. Either Upright or Recumbent

1. oblique torso positions

   a. anterior oblique (facing the image receptor)

      i. *left anterior oblique (LAO)* — body rotated with the left anterior portion closest to the image receptor

      ii. *right anterior oblique (RAO)* — body rotated with the right anterior portion closest to the image receptor

   b. posterior oblique (facing the radiographic tube)

      i. *left posterior oblique (LPO)* — body rotated with the left posterior portion closest to the image receptor

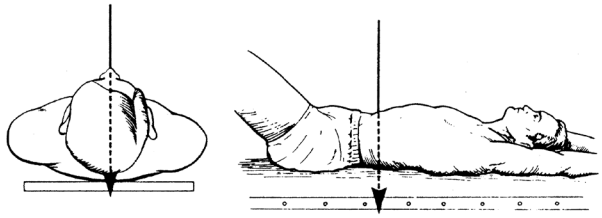
      ii. *right posterior oblique (RPO)* — body rotated with the right posterior portion closest to the image receptor

2. oblique extremity positions

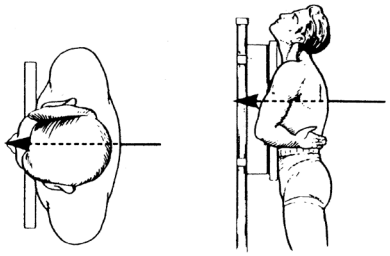
   a. lateral (external) rotation — from either prone or supine, outward rotation of the extremity

   b. medial (internal) rotation — from either prone or supine, inward rotation of the extremity

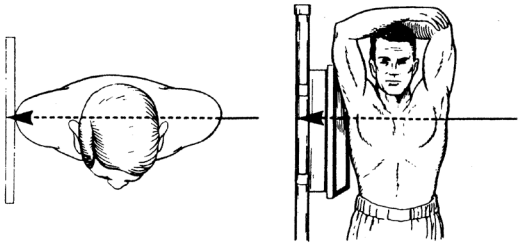
Anteroposterior Projection



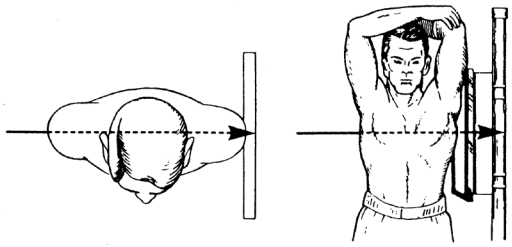
Posteroanterior Projection



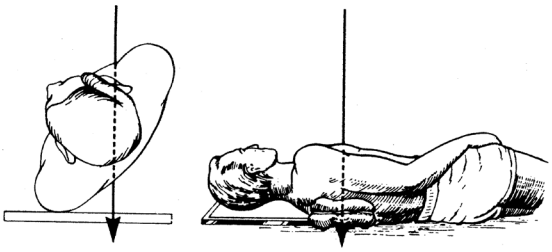
Right Lateral Position



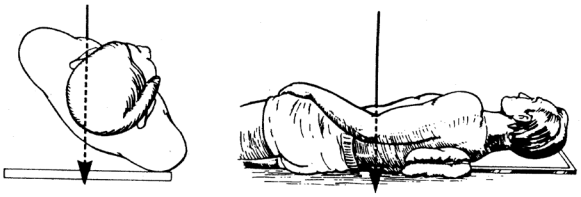
Left Lateral Position



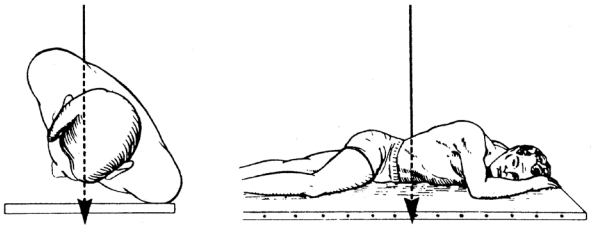
Left Posterior Oblique Position



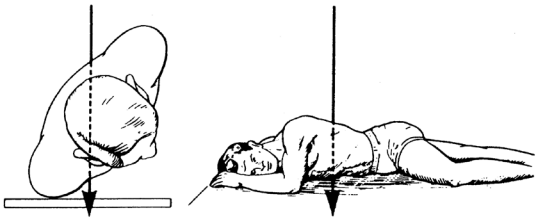
Right Posterior Oblique Position



Left Anterior Oblique Position



Right Anterior Oblique Position



Radiography

Certification and registration requirements for radiography are based on the results of a comprehensive practice analysis conducted by The American Registry of Radiologic Technologists (ARRT) staff and the Radiography Practice Analysis Committee. The purpose of the practice analysis is to identify job responsibilities typically required of radiographers at entry into the profession. The results of the practice analysis are reflected in this document. The attached task inventory is the foundation for ARRT's clinical competency requirements and content outline which in turn is the foundation for the examination content specifications and CQR SSA content specifications.

Basis of Task Inventory

In 2019, the ARRT surveyed a large, national sample of radiographers to identify their responsibilities. When evaluating survey results, the committee applied a 40% criterion. That is, to be included on the task inventory, an activity must have been performed by at least 40% of radiographers. The committee could include an activity that did not meet the 40% criterion if there was a compelling rationale to do so (*e.g., a task that falls below the 40% criterion but is expected to rise above the 40% criterion in the near future).

Application to Clinical Competency Requirements

The purpose of the clinical requirements is to verify that individuals certified by the ARRT have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills covered by the certification examination, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively during the course of his or her formal education. An activity must appear on the task inventory to be considered for inclusion in the clinical competency requirements. For an activity to be designated as a mandatory requirement, survey results had to indicate that radiographers performed that activity. The committee designated clinical activities performed by fewer radiographers or which are carried out only in selected settings, as elective. The *Radiography Didactic and Clinical Competency Requirements* are available from ARRT's website (www.arrt.org).

Application to Content Specifications

The purpose of the exam is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of the staff technologist at entry into the profession. The content specifications identify the knowledge areas underlying performance of the tasks on the task inventory. Every content category can be linked to one or more activities on the task inventory. Note that each activity on the task inventory is followed by a content category that identifies the section of the content specifications corresponding to that activity. The *Radiography Content Specifications* are available from ARRT's website (www.arrt.org).

* The abbreviation "e.g.," is used to indicate that examples are listed in parentheses, but that it is not a complete list of all possibilities.

Activity			Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	1.	Sequence imaging procedures to avoid affecting subsequent examinations (e.g., residual contrast material).	PC.1.B.3.C, PC.1.G.1.D, PC.1.G.4
	2.	Verify the patient's identity.	PC.1.A.2.A
	3.	Evaluate the patient's ability to understand and comply with requirements for the requested examination.	PC.1.B, S.2.A.4.B
	4.	Obtain pertinent medical history.	PC.1.A.2.A, PC.1.C.3.B, PC.1.G.1
	5.	Manage interpersonal interactions in an effective manner.	PC.1.B.2
	6.	Explain and confirm the patient's preparation (e.g., diet restrictions, preparatory medications).	PC.1.B.3.B
	7.	Review the examination request to verify information is accurate, appropriate, and complete (e.g., patient history, clinical diagnosis, physician's orders).	PC.1.A.2.A
	8.	Explain the procedure instructions to patient, patient's family, or authorized representative (e.g., pre-procedure, post procedure).	PC.1.B.3.A
	9.	Respond as appropriate to procedure inquiries from the patient, patient's family, or authorized representative (e.g., scheduling delays, exam duration).	PC.1.B.3.A
	10.	Monitor the patient's auxiliary medical equipment (e.g., IVs, oxygen) during a procedure.	PC.1.C.2
	11.	Follow environmental protection standards for handling and disposing of bio-hazardous materials (e.g., sharps, blood, body fluids).	PC.1.E.3.D, PC.1.F.2
	12.	Follow environmental protection standards for handling and disposing of hazardous materials (e.g., disinfectant, chemotherapy IV, radioactive implant).	PC.1.F
	13.	Provide for the patient's safety, comfort, and modesty.	PC.1.A, PC.1.C
	14.	Notify appropriate personnel of adverse events or incidents (e.g. patient fall, wrong patient imaged).	PC.1.A.2.F, PC.1.C.3, PC.1.G.6.D, IP.1.E
	15.	Demonstrate and promote professional and ethical behavior (e.g., confidentiality, regulation compliance).	PC.1.A, PC.1.B
	16.	Verify informed consent as necessary.	PC.1.A.1.A
	17.	Recognize abnormal or missing lab values relative to the procedure ordered.	PC.1.G.5.C
	18.	Handle, label, and submit laboratory specimens (e.g., cerebrospinal fluid, synovial fluid).	P.1.B.6, P.3.C.3

Activity			Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	19.	Communicate relevant information to appropriate members of the care team.	PC.1.A, PC.1.B, PC.1.G
	20.	Practice Standard Precautions.	PC.1.E.3
	21.	Follow appropriate procedures when caring for patients with communicable diseases.	PC.1.E.3, PC.1.E.4, PC.1.E.5
	22.	Use positioning aids, as needed, to reduce patient movement, and/or promote patient safety.	PC.1.A.2.D, P.
	23.	Use proper body mechanics and/or ergonomic devices to promote personnel safety.	PC.1.C.1
	24.	Prior to administration of a medication other than a contrast agent, review pertinent information to prepare appropriate type and dosage.	PC.1.G.1, PC.1.G.2
	25.	Prior to administration of a contrast agent, review pertinent information to prepare appropriate type and dosage.	PC.1.G.1, PC.1.G.4, PC.1.G.5
	26.	Prior to administration of a contrast agent, determine if patient is at risk for an adverse reaction.	PC.1.G.1, PC.1.G.5
	27.	Use sterile or aseptic technique when indicated.	PC.1.E.2, PC.1.G.2.C
	28.	Perform venipuncture.	PC.1.G.2.C
	29.	Administer contrast agents as required by the procedure.	PC.1.G..2, PC.1.G.4, PC.1.G.5
	30.	Assess the patient after administration of a contrast agent to detect adverse reactions.	PC.1.C.3, PC.1.G.6
	31.	Obtain vital signs.	PC.1.C.3.A
	32.	Recognize and communicate the need for prompt medical attention.	PC.1.C.3, PC.1.D, PC.1.G.6
	33.	Assist with providing emergency care (e.g., CPR).	PC.1.C.3, PC.1.D, PC.1.G.6
	34.	Clean and disinfect or sterilize facilities and equipment.	PC.1.E.2.A, PC.1.E.2.B
	35.	Document required information on the patient's medical record (e.g., imaging procedure documentation, images, adverse events).	PC.1.A.2.F, PC.1.B.1.A, PC.1.C.3, PC.1.G.6.D, IP.1.E, IP.2.B.6
	36.	Evaluate the need for and use of protective shielding.	S.2.B
	37.	Take appropriate precautions to minimize radiation exposure to the patient.	S.2.A
	38.	Screen female patients of childbearing age for the possibility of pregnancy and take appropriate action (e.g., document response, contact physician).	PC.1.B, S.2.A.4

Activity			**Content Categories** Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	39.	Restrict beam to the anatomical area of interest.	S.2.A.3, IP.1.A.1.H, IP.2.A.2.F
	40.	Set technical factors to produce optimal images and minimize patient dose.	S.2.A.1, IP.1.A, IP.1.B, IP.1.C
	41.	Document radiographic procedure dose.	S.2.A.6, S.2.A.9.K
	42.	Take appropriate action to minimize fluoroscopy dose.	S.2.A.9
	43.	Document fluoroscopy time.	S.2.A.9.K, IP.2.A.4
	44.	Document fluoroscopy dose.	S.2.A.9.K, IP.2.A.4
	45.	Keep all unnecessary persons out of the immediate area during radiation exposure.	S.2.B.5.B
	46.	Take appropriate precautions to minimize occupational radiation exposure.	S.2.B
	47.	Advocate radiation safety and protection.	S.2.A, S.2.B
	48.	Describe the potential risk of radiation exposure when asked.	PC.1.B.3, S.1.B
	49.	Wear a radiation monitoring device while on duty.	S.2.B.5
	50.	Evaluate individual occupational exposure reports to determine if values for the reporting period are within established limits.	S.2.B.5.B
	51.	Select appropriate radiographic exposure factors using the following: a. Fixed kVp technique chart b. Variable kVp technique chart c. Automatic Exposure Control (AEC) d. Anatomically programmed technique	IP.1.A, IP.1.B, IP.1.C
	52.	Operate radiographic unit and accessories including: a. Fixed unit b. Mobile unit	IP.2.A.1, IP.2.A.2, IP.2.A.3, IP.2.A.4
	53.	Operate fluoroscopic unit and accessories including: a. Fixed fluoroscopic unit b. Mobile fluoroscopic unit (e.g., C-arm, O-arm)	IP.2.A.4
	54.	Operate digital imaging devices and information technology systems including: a. Computed radiography (CR) b. Digital radiography (DR) c. Picture archiving and communication systems (PACS) d. Medical information systems (e.g., HIS, RIS, EMR, EHR)	IP.2.A.2.E, IP.2.A.3, IP.2.B
	55.	Recognize and report malfunctions in the information technology systems (e.g., downtime procedures).	IP.2.B.6.C

Activity			Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	56.	Remove radiopaque materials that could interfere with the image from the exposure field (e.g., clothing, jewelry).	PC.1.B.3.A, IP.1.F.8
	57.	Use radiopaque anatomical side markers at the time of image acquisition.	IP.1.F.7
	58.	Select imaging accessories (e.g., grid, compensating filter) for the examination requested.	IP.1.A, IP.1.B.4.F, IP.2.A.3
	59.	Align central ray to body part and image receptor to demonstrate the desired anatomy.	P.
	60.	Explain breathing instructions prior to making the exposure.	PC.1.B.3.A, IP.1.A.3.I, P.
	61.	Position patient to demonstrate the desired anatomy using anatomical landmarks.	P.
	62.	Modify exposure factors for circumstances such as involuntary motion, casts and splints, pathological conditions, contrast agent, or patient's inability to cooperate.	IP.1.A.3.I, IP.1.A.3.K, IP.1.B.4, IP.1.C
	63.	Adapt procedures for: a. Patient condition (e.g., age, size, trauma, pathology) b. Location (e.g., mobile, surgical, isolation)	PC.1.C, PC.1.E, S.2.A.4, S.2.A.9, IP.1.A, IP.1.B, IP.1.C, P.
	64.	Select appropriate geometric factors (e.g., SID, OID, focal spot size, tube angle).	IP.1.A
	65.	Evaluate images for diagnostic quality.	IP.1.F, IP.12.C, P.
	66.	Respond appropriately to exposure indicator values.	IP.1.F.1
	67.	Verify accuracy of patient identification associated with images.	IP.1.E, IP.1.F.7
	68.	Add electronic annotations on images to indicate position or other relevant information (e.g., time, upright, decubitus, post-void).	PC.1.A.2.E, IP.1.E, IP.1.F.7
	69.	Perform post-processing on images in preparation for interpretation.	IP.2.B.4
	70.	Determine corrective measures if image is not of diagnostic quality and take appropriate action.	IP.1.F, P.
	71.	Identify image artifacts and make appropriate corrections as needed.	IP.1.F.8, P.
	72.	Store and handle image receptor in a manner which will reduce the possibility of artifact production.	IP.1.F.8, IP.1.F.9, IP.2.C.3
	73.	Recognize and report malfunctions in the imaging unit and accessories.	IP.1.F.8, IP.2.C.2

Activity			Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	74.	Recognize the need for periodic maintenance and evaluation of radiographic equipment affecting image quality and radiation safety (e.g., shielding, image display monitor, light field, central ray detector calibration).	IP.2.C
	75.	Perform routine maintenance on digital equipment including: a. Detector calibration b. CR plate erasure c. Equipment cleanliness d. Test images	IP.2.C.3
		Perform the following diagnostic examinations:	
	76.	Chest	P.2.A.1
	77.	Ribs	P.2.A.2
	78.	Soft tissue neck	P.2.A.4
	79.	Sternum	P.2.A.3
	80.	Sternoclavicular joints	P.2.A.5
	81.	Abdomen	P.2.B.1
	82.	Esophagus	P.2.B.2
	83.	Swallowing dysfunction study	P.2.B.3
	84.	Foreign body, airway or ingested	P.2.A.1, P.2.A.4, P.2.B.1
	85.	Upper GI series, single or double contrast	P.2.B.4
	86.	Small bowel series	P.2.B.5
	87.	Contrast enema (e.g., barium, iodinated), single or double contrast	P.2.B.6
	88.	Surgical cholangiography	P.2.B.7
	89.	ERCP	P.2.B.8
	90.	Cystography	P.2.C.1
	91.	Cystourethrography	P.2.C.2
	92.	Intravenous urography	P.2.C.3
	93.	Retrograde urography	P.2.C.4
	94.	Hysterosalpingography	P.2.C.5
	95.	Cervical spine	P.1.B.1
	96.	Thoracic spine	P.1.B.2
	97.	Scoliosis series	P.1.B.3
	98.	Lumbar spine	P.1.B.4
	99.	Sacrum/coccyx	P.1.B.5

Activity			Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
	100.	Sacroiliac joints	P.1.B.7
	101.	Pelvis/hip	P.1.B.8
	102.	Skull	P.1.A.1
	103.	Facial bones	P.1.A.2
	104.	Mandible	P.1.A.3
	105.	Temporomandibular joints	P.1.A.5
	106.	Nasal bones	P.1.A.6
	107.	Orbits	P.1.A.7
	108.	Paranasal sinuses	P.1.A.8
	109.	Toes	P.3.B.1
	110.	Foot	P.3.B.2
	111.	Calcaneus	P.3.B.3
	112.	Ankle	P.3.B.4
	113.	Tibia/fibula	P.3.B.5
	114.	Knee/patella	P.3.B.6
	115.	Femur	P.3.B.7
	116.	Fingers	P.3.A.1.
	117.	Hand	P.3.A.2
	118.	Wrist	P.3.A.3
	119.	Forearm	P.3.A.4
	120.	Elbow	P.3.A.5
	121.	Humerus	P.3.A.6
	122.	Shoulder	P.3.A.7
	123.	Scapula	P.3.B.8
	124.	Clavicle	P.3.A.9
	125.	Acromioclavicular joints	P.3.A.10
	126.	Bone survey	P.3.C.8
	127.	Long bone measurement	P.3.B.8
	128.	Bone age	P.3.C.1
		Assist radiologist with the following invasive procedures:	
	129.	Joint injection (arthrography) - fluoroscopic guided contrast injection	P.3.C.3
	130.	Myelography - fluoroscopic guided contrast injection	P.1.B.6

Radiography Curriculum

Sponsored by the American Society of Radiologic Technologists, 15000 Central Ave. SE, Albuquerque, NM 87123-3909.

The Radiography Curriculum *was produced by the ASRT Radiography Curriculum Revision Project Group.*

Introduction

The first ASRT Radiography Curriculum was written in 1952. Throughout its history, the goal of this document has been to outline a common body of knowledge that is essential for entry-level radiographers. The challenge of any curriculum is to give students a solid foundation of traditional core knowledge while also providing opportunities to develop skills that will serve them beyond the entry-level of the Medical Imaging and Radiologic Sciences. The focus of this document is on pre-professional core content that can be expanded with institution-specific content to fulfill the requirements for an academic degree.

Organization:

The document is divided into two main content areas: pre-professional core content and optional content.

- Pre-professional core content: This content makes up the bulk of the document and includes educational content that the professional community supports as essential to enter the profession of radiography. Specific instructional methods are intentionally omitted to allow for creativity in program development and instructional delivery.
- Optional content: Content in this section is to assist programs that want to enhance their curriculum with select topics, either to satisfy the mission of their program or the requirements of their local employment market.

A list of learning objectives associated with each content area has been incorporated into this document to serve as a resource for programs. Learning objectives are offered as a guide. Faculty members are encouraged to expand these fundamental objectives as they incorporate them into their curricula.

Radiography programs are encouraged to organize the content and objectives to meet their goals and needs. In general, students must develop skills in areas such as information literacy, scientific inquiry, self-reflection, collaboration, and mentoring. However, advances in technology and employer expectations may require more independent judgment by radiographers.

The ASRT Radiography Curriculum serves as a blueprint for educators to follow in designing their programs and in ensuring that their programs match the standards of the profession. In the medical imaging and radiologic sciences, students must learn the essential clinical skills that employers expect of graduates, while educators must ensure that students are afforded the opportunity to prepare for the certification examinations offered by the ARRT. This curriculum allows for flexibility to meet the needs of the local community, yet also satisfy the requirements for accreditation and the ARRT examination. The curriculum also offers a foundation for a transition to baccalaureate studies and, more importantly, for individual lifelong learning.

Professional Characteristics:

This curriculum is designed to ensure that entry-level radiographers possess the technical skills outlined in the ASRT Radiography Practice Standards. In addition, the graduate should be able to:

- Exercise prudent judgment in administering ionizing radiation.
- Provide optimal patient care in an evolving and diverse society.
- Recognize the challenges of providing direct patient care in today's health care setting.
- Work collaboratively in a dynamic healthcare environment.
- Interpret (or conduct) research and evaluate sources of information to be used in evidence-based practice.
- Ensure the security and confidentiality of patient medical information.
- Explain the value of lifelong learning.
- Collaborate with others in the community to promote standards of excellence in the medical imaging and radiologic sciences.
- Contribute to the education and clinical skill development of medical imaging and radiologic sciences students.
- Promote an inclusive environment.
- Advocate for diverse patient populations.

General Education:

General education is an integral part of the development of a radiographer. This content is designed to assist in developing skills in communication, human diversity, scientific inquiry, critical thinking and judgment. All these skills are required to perform the responsibilities of an entry-level radiographer. Knowledge gained from general education serves to enhance the content and application of the radiography curriculum.

The ARRT® requires an associate degree (or higher) to apply for the certification exam for radiography. Specific general education requirements have been eliminated from the radiography curriculum. The content listed below is designed only to serve as guidance for program development. Individual states, accreditation agencies, and educational systems have unique general education requirements

Postsecondary general education should be gained through courses that provide college credit and meet the general content objectives listed below:

Mathematics and Reasoning

- Demonstrate skills in analysis, quantification, and synthesis.
- Apply problem-solving or modeling strategies.

Communication

- Write and read critically.

- Speak and listen critically.
- Gather, organize, and present information.
- Locate, evaluate, and synthesize material from diverse sources and points of view.

Humanities

- Demonstrate respect for diverse populations.
- Define ethics and its role in personal and professional interactions.
- Critically examine personal attitudes and values.

Information Systems

- Use computerized systems to acquire, transfer, and store digital information.
- Use technology to retrieve, evaluate, apply, and disseminate information.

Social Sciences

- Adapt interactions to meet the cultural and psychological needs of individuals.
- Describe individual and collective behavior.
- Exhibit and develop leadership skills.
- Exercise responsible and productive citizenship.
- Function as a public-minded individual.

Natural Sciences

- Arrive at conclusions using the scientific method.
- Make informed judgments about science-related topics.
- Develop a scientific vocabulary.

Table of Contents

Pre-professional Core Content

Content reflects educational content the professional community supports as essential for readiness to enter the radiography profession.

Introduction to Medical Imaging and Radiologic Sciences and Health Care

Objectives:

- Recognize and discuss medical procedures and terminology.
- Analyze medical reports, orders, and requests.
- List medical imaging, radiologic sciences, and other health professions.
- Evaluate evidence-based health care practices.
- Describe health care environments, organizations, and regulatory agencies.
- Discuss radiology organization and staffing.
- Explain professional credentialing and the associated organizations.
- Demonstrate professional development and advancement.

Content:

I. Medical Terminology

A. The word-building process
   1. Root words
   2. Prefixes
   3. Suffixes
   4. Combination forms

B. Translation of medical terms into layman's terms

C. Correct pronunciation of medical terms

D. Correct spelling of medical terms

E. Medical abbreviations and symbols
   1. Abbreviations
      a. Examples
      b. Interpretations
      c. Restrictions (e.g., The Joint Commission's "Do Not Use" list)
   2. Pharmaceutical symbols and terms

II. Procedures and Terminology

A. Radiography

B. Other imaging modalities

C. Radiation oncology

D. Surgery

III. Orders, Requests, and Diagnostic Reports

A. Procedure orders and requests
    1. Patient identification
    2. Procedures ordered
    3. Patient history
    4. Clinical indications
    5. Ordering physician/provider

B. Diagnostic reports
    1. Content
    2. Interpretation

IV. Health Professions

A. Medical imaging and radiologic sciences
    1. Applications specialist
    2. Bone densitometry
    3. Breast sonography
    4. Cardiac-interventional radiography
    5. Clinical leadership
    6. Computed tomography
    7. Diagnostic medical sonography
    8. Diagnostic radiography
    9. Echocardiography
    10. Education
    11. Health physics
    12. Imaging informatics
    13. Magnetic resonance imaging
    14. Mammography
    15. Medical dosimetry
    16. Medical physics
    17. Molecular imaging
    18. Multi-credentialed
    19. Nuclear medicine advanced associate
    20. Nuclear medicine technology
    21. Quality management
    22. Radiation therapy
    23. Radiologist assistant
    24. Research
    25. Vascular sonography
    26. Vascular-interventional radiography

B. Other health professions

V. Interprofessional Practice & Education

A. Interprofessional education
B. Collaborative practice

VI. Evidence-based Practice

VII. Health Care Environment

A. Health care settings
   1. Hospitals
   2. Clinics/pain clinics
   3. Mental health facilities
   4. Long-term/residential facilities
   5. Hospice
   6. Outpatient/ambulatory care
   7. Free Standing Imaging Center (e.g. general, women's, and vascular)
   8. Home health care
   9. Telehealth
   10. Other (e.g., jails, prisons, medical examiner offices)

B. Payment/reimbursement systems
   1. Self-pay
   2. Insurance
   3. Government programs

VIII. Health Provider Organization

A. Mission

B. Vision

C. Values

D. Administrative services
   1. Governing board
   2. Administrative services
   3. Admissions
   4. Information systems
   5. Procurement
   6. Accounting
   7. Support services
   8. Human resources

E. Medical services
   1. Physicians
   2. Clinical services
   3. Clinical support services

IX. Accreditation

A. Health care institutions (e.g., The Joint Commission)

B. Modalities (e.g., ACR)

C. Educational
   1. Programmatic accreditation (e.g., Joint Review Committee on Education in Radiologic Technology [JRCERT])
   2. Regional
   3. Other

X. Regulatory Agencies

A. Federal

B. State

XI. Radiology Organization

A. Professional personnel
   1. Administrators/managers
   2. Radiologists
   3. Radiologic technologists
   4. Radiologist assistants
   5. Radiology nurses
   6. Medical physicists
   7. Other medical imaging and radiologic sciences professionals

B. Support personnel
   1. Information technology staff
   2. Administrative personnel
   3. Other (e.g., patient transporters, aides)

C. Educational personnel
   1. Program director
   2. Clinical coordinator
   3. Didactic faculty
   4. Adjunct faculty
   5. Clinical preceptor
   6. Clinical staff

XII. Professional Credentialing

A. National certification and registration (e.g., American Registry of Radiologic Technologists [ARRT])

B. State licensure

XIII. Professional Organizations

A. Purpose, function and activities

B. Types
   1. Local
   2. State
   3. National
   4. International
   5. Other (e.g., student)

XIV. Professional Development and Advancement

A. Required
   1. Continuing education
   2. Continuing qualifications requirements (CQR)

B. Clinical experience

C. Continuing education opportunities
   1. Postprimary certification
   2. Collegiate/educational programs
   3. Self-learning activities
   4. Professional conferences
   5. Webinars
   6. Other (e.g., vendor programs)

D. Employment considerations
   1. Geographic mobility
   2. Economic factors
   3. Workforce needs

E. Advancement opportunities
   1. Administration
   2. Advanced practice
   3. Education
   4. Industrial
   5. Medical informatics
   6. Medical physics
   7. Research
   8. Sales/applications
   9. Safety Officer

Ethics and Law in Medical Imaging and Radiologic Sciences

Objectives:

- Describe the basis of ethics and characteristics of ethical behavior.
- List ethical dilemmas and ethically-complex areas of health care and medical imaging.
- Discuss the basis of law and major legal concerns in health care.
- Explain the types of consent, as well as the conditions and documentation of consent.

Content

I. Ethics and Ethical Behavior

A. Origins and history of ethics

B. Ethical principles

C. Moral reasoning

D. Personal behavior standards

E. Competence

F. Professional attributes

G. Standards of practice

H. Standards of professional ethics

I. Systematic analysis of ethical problems

J. Ethical violations and sanctions

K. American Hospital Association (AHA) Patient Care Partnership (Patients' Bill of Rights)

II. Ethical Dilemmas

A. Individual and societal rights

B. Cultural considerations

C. Economic considerations

D. Technology

E. Resource scarcity

F. Access to quality health care

G. Human experimentation and research

H. Diversity, equity, and inclusion

I. End-of-life

J. Ethics committee
   1. Structure
   2. Goals
   3. Function

K. Ethical conduct of research
   1. Historical events
   2. Institutional review board
   3. Data collection
   4. Data reporting

L. Ethical dilemmas in medical imaging
   1. Image cropping or masking
   2. Electronic annotations
   3. Manipulation of metadata
   4. Manipulation of electronic data (e.g., exposure indicator, processing algorithm, brightness, contrast)
   5. R/L electronic markers
   6. ALARA
      a. Dose creep
      b. Manipulation of exposure indicators

III. Legal Issues

A. Sources of law

B. Parameters of legal responsibility

C. HIPAA
   1. Confidentiality of patient medical records (written and electronic)
   2. Electronic communication (e.g., cell phones, social networking sites, email, photography)

D. Tort law (e.g., negligence)

E. Criminal law

F. American Hospital Association (AHA) Patient Care Partnership

1. Privacy
2. Access to information
3. Living will, health care proxy, advanced directives

IV. Legal Doctrines and Standards

A. Legal risk reduction and risk management

B. Health records
   1. Timely, accurate, and comprehensive methods of documentation
   2. Radiographic images as legal documents
   3. Manipulation of electronic data

V. Patient Consent

A. Definition

B. Types (e.g., informed, oral, implied)

C. Conditions for valid consent

D. Documentation of consent

E. Consent revocation

F. Patient Rights and Responsibilities

G. Patient restraints

Patient Care and Services in the Medical Imaging and Radiologic Sciences

Considerations
Before the introduction of this educational content, students should complete patient safety training (including CPR and basic life support [BLS] for health professionals certification), and be familiar with the anatomy and physiology of the circulatory and excretory systems.

Regulations of R.T. practice vary by state and institution. However, the official position of the American Society of Radiologic Technologists is that the content of the ASRT Practice Standards should be included in educational programs, regardless of the limitations of the state or institution where the curriculum is taught.
In states or institutions where students are permitted to perform intravenous injections, the educational program has ethical and legal responsibilities to the patient and the student. The student shall be assured that:

- Legal statutes allow student radiographers to perform venipuncture.
- Professional liability coverage is adequate.
- Adequate supervision is provided.
- Appropriate, structured laboratory objectives are identified.
- Evaluation of competency occurs before venipuncture is performed unsupervised.

Objectives:

- Recognize the members of the health care team and their responsibilities.
- Describe the elements of professionalism in health care, including attitudes, communication techniques, and psychological aspects of patient care.
- Apply environmental, occupational, and patient safety techniques.
- Evaluate patient health using vital signs, laboratory tests, pain assessments, and patient records.
- Discuss the types, characteristics, and spread of infectious pathogens.
- Demonstrate infection control practices, procedures, and equipment.
- Identify and respond to medical emergencies.
- Recognize and accommodate traumatic injuries.
- Explain drug classifications, naming, routes of administration, and safety practices.
- List drug categories relevant to radiography.
- Describe types of contrast agents and their application.
- Demonstrate safe venipuncture technique and management of tubes, catheters, lines, and other interventional medical devices.

Content

I. Health Care Team

A. Responsibilities of the health care facility

1. Care for all patients

2. Promote health
3. Prevent illness
4. Education
5. Research

B. Members and responsibilities (e.g. physicians, nurses, allied health professionals, etc.)

C. Responsibilities of the radiographer
   1. Perform radiographic examination
   2. Perform patient care and assessment
   3. Adhere to radiation protection guidelines
   4. Follow practice standards
   5. Assist the radiologist or radiologist assistant (R.R.A.)

II. Professionalism in Patient Care

A. Health and illness continuum

B. Diversity, equity, and inclusion

C. Emotional intelligence
   1. Self-awareness
   2. Self-regulation
   3. Motivation
   4. Empathy
   5. Social skills

D. Developing professional attitudes
   1. Teamwork
   2. Work ethic
   3. Health role model
   4. Sympathy
   5. Compassion
   6. Assertiveness

E. Age- and generation-specific communication
   1. Neonates
   2. Adolescents
   3. Young adults
   4. Middle adults
   5. Geriatrics

F. Communication
   1. Verbal
   2. Nonverbal
   3. Language and cultural variations

4. Accessibility
    a. Hearing, vision, and speech impairments
    b. Neurological impairments
    c. Developmental impairments
    d. Altered states of consciousness
    e. Human diversity
    f. Artificial speech
5. Other factors that impede communication
    a. Colloquialisms and slang
    b. Medical terminology
6. Patient interactions
    a. Eye contact
    b. Volume and speed of speech
    c. Hand gestures
    d. Effective listening
    e. Feedback
    f. Cultural sensitivity
7. Communication with families or authorized representatives
8. Communication with other health care professionals (e.g. SBAR, TeamSTEPPS)

G. Psychological considerations
1. Dying and death
    a. Understanding the process
    b. Aspects of death
        1) Emotional
        2) Personal
        3) Physical
    c. Grief and counseling
    d. Patient support services
        1) Family and friends
        2) Pastoral care
        3) Patient-to-patient support groups
        4) Psychological support groups
        5) Hospice
        6) Home care
2. Patient's emotional responses
    a. Age
    b. Gender
    c. Marital/family status
    d. Socioeconomic factors
    e. Cultural and religious variations
    f. Physical condition
    g. Self-image
    h. Past health care experiences
    i. Beliefs

j. Attitudes
k. Prejudices
l. Self-awareness

III. Patient/Radiographer Interactions

A. Patient identification methods
1. Interviewing and questioning
2. Chart/requisition
3. Wrist bands
4. Institution-specific

B. Procedure explanation
1. Positioning
2. Length of procedure
3. Immobilization devices
4. Equipment movement/sounds
5. Pre and postexposure instructions

C. Interactions with patient's family members, friends, or authorized representatives

IV. Safety and Transfer

A. Environmental safety
1. Fire
2. Electricity
3. Hazardous materials
   a. Chemicals
   b. Chemotherapy agents
4. Radioactive materials
5. Personal belongings
6. Occupational Safety and Health Administration (OSHA)
7. Environmental Protection Agency (EPA)

B. Body mechanics
1. Body alignment
2. Movement techniques

C. Patient transfer and movement
1. Assessing patient mobility
2. Rules for safe patient transfer
3. Positioning for safety, comfort, or exams
4. Wheelchair transfers
5. Stretcher transfers
   a. Sheet transfer
   b. Log roll
   c. Transfer devices

D. Fall prevention

E. Patient positions
   1. Supine
   2. Prone
   3. Decubitus
   4. Oblique
   5. Fowler's
   6. Semi-Fowler's
   7. Sims'
   8. Trendelenburg
   9. Lithotomy

F. Safety and immobilization
   1. Types
   2. Applications
   3. Devices
      a. Adult
      b. Pediatric

G. MR safety

H. Incident reporting
   1. Legal considerations
   2. Documentation
   3. Procedures

V. Evaluating Patient Needs

A. Social determinants of health

B. Assessing patient status
   1. Evaluation methodology
   2. Clinical information

C. Vital signs
   1. Temperature
   2. Pulse
   3. Pulse oximetry
   4. Respiration
   5. Blood pressure
   6. Normal ranges and values
   7. Interfering factors
   8. Adult vs. pediatric
   9. Acquiring and recording vital signs

a. Procedures
b. Demonstration

D. Laboratory tests
1. Blood urea nitrogen (BUN)
2. Creatinine
3. Glomerular filtration rate (GFR)
4. Hemoglobin
5. Red blood cells (RBCs)
6. Platelets
7. Oxygen (O_2) saturation
8. Prothrombin
9. Partial thromboplastin time

E. Patient Record
1. Elements of a patient record
2. Retrieving specific information
3. Documentation in the chart

F. Pain Assessment
1. Description
2. Intensity
3. Location
4. Duration
5. Aggravating and alleviating factors

VI. Infection Control

A. Infectious pathogens
1. Types
2. Hospital-acquired
3. Communicable
4. Multidrug-resistant organisms (MDRO)
5. Other

B. Centers for Disease Control and Prevention (CDC)
1. Purpose
2. Publications and bulletins

C. Cycle of infection
1. Reservoir of infection
2. Susceptible host
3. Transmission of disease
a. Direct
b. Indirect
c. Routes (e.g., bloodborne, airborne)

D. Preventing disease transmission
    1. Transmission-based precautions
    2. Health care worker protection
        a. Immunization
        b. Booster
        c. Post-exposure protocols

E. Asepsis
    1. Medical
        a. Hand washing
        b. Chemical disinfectants
    2. Surgical
        a. Growth requirements for microorganisms
        b. Methods used to control microorganisms
            1) Moist heat
            2) Dry heat
            3) Gas
            4) Chemicals
            5) Radiation
        c. Procedures
            1) Opening packs
            2) Gowning/gloving
            3) Skin preparation
            4) Draping
            5) Dressing changes
        d. Packing
        e. Storage
        f. Linen

F. Isolation techniques and communicable diseases
    1. Category-specific
    2. Disease-specific
    3. Standard precautions

G. Procedure
    1. Gowning
    2. Gloving
    3. Masking
    4. Patient transfer
    5. Cleaning and disposal of contaminated waste
    6. Cleaning image receptors and imaging equipment

H. Precautions for the compromised patient (reverse isolation)
    1. Purpose

2. Procedure

I. Psychological considerations

VII. Medical Emergencies

A. Emergency equipment

B. Latex reactions

C. Shock
   1. Signs and symptoms
   2. Types
      a. Hypovolemic
      b. Distributive
         1) Anaphylactic
         2) Neurogenic
         3) Septic
      c. Cardiogenic
   3. Medical interventions

D. Diabetic emergencies
   1. Signs and symptoms
   2. Types
      a. Hypoglycemia
      b. Hyperglycemia (ketoacidosis)
      c. Hyperosmolar coma
   3. Medical interventions

E. Respiratory and cardiac failure
   1. Adult vs. pediatric
   2. Signs and symptoms
   3. Equipment
   4. Medical interventions

F. Airway obstruction
   1. Signs and symptoms
   2. Medical interventions

G. Cerebrovascular accident (stroke)
   1. Signs and symptoms
   2. Medical interventions

H. Fainting and convulsive seizures
   1. Signs and symptoms
   2. Types

a. Nonconvulsive (petit mal)
b. Convulsive (grand mal)
3. Reasons for fainting
4. Medical interventions

I. Other medical conditions
1. Epistaxis
2. Nausea
3. Postural hypotension
4. Vertigo
5. Asthma

VIII. Trauma

A. Head injuries
1. Glasgow coma scale
2. Symptoms
3. Medical interventions

B. Spinal injuries
1. Assessment
2. Symptoms
3. Medical interventions
4. Transportation

C. Fractures
1. Types
2. Symptoms
3. Orthopedic devices
4. Positioning

D. Wounds
1. Symptoms
2. Medical interventions

E. Burns
1. Classifications
2. Medical interventions

IX. Drug Nomenclature

A. Chemical name

B. Generic name

C. Trade/brand name

X. Drug Classification

A. Chemical group

B. Mechanism and site of action

C. Primary effect

XI. General Pharmacologic Principles

A. Pharmacokinetics

B. Pharmacodynamics

C. Pharmacogenetics

XII. Six Rights of Drug Safety

A. The right medication

B. The right dose

C. The right patient

D. The right time

E. The right route

F. The right documentation

XIII. Drug Categories Relevant to Radiography (uses and effects)

A. Analgesics

B. Anesthetics

C. Antianxiety drugs

D. Antiarrhythmics

E. Antibacterial drugs

F. Anticholinergics

G. Anticoagulants

H. Anticonvulsants

I. Antidepressants

J. Antidiabetics

K. Antiemetics

L. Antihistamines

M. Antihypertensive drugs

N. Anti-inflammatory drugs

O. Antiseptic and disinfectant agents

P. Antiviral drugs

Q. Bronchodilators

R. Cathartic and antidiarrheal drugs

S. Coagulants

T. Corticosteroids

U. Diuretics

V. Hormones

W. Laxatives

X. Sedatives and hypotonic drugs

Y. Vasodilators and vasoconstrictors

XIV. Contrast Agents

A. Types of contrast agents
   1. Metallic salts
   2. Organic iodides
      a. Ionic contrast agents
      b. Nonionic contrast agents
   3. Gases

B. Beam attenuation characteristics
   1. Radiolucent (negative)
   2. Radiopaque (positive)
   3. Effect of atomic number

C. Pharmacologic profile
   1. Chemical composition
   2. Absorption
   3. Distribution
   4. Metabolism
   5. Elimination
   6. Indications
   7. Effects
   8. Interactions and contraindications
   9. Patient reactions

D. Appropriateness to examination
   1. Patient condition (e.g., perforated bowel)
   2. Patient age and weight
   3. Laboratory values (e.g., BUN, creatinine, eGFR)
   4. Check for allergies
   5. Contrast media dose calculation

E. Preparation

F. Reactions to Contrast Agents
   1. Signs
   2. Symptoms
   3. Medical intervention

XV. Routes of Drug Administration

A. Enteral
   1. Sublingual
   2. Buccal
   3. Rectal

B. Tube or catheter

C. Inhalation

D. Topical

E. Parenteral
   1. Intravenous
   2. Intra-arterial
   3. Intrathecal
   4. Intramuscular
   5. Subcutaneous
   6. Intradermal

7. Intraosseous

XVI. Pharmacology and Venipuncture

A. Current Practice Status
   1. Professional standards
      a. Scope of practice
      b. Practice standards
      c. Professional liability and negligence
   2. State statutes
   3. Employer policy

B. Methods
   1. Infusion
   2. Intermittent infusion
   3. Direct injection
      a. Hand injection
      b. Automatic power injection

C. Sites of administration
   1. Peripheral
   2. Central

D. Venipuncture procedures
   1. Equipment and supplies
   2. Patient identification, assessment, and instructions
   3. Informed consent
   4. Dosage, dose calculations, and dose-response
      a. Adults
      b. Pediatric patients
   5. Patient preparation
   6. Application of standard precautions
   7. Procedure
      a. Injection through an existing line
      b. Venipuncture
   8. Site observation
   9. Emergency medical treatment procedure
      a. Appropriate codes
      b. Emergency cart (crash cart)
      c. Emergency medications
      d. Accessory equipment
      e. Radiographer's response and documentation

E. Complications
   1. Infiltration
   2. Extravasation

3. Phlebitis
4. Air embolism
5. Drug incompatibility
6. Low fluid level in container

F. Discontinuation
1. Equipment and supplies for withdrawal
2. Patient preparation
3. Application of standard precautions
4. Withdrawal procedure
5. Site observation
6. Patient observation
7. Postprocedural tasks

G. Documentation of administration

H. Technologist's response and documentation

II. Tubes, Catheters, Lines, and Other Devices

A. Function and handling of devices

B. Nasogastric/nasointestinal

C. Endotracheal tube

D. Suction
1. Adult vs. pediatric
2. Special precautions

E. Tracheostomy
1. Suction techniques
2. Cardiopulmonary resuscitation (CPR) with tracheostomy

F. Chest (thoracostomy) tube
1. Purpose
2. Location

G. Implanted devices
1. Types
2. Purpose
3. Location

H. Venous catheters
1. Types
2. Purpose

3. Location
4. Care (e.g., infection control)
5. Access

I. Tissue drains

J. Oxygen administration
   1. Values
   2. Oxygen therapy
   3. Oxygen delivery systems
      a. Low-flow systems
      b. High-flow systems
   4. Special precautions

K. Urinary collection
   1. Procedure
      a. Male
      b. Female
   2. Alternative methods of urinary drainage

L. Ostomies
   1. Types
   2. Purpose
   3. Location
   4. Care
   5. Access

Human Anatomy and Physiology

Objectives:

- Label anatomy using directional terminology, planes of reference, and body cavities.
- Explain the chemical composition of the body, including inorganic and organic compounds.
- Describe cellular structures and genetic processes of cell function and reproduction.
- Define different types of metabolism and related body processes.
- Explain the tissues, divisions, and functions of the body's systems.
- Recognize major sectional anatomy of the body.

Content

I. Anatomical Nomenclature

A. Directional references
   1. Anterior/posterior
   2. Ventral/dorsal
   3. Medial/lateral
   4. Superior/inferior
   5. Proximal/distal
   6. Cephalad/caudad

B. Body planes
   1. Sagittal
   2. Coronal
   3. Transverse (axial/horizontal)
   4. Longitudinal

C. Body cavities (structural limits, function, contents)
   1. Cranial
   2. Thoracic
   3. Abdominal/pelvic

II. Chemical Composition

A. Atoms

B. Chemical bonds

C. Inorganic compounds
   1. Acids
   2. Bases
   3. Salts
   4. Water

D. Organic compounds
   1. Carbohydrates

2. Lipids
3. Proteins
    a. Nucleic acids
    b. DNA
    c. RNA

III. Cell Structure and Genetic Control

A. Cell membranes
1. Chemistry
2. Structure
3. Physiology
4. Transport processes
    a. Diffusion
    b. Osmosis
    c. Filtration
    d. Active transport and physiological pumps
    e. Phagocytosis and pinocytosis

B. Cytoplasm

C. Organelles
1. Nucleus
2. Ribosomes
3. Endoplasmic reticulum
4. Golgi complex
5. Mitochondria
6. Lysosomes
7. Peroxisomes
8. Cytoskeleton
9. Centrosome and centrioles
10. Flagella and cilia

D. Gene action
1. Protein synthesis
2. Nucleic acid (RNA/DNA) synthesis
3. Transcription
4. Translation

E. Cell reproduction
1. Mitosis
2. Meiosis

F. Aberration and abnormal cell division

IV. Metabolism

A. Anabolism

B. Catabolism

C. Enzymes and metabolism

D. Carbohydrate metabolism

E. Lipid metabolism

F. Protein metabolism

G. Regulation and homeostasis

V. Tissues

A. Types
   1. Epithelial
   2. Connective
   3. Muscle
   4. Nerve

B. Tissue repair

VI. Skeletal System

A. Osseous tissue
   1. Structural organization
      a. Medullary cavity/marrow
      b. Compact bone including the Haversian System
      c. Cancellous bone
      d. Periosteum
      e. Cartilage
   2. Development and growth
      a. Physis
      b. Diaphysis
      c. Epiphyseal line
      d. Metaphysis
   3. Classification and features
      a. Long
      b. Short
      c. Flat
      d. Irregular
      e. Processes and bony projections
      f. Depressions and openings

B. Divisions

1. Axial
    a. Skull
    b. Hyoid bone
    c. Vertebral column
    d. Thorax
2. Appendicular
    a. Shoulder girdle
    b. Upper extremities
    c. Pelvic girdle
    d. Lower extremities
3. Sesamoids

C. Functions

D. Joints
1. Types
    a. Synarthroses
    b. Amphiarthroses
    c. Diarthroses
2. Joint Anatomy
    a. Meniscus
    b. Articular cartilage
    c. Synovial membranes
    d. Fibrous membranes
    e. Ligaments
    f. Tendons
3. Articulation

VII. Muscular System

A. Types and characteristics
1. Smooth
2. Cardiac
3. Skeletal

B. Functions

VIII. Nervous System

A. Neural tissue
1. Neurons
2. Neuroglia

B. Central nervous system
1. Brain and cranial nerves
2. Spinal cord

C. Peripheral nervous system
    1. Sympathetic nerves
    2. Parasympathetic nerves

IX. Sensory System

A. General senses
    1. Nociperception
    2. Chemoreception
    3. Thermoreception
    4. Mechanoreception

B. Special senses
    1. Vision
    2. Hearing and equilibrium
    3. Olfaction
    4. Gustation
    5. Tactile

X. Endocrine System

A. Primary organs

B. Homeostatic control

C. Endocrine tissue and related hormones
    1. Pituitary (hypophysis) gland
    2. Pineal gland
    3. Thyroid gland
    4. Parathyroid gland
    5. Adrenal (suprarenal) glands
    6. Heart and kidneys
    7. Digestive system
    8. Pancreas
    9. Testes
    10. Ovaries
    11. Thymus
    12. Placenta

XI. Digestive System

A. Primary organs
    1. Oral cavity
    2. Pharynx
    3. Esophagus
    4. Stomach
    5. Small intestine
    6. Large intestine

B. Accessory organs
    1. Salivary glands
    2. Pancreas
    3. Liver
    4. Gallbladder and biliary tree

C. Digestive processes
    1. Ingestion
    2. Peristalsis
    3. Segmentation
    4. Digestion
    5. Absorption
    6. Defecation

XII. Cardiovascular System

A. Blood
    1. Composition
    2. Clotting system
    3. Hemopoiesis
    4. Function

B. Heart and vessels
    1. Anatomy
    2. Function

C. Electrocardiogram (ECG) tracings

XIII. Lymphatic System and Immunity

A. Lymphatic system
    1. Lymph vessels
    2. Lymph nodes
    3. Lymphatic organs
        a. Thymus
        b. Lymph nodes
        c. Spleen
    4. Lymphatic tissue
        a. Tonsils and adenoids
        b. Peyer's patches

B. Immune system
    1. Nonspecific defenses
        a. Physical barriers
        b. Leukocytes
        c. Immunological surveillance

2. B-cell response
    a. Production
    b. Types of immunoglobulins
    c. Function
    d. Regulation of B-cell response
3. T-cell response
    a. Production
    b. Types
    c. Function
    d. Regulation of T-cell response
4. Passive and active immunity

XIV. Respiratory System

A. Components, structure, and function
1. Nasal and sinus cavities
2. Pharynx
3. Larynx
4. Trachea
5. Bronchi
6. Lungs
7. Thorax

B. Physiology
1. Pulmonary ventilation
2. Alveolar gas exchange
3. Transport of blood gases
4. Tissue gas exchange
5. Control and regulation of respiration

XV. Urinary System

A. Kidneys
1. Macroscopic Anatomy
    a. Renal capsules
    b. Renal cortex
    c. Medulla
2. Microscopic anatomy
    a. Nephrons
    b. Glomerulus
    c. Collecting tubes

B. Ureters

C. Bladder

D. Urethra

E. Urine
   1. Physical characteristics
   2. Chemical composition

F. Micturition

XVI. Reproductive System

A. Male
   1. External organs
   2. Internal organs

B. Female
   1. External organs
   2. Internal organs
   3. Mammary glands

C. Reproductive physiology
   1. Ovarian cycle
   2. Menstrual cycle
   3. Aging and menopause

XVII. Introduction to Sectional Anatomy

A. Head/neck
   1. Brain
   2. Cranium
   3. Major vessels

B. Thorax
   1. Mediastinum
   2. Lung
   3. Heart
   4. Airway
   5. Major vessels

C. Abdomen
   1. Liver
   2. Biliary
   3. Spleen
   4. Pancreas
   5. Kidneys and ureters
   6. Peritoneum
   7. Retroperitoneum
   8. Gastrointestinal (GI) tract
   9. Major vessels

Radiographic Procedures

Objectives:

- Discuss radiographic technique using anatomic, positioning, and projection terminology.
- Evaluate radiographic orders and preparation for procedures.
- Describe patient communication techniques and planning.
- Apply patient positioning techniques for common exams.
- Conduct contrast studies, including patient preparation and positioning.
- Recognize special concerns and techniques for mobile and surgical radiography.

Content

I. Positioning and Projection Terminology

A. Standard terms
   1. Radiographic position
   2. Radiographic projection
   3. Radiographic view
   4. Radiographic method

B. Positioning terminology
   1. Recumbent
   2. Supine
   3. Prone
   4. Lateral
   5. Trendelenburg
   6. Decubitus
   7. Erect/upright
   8. Anterior position
   9. Posterior position
   10. Oblique position

C. General planes
   1. Sagittal or midsagittal
   2. Coronal or midcoronal
   3. Transverse
   4. Longitudinal

D. Skull lines
   1. Glabellomeatal line
   2. Interpupillary line
   3. Orbitomeatal line
   4. Infraorbitomeatal line
   5. Acanthiomeatal line
   6. Mentomeatal line

E. Skull landmarks
   1. Auricular point
   2. Gonion (angle)
   3. Mental point
   4. Acanthion
   5. Nasion
   6. Glabella
   7. Inner canthus
   8. Outer canthus
   9. Infraorbital margin
   10. Occlusal plane
   11. External auditory meatus (EAM)
   12. Mastoid tip
   13. Top of ear attachment (TEA)

F. Surface landmarks
   1. Hyoid bone
   2. Thyroid cartilage
   3. Vertebra prominens
   4. Jugular notch
   5. Sternal angle
   6. Inferior angles of the scapula
   7. Xiphoid process
   8. Inferior costal margin
   9. Superior-most aspect of iliac crest
   10. Anterior superior iliac spine (ASIS)
   11. Pubic symphysis
   12. Greater trochanter
   13. Posterior superior iliac spine (PSIS)

G. Movement and direction terminology
   1. Cephalad/caudad
   2. Inferior/superior
   3. Proximal/distal
   4. Plantar/palmar
   5. Pronate/supinate
   6. Flexion/extension
   7. Abduction/adduction
   8. Inversion/eversion
   9. Medial/lateral

H. Positioning aids
   1. Sponges
   2. Sandbags
   3. Immobilization devices (e.g., tape, Velcro straps, Pigg-O-Stat)

I. Accessory equipment
   1. Lead shields
   2. Lead markers
   3. Image receptor/detector holders
   4. Compensating filters

II. General Considerations

A. Evaluation of radiographic orders
   1. Patient identification (two means)
   2. Verification of procedure(s) ordered
   3. Clinical history and patient assessment
      a. Role of the radiographer
      b. Questioning skills
      c. Chief complaint
      d. Allergy history
      e. Localization
      f. Chronology
      g. Severity
      h. Onset
      i. Aggravating or alleviating factors
      j. Associated manifestations
      k. Special considerations
   4. Exam sequencing

B. Room preparation
   1. Cleanliness, organization, appearance, and safety
   2. Necessary supplies and accessory equipment

III. Patient Considerations

A. Establishing rapport
   1. Patient education
      a. Communication
      b. Common radiation safety issues and concerns
   2. Culture, ethnicity, and diversity
   3. Pregnancy status
   4. Transgender/transitioning patients

B. Patient preparation
   1. Verification of dietary preparation
   2. Verification of medication preparation
   3. Disrobing and gowning
   4. Removal of artifact-causing items

C. Patient assistance

D. Patient monitoring

E. Patient discharge

IV. Positioning Considerations for Routine Radiographic Procedures

A. Patient instructions

B. Special considerations
   1. Atypical conditions procedures
   2. Surgical procedures
   3. Trauma
   4. Cultural awareness
   5. Claustrophobia

C. Study-specific positioning
   1. Skeletal system
      a. Upper extremity
         1) Fingers
         2) Hand
         3) Wrist
         4) Forearm
         5) Elbow
         6) Humerus
      b. Shoulder girdle
         1) Shoulder joint
         2) Scapula
         3) Clavicle
         4) Acromioclavicular joints
      c. Lower extremity
         1) Toes
         2) Foot
         3) Ankle
         4) Calcaneus
         5) Tibia/fibula
         6) Knee/Patella
         7) Femur
      d. Pelvic girdle
         1) Pelvis
         2) Hip
      e. Vertebral column
         1) Cervical
         2) Thoracic
         3) Lumbar
         4) Sacrum

5) Coccyx
6) Sacroiliac joints

f. Bony thorax
1) Ribs
2) Sternum
3) Sternoclavicular joints

g. Cranium
1) Skull
2) Facial bones
3) Nasal bones
4) Orbits
5) Mandible
6) Temporomandibular joints
7) Paranasal sinuses

h. Special studies
1) Bone survey
2) Long bone measurement
3) Bone age
4) Foreign body
5) Scoliosis survey
6) Myelography
7) Arthrography

2. Respiratory system
a. Upper airway/soft tissue neck
b. Chest

3. Abdominal viscera
a. Abdomen and gastrointestinal (GI) series
b. Urological studies

V. Procedural Considerations for Contrast Studies

A. Patient education
1. General procedure
2. Patient preparation
3. Follow-up care

B. Indications and contraindications

C. Equipment and materials

D. General procedure and follow-up care

E. Patient and body part positioning

F. Structures and functions demonstrated

G. Positioning for abdomen, GI, and GU studies
    1. Abdomen and GI studies
        a. Abdomen
        b. Esophagus
        c. Swallowing dysfunctional study
        d. Upper GI series (single or double contrast)
        e. Small bowel series
        f. Contrast enema (single or double contrast)
        g. Surgical cholangiography
        h. Endoscopic retrograde cholangiopancreatography (ERCP)
    2. Positioning for GU studies
        a. Cystography
        b. Cystourethography
        c. Intravenous urography
        d. Retrograde urography
        e. Hysterosalpingography

VI. Mobile and Surgical Radiography

A. Verify order prior to bedside procedure

B. Steps for bedside procedure
    1. Standard procedure
    2. Neonates
    3. Orthopedic patients

C. Radiography in surgery
    1. Surgical clothing
    2. Equipment preparation
    3. Sterile field awareness
    4. Communication skills

D. Radiation protection
    1. Patient
    2. Radiographer
    3. Other

Radiographic Pathology

Objectives:

- Define common terms related to pathology.
- Describe the causes of disease.
- Explain radiologic pathology, including body systems, complications, and procedural considerations.
- Discuss the relevance of pathology to radiographic procedures.

Content

I. Definitions/Terminology

A. Pathology

B. Disease
   1. Acute
   2. Chronic

C. Pathogenesis

D. Etiology

E. Diagnosis
   1. Signs (objective)
   2. Symptoms (subjective)

F. Prognosis

G. Manifestations of pathology

H. Incidence

I. Prevalence

J. Morbidity

K. Mortality

L. Epidemiology

II. Causes of Disease (Process, Examples)

A. Pathological

B. Traumatic

C. Surgical

D. Healing process

E. Complications

F. Genetics vs. heredity

G. Congenital

III. Radiologic Pathology

A. Body systems
   1. Skeletal
   2. Digestive
   3. Respiratory
   4. Urinary
   5. Reproductive
   6. Circulatory/cardiovascular
   7. Endocrine
   8. Nervous

B. Definitions

C. Etiology

D. Sites

E. Complications

F. Prognosis

G. Radiographic appearance

H. Procedural and technical considerations

I. Appropriate imaging concentration

IV. Implications for Practice

A. Indications for procedure

B. Relevance to radiographic procedures
   1. Technical considerations
   2. Patient considerations

Radiation Physics and Instrumentation

Objectives:

- Describe the structure of atoms and types of radiation.
- Explain x-ray production and the effect of various factors.
- Discuss photon interactions with matter.
- Diagram the elements of the x-ray circuit and x-ray tube.
- Employ radiographic equipment of various types.
- Describe the elements and operation of fluoroscopy systems.
- Apply quality control measures to imaging equipment and accessories.

Content

I. Structure of the Atom

A. Nucleus

B. Subatomic structure

C. Electron shells
   1. Binding energy
   2. Valence shell
   3. Ionization
   4. Excitation

D. Nomenclature
   1. Atomic number
   2. Mass number

II. Nature of Radiation

A. Types of radiation
   1. Electromagnetic
      a. Spectrum
      b. Wave-particle duality
      c. Properties (e.g., frequency, wavelength, energy, velocity)

   2. Particulate

   3. Nonionizing (excitation) vs. ionizing
      a. Energy
      b. Probability

B. Radioactivity
   1. Radioactive decay
      a. Alpha emission
      b. Beta emission

c. Gamma emission
2. Half-life ($T_{½}$)

III. X-Ray Production

A. Historical introduction

B. Target interactions
1. Bremsstrahlung
2. Characteristic
3. Anode heat

C. Describing the x-ray beam
1. Frequency and wavelength
2. Beam characteristics
a. Quality
b. Quantity
c. Primary versus remnant (exit)
3. Leakage radiation
4. Off-focus/stem radiation

D. Conditions for x-ray production
1. Source of free electrons (e.g., thermionic emission)
2. Acceleration of electrons
3. Focusing the electron stream
4. Deceleration of electrons

E. Factors affecting x-ray emission spectrum
1. kVp
2. mA
3. Time
4. Atomic number of target
5. Filtration
6. Generator phase

IV. Photon Interactions with Matter

A. Photon transmission
1. Exit/remnant radiation

B. Types and descriptions
1. Unmodified scattering (coherent or classical)
2. Photoelectric
3. Compton
4. Pair production

C. Probability of photon interactions

1. Atomic number
2. Energy
3. Tissue volume
4. Part thickness

D. Effect on image

E. Patient and operator dose effects

V. X-ray Circuit

A. Electricity
   1. Potential difference
   2. Current
      a. Direct
      b. Alternating
   3. Resistance

B. Electrical safety
   1. Ground
   2. Circuit breaker

C. Transformers
   1. Step-up
   2. Step-down
   3. Autotransformer

D. Components and functions
   1. Operating (control) console
   2. Filament circuit
   3. Tube circuit

E. Rectification
   1. Purpose
   2. Mechanisms

F. High-frequency generators

VI. Radiographic Equipment

A. Fixed units
   1. Components
      a. Tubes
      b. Beam restriction
      c. Tables
      d. Operating (control) console
      e. Tube support systems

f. Wall units
g. Potter-Bucky mechanism
h. Image receptors

2. Equipment operation and manipulation
3. Applications

B. Mobile units
1. Components
a. Tubes
b. Beam restriction
c. Operating (control) console
d. Tube support systems
e. Image receptors

2. Equipment operation and manipulation
3. Clinical applications (e.g. ED, OR, patient rooms)

C. Automatic exposure control (AEC)
1. Radiation detector
a. Ionization chamber
b. Solid state

2. Minimum response time
3. Backup time
4. Alignment and positioning considerations
a. Radiation detector selection
b. Radiation detector configuration
c. Radiation detector sensitivity

5. Compensation issues
a. Contrast agents
b. Patient size
c. Pathology
d. Prosthetics/implants
e. Collimation
f. Image receptor variations

D. Manual exposure control

VII. Diagnostic X-ray Tubes

A. Construction

B. Extending tube life
1. Warm-up procedures
2. Rotor considerations
3. Filament considerations
4. Anode thermal capacity and exposure limits
5. Tube movement

VIII. Fluoroscopy

A. Flat panel detectors
   1. Detective quantum efficiency (DQE)
   2. Modulation transfer function (MTF)
      a. Line spread function (LSF)
      b. Point spread function (PSF)
      c. Edge spread function (ESF)
   3. Contrast-to-noise ratio (CNR)
   4. Binning
   5. File sizes
   6. Data management
   7. Image monitoring
      a. CCD
      b. CMOS

B. Controls
   1. Automatic exposure rate control (AERC)/Automatic brightness control (ABC)
   2. Field of view (FOV)
      a. Magnification
      b. Dose

C. Operation modes
   1. Fluoroscopy (real-time viewing)
      a. Continuous
      b. Pulsed
         1) Pulse width
         2) Pulse height
         3) Pulse interval
         4) Frame rate
         5) Dose rate
         6) Temporal averaging
   2. Fluorography (image recording and storage)
      a. Unsubtracted
      b. Digital subtraction angiography (DSA)
      c. Cine

D. Image viewing
   1. Last-image-hold (LIH)
   2. Last-sequence-display
   3. Display monitors

E. Image quality
   1. Image signal
   2. Signal-to-noise ratio (SNR)

3. Contrast-to-noise ratio (CNR)
4. Resolution
    a. Contrast
    b. Temporal
    c. Spatial

F. Mobile units
1. C-arm
2. Mini C-arm
3. Hand-held
4. O-arm

G. Operation and manipulation
H. Detector elements (DEL) binning

IX. Quality Control of Imaging Equipment and Accessories

A. Radiographic
1. kVp accuracy
2. Filtration and half-value layer (HVL)
3. Exposure reproducibility
4. Exposure linearity
5. Timer accuracy
6. Beam alignment
7. Collimator accuracy
8. SID indicator
9. Image receptors
10. Automatic exposure control (AEC)
11. Display monitors
12. Erasure thoroughness (CR)

B. Fluoroscopic
1. Exposure rate
2. Source-to-skin distance (SSD)
3. Automatic brightness systems (ABS)/Automatic exposure rate control (AERC)
4. kVp accuracy
5. Filtration and half-value layer (HVL)
6. Exposure reproducibility
7. Exposure linearity
8. Focal spot size
9. Beam alignment
10. Collimator accuracy
11. Visual/audible monitors

C. Personnel protective apparel

D. Recognizing and reporting malfunctions

Image Production

Objectives:

- Explain exposure factors and their effect on the final image.
- Describe the image acquisition process and associated errors.
- Recognize the purpose and management of exposure factors.
- Discuss the computer processing and image display process.
- Apply quality management techniques and programs.
- Recognize the mechanisms for transfer, storage, and remote assessment of medical images.
- List common downtime procedures for radiologic technologists.

I. Exposure Factors

A. Milliampere-seconds (mAs)
   1. Beam quantity
   2. Milliamperes (mA)
   3. Time
   4. Direct square law/exposure maintenance formula

B. Kilovoltage peak (kVp)
   1. Beam quality/penetrability
   2. Beam quantity
   3. Subject contrast
   4. 15 percent rule

C. Beam Restriction
   1. Function/purpose
      a. Reduce irradiated tissue volume
      b. Reduce patient dose
      c. Reduce scatter radiation
   2. Types
      a. Manual collimators
      b. Automatic collimators
      c. Cylinders and cones
      d. Ancillary devices (e.g., lead blockers/lead masks)
   3. Collimator components
      a. Lead shutters
      b. Light source

D. Distance
   1. Source-to-image receptor distance (SID)
   2. Source-to-object distance (SOD)
   3. Object-to-image receptor distance (OID)
   4. Inverse square law

5. Anode heel effect

E. Focal spot size

F. Filtration
   1. Total
      a. Inherent
      b. Added
   2. Compensating
   3. Measurement
      a. Aluminum equivalency
      b. Half-value layer (HVL)
   4. Material
      a. Aluminum
      b. Copper
      c. Clear lead

G. Scatter radiation
   1. Production
      a. Collimation
      b. Kilovoltage peak (kVp)
      c. Irradiated tissue
         1) Thickness
         2) Composition
   2. Reduction
      a. Grid
      b. Lead masking

H. Grids
   1. Purpose/mechanism
   2. Construction
   3. Types
      a. Linear
         1) parallel
         2) focused
      b. Crossed
      c. Moving
      d. Stationary
      e. Virtual
   4. Characteristics
      a. Grid radius
      b. Ratio
      c. Frequency
   5. Grid conversion factors
   6. Selection

a. kVp
b. Patient/exam
c. Focal range
d. Alignment latitude
e. Short axis
f. Long axis

7. Grid errors
   a. Off-level
   b. Off-center
   c. Off-focus
   d. Upside down
   e. Moiré effect (aliasing)

II. Image Acquisition

A. Algorithm selection

B. Entrance exposure

C. Absorbed exposure
   1. Differential absorption
      a. Irradiated material (amount and type)
         1) Anatomy
         2) Pathology
   2. Beam quality

D. Remnant exposure
   1. Exposure indicators
   2. Deviation index
   3. Air kerma (K indicators)

E. Image receptors
   1. Direct conversion
   2. Indirect conversion
      a. Thin film transistor (TFT) arrays
      b. Charge-coupled device (CCD)
      c. Complementary metal oxide semiconductor (CMOS) systems
   3. Photostimulable phosphor (PSP) plate
   4. Evaluation of characteristics
      a. Detective quantum efficiency (DQE)
      b. Modulation transfer function (MTF)
         1) Line spread function (LSF)
         2) Point spread function (PSF)
         3) Edge spread function (ESF)
      c. Spatial resolution
      d. Bit depth
   5. Detector element (DEL)

a. Size
b. Fill factor
c. Pitch

F. Analog-to-digital conversion/data extraction
1. Sampling frequency
2. Quantization

III. Image Acquisition Errors

A. Histogram analysis errors
1. Incorrect anatomic menu selection
2. Exposure field recognition
a. Collimation border recognition
b. Exposure field distribution (segmentation error)
3. Unexpected material in data set (e.g., metal)
4. Overexposure/saturation
5. Underexposure/starvation

B. Low-intensity radiation response
1. Accumulated background radiation
2. Image retention (e.g., ghosting)

IV. Exposure Factor Formulation

A. Purpose
1. Exposure standardization
2. Patient exposure reduction

B. Technique charts
1. Fixed kVp/variable mAs
2. Variable kVp/fixed mAs

C. Automated systems
1. Automatic exposure control
2. Anatomically programmed technique

D. Other considerations
1. Casts
2. Pathology
3. Age
4. Part size
5. Body mass index
6. Contrast media
7. Grids
8. Distance

V. Computer Preprocessing

A. Histogram
   1. Creation and analysis
   2. Values of Interest (VOI)
   3. Automatic rescaling
   4. Look-up table (LUT) application

B. Automatic Electronic Masking

VI. Image Display

A. Characteristics
   1. Aspect ratio
   2. Spatial resolution
      a. Matrix size
      b. Pixel dimensions
         1) Size
         2) pitch
   3. Contrast resolution
   4. Luminance
      a. Pixel intensity
      b. Color

B. Viewing conditions
   1. Ambient lighting (peripheral glare)
   2. Viewing angle/on-axis viewing (viewing direction)
   3. Veil glare

C. Types
   1. Liquid crystal displays (LCD)
   2. Light emitting diodes (LED)
   3. Active matrix arrays (e.g., AMOLED)

D. Operator Processing (postprocessing)
   1. Windowing
      a. Display brightness (window level)
      b. Display contrast (window width)
   2. Spatial domain processing
      a. Look-up table (LUT) reprocessing
      b. Equalization
   3. Spatial frequency processing
      a. Low-frequency (smoothing)
      b. High-frequency (edge enhancement)
   4. Image reformatting
      a. Electronic masking
      b. Magnification/zoom/pan
      c. Rotation

d. Image flip (inversion)
e. Region of interest (ROI)
f. Field of view (FOV)

.

VII. Quality Management

A. Continuous quality improvement (CQI)
1. Standards for quality
2. Communications
3. Quality management manual
4. Responsibility and administration
5. Test equipment, procedures, and training
6. Record-keeping
7. Test review
8. Evaluation
9. Continuing education

B. Quality assurance and maintenance
1. Image quality control
   a. Exposure indicator accuracy
   b. Image integrity
2. Image receptor systems
   a. Image receptor maintenance
      1) Cleaning and inspection
      2) Erasure
   b. Equipment calibration
   c. Uniformity
   d. Spatial resolution
3. Image display systems
   a. Care and maintenance
   b. Grayscale standard display (e.g., SMPTE)
   c. Luminance
   d. Spatial resolution
   e. Contrast resolution
   f. Veiling glare
4. Reject analysis
5. Patient exposure monitoring
6. Service engineer and/or medical physicist responsibilities
   a. Notification process
   b. Preventive maintenance
7. Involvement in quality control

C. Benefits
1. Patient safety
2. Reduced radiation exposure
3. Efficacy of patient care

4. Departmental efficiency
5. Consistent image quality
6. Cost-effectiveness

VIII. Image Informatics and Archiving

A. System architecture
   1. Enterprise imaging
   2. Image distribution and viewing
   3. Integrating the healthcare enterprise (IHE)
   4. Health level seven standard (HL7)
   5. Cloud-based computing
   6. Database health monitoring
   7. Cybersecurity

B. Network connectivity
   1. Information management
      a. Hospital/health information system (HIS)
      b. Radiology information system (RIS)
      c. Electronic medical record (EMR)/electronic health record (EHR)
   2. Network architecture
      a. Network protocols
      b. Transmission protocols
      c. Network components
      d. Network configuration

C. Data file
   1. Raw data
   2. Image data

D. Medical image management and processing system (MIMPS) (formerly picture archiving and communication system [PACS])
   1. System components and functions
   2. Emergency contingency plan
   3. Digital imaging and communication in medicine (DICOM) standards
   4. Technologist responsibilities
      a. Accessing work order (worklist)
      b. Postprocessing (e.g. image operation and manipulation)
      c. Annotation issues
      d. Image transmission
      e. HIPAA
      f. Workflow
      g. Metadata

E. Medical image storage and communications devices
   1. Architectures
      a. Network attached storage (NAS)

b. Storage area network (SAN)
c. Direct attached storage (DAS)

2. Archive media and management
   a. Short-term digital memory (Redundant array of independent discs [RAID])
   b. Long-term
      1) Optical discs
      2) Tapes
3. Vendor neutral archives (VNA)
4. DICOM storage considerations
   a.Service object pair (SOP) digital image storage
      1) Digital image compression
         a) Types of compression
            (1) Lossless
            (2) Lossy
         b) Compression ratios

IX. Teleradiology

X. Downtime Procedures

A. Patient scheduling

B. Order creation

C. Image acquisition

D. Image processing

E. Image informatics and archiving

F. Post-downtime data entry

G. Review and quality control

Image Analysis

Objectives:

- List image appearance standards.
- Justify the need for imaging standards.
- Explain technical, procedural, and clinical factors affecting image appearance.
- Recognize patient-related and equipment-related artifacts.
- Describe corrective actions that can be taken to improve image appearance.

Content

I. Image Appearance Standards

A. Establishing appearance standards
   1. Exam demands
   2. Visual acuity and perception
   3. Image viewing conditions
   4. Radiologist preferences and demands

B. Maintaining appearance standards (QA program)

II. Imaging Standards

A. Purpose

B. Problem-solving process

C. Role of the radiologic technologist
   1. Determining cause of problems
   2. Corrective actions
      a. Recommending
      b. Implementing

D. Establishing acceptable limits

III. Technical Factors

A. Brightness

B. Contrast (grayscale)
   1. Subject contrast
   2. Latent image contrast (raw image contrast)
   3. Displayed image contrast (processed image contrast)

C. Noise
   1. Random (e.g., quantum mottle, scatter)
   2. Electronic (e.g., electronic interference, detector malfunction, software)
   3. Quantum

4. System
5. Background

D. Signal-to-noise ratio (SNR)

E. Contrast-to-noise ratio (CNR)

F. Gross exposure errors (e.g., saturation, loss of contrast)

G. Spatial resolution
   1. Temporal resolution
   2. Geometric resolution
   3. Image receptor resolution

H. Distortion
   1. Shape
      a. Foreshortening
      b. Elongation
   2. Size
      a. Source-to-image receptor distance (SID)
      b. Source-to-object distance (SOD)
      c. Object-to-image receptor distance (OID)

I. Contrast resolution

III. Procedural Factors

A. Image identification
   1. Patient information
   2. Date of examination
   3. Lead markers
   4. Institutional data

B. Positioning
   1. Anatomical considerations
      a. Anatomy of interest
      b. Plane/baseline reference
      c. Central ray
         1) Location
         2) Angulation
      d. Anatomical variations
      e. Body habitus
      f. Pathology
   2. Positioning aids

C. Radiation protection

1. Collimation
2. Shielding
3. Repeated images

IV. Clinical Factors

A. Contrast agents

B. Pre-examination preparation

V. Artifacts

A. Patient-related

B. Equipment-related
   1. Digital
   2. Display monitor

VI. Equipment Malfunction

VII. Corrective Action

A. Technical factors

B. Procedural factors

C. Artifacts

D. Equipment malfunction

Radiation Biology and Health Physics

Objectives:

- Describe basic cellular biology and the molecular effects of ionizing radiation.
- Recognize the various health effects of radiation exposure.
- Explain variations in cell radiosensitivity and response.
- List the units and measures used to evaluate radiation exposure.
- Discuss the agencies and regulations involved in radiation safety.
- Outline the elements of a personnel monitoring program.
- Identify radiation protection tools and methods.
- Apply personnel and patient radiation protection techniques.

Content

I. Introduction

A. Molecules
   1. Ionic bonds
   2. Covalent bonds

B. Cellular biology
   1. Cellular structure
      a. Cell membranes
      b. Cytoplasm
      c. Protoplasm
      d. Organelles
      e. Nuclei
   2. Cellular function
      a. Cell chemistry
      b. Metabolism
      c. Organic and inorganic compounds
   3. Cell proliferation
      a. Cell cycle
      b. Mitosis
      c. Meiosis
      d. Differentiation

C. Types of ionizing radiation
   1. Electromagnetic radiation
      a. X-rays
      b. Gamma rays
   2. Particulate radiation
      a. Alpha
      b. Beta
      c. Neutrons
      d. Protons

D. Sources of medical radiation exposure
    1. Diagnostic radiology
    2. Computed tomography (CT)
    3. Cardiac interventional radiology
    4. Vascular-Interventional radiology
    5. Nuclear medicine
    6. Radiation oncology

E. Other sources of radiation exposure

II. Radiation Energy Transfer

A. Molecular effects of radiation
    1. Direct effect
        a. Target theory
            1) Target molecules
            2) Cell death
    2. Indirect effect
        a. Radiolysis of water

B. Factors affecting energy transfer
    1. Linear energy transfer (LET)
    2. Relative biological effectiveness (RBE)
    3. Factors influencing RBE
        a. Linear energy transfer (LET)
        b. Oxygen enhancement ratio (OER)

III. Radiation Effects

A. Subcellular radiation effects
    1. Radiation effects on DNA
        a. Types of damage
        b. Implications for humans
    2. Radiation effects on chromosomes
        a. Types of damage
        b. Implications for humans

B. Cellular radiation effects
    1. Types of cell death
        a. Interphase death
        b. Mitotic (genetic) death
    2. Other effects
        a. Mitotic delay
        b. Reproductive failure
        c. Interference of function

C. Individual radiation effects
    1. Somatic effects
        a. Short-term
        b. Long-term
        c. Stochastic (probabilistic) effects
        d. Nonstochastic (deterministic) effects/tissue reactions
    2. Embryo and fetal effects

D. Factors influencing radiation response

IV. Radiosensitivity and Response

A. Law of Bergonié and Tribondeau
    1. Differentiation
    2. Mitotic rate
    3. Metabolic rate

B. Cell survival and recovery
    1. Factors influencing survival
        a. Linear energy transfer (LET)
        b. Relative biologic effect (RBE)
        c. Oxygen enhancement ratio (OER)
        d. Fractionation
        e. Protraction
        f. Age
        g. Chemical agents
        h. Lethal dose and LD_{50}

C. Systemic response to radiation
    1. Hemopoietic
    2. Integumentary
    3. Digestive
    4. Urinary
    5. Respiratory
    6. Reproductive
    7. Muscle
    8. Nervous
    9. Endocrine

D. Radiation dose-response curves
    1. Linear, nonthreshold
    2. Nonlinear, nonthreshold
    3. Linear, threshold
    4. Nonlinear, threshold

E. Total body irradiation

1. Acute radiation syndrome
    a. Hemopoietic
    b. Gastrointestinal
    c. Central nervous system
2. Stages of response and dose levels
3. Factors that influence response
4. Medical interventions of response

F. Late effects of radiation
1. Somatic responses
    a. Mutagenesis
    b. Carcinogenesis
2. Stochastic (probabilistic) effects
3. Non-stochastic (deterministic) effects/tissue reactions
4. Genetic effects
5. Occupational risks for radiation workers

G. Risk estimates
1. Relative
2. Excess
3. Absolute

V. Introduction to Health Physics

A. Justification for radiation protection
1. Somatic effects
2. Genetic effects

B. Potential biological damage of ionizing radiation
1. Stochastic (probabilistic) effects/tissue reactions
2. Nonstochastic (deterministic) effects/tissue reactions
3. Tissue reactions

C. Objectives of a radiation protection program
1. Documentation
2. Occupational and nonoccupational dose limits
3. ALARA concept (personnel protection)
4. Comparable risk
5. Negligible individual dose (NID)
6. Sources of radiation
    a. Natural
    b. Man-made (artificial)

D. Legal and ethical responsibilities

VI. Units, Detection, and Measurement

A. Système International d'Unités (SI Units)
   1. Exposure - Coulomb/kilogram (C/kg)
   2. Absorbed dose - Gray (Gy_t)
   3. Air kerma (Gya)
   4. Dose equivalent - Sievert (Sv)
   5. Effective dose- Sievert (Sv)
   6. Radioactivity - Becquerel (Bq)

B. Dose documentation and reporting
   1. U.S. Nuclear Regulatory Commission (NRC) Regulations (10 Code of Federal Regulations [CFR]) Part 20 Standards for Radiation Protection
   2. National Council on Radiation Protection and Measurements (NCRP) Guidelines
      a. Dose quantities
         1) Effective dose (E)
         2) Collective effective dose (S)
         3) Average effective dose to an individual in a group exposed to a specific source (Eexp)
         4) Effective dose per individual in the U.S. population whether exposed to the specific source or not (EUS)

C. Radiation detection devices
   1. Area monitors
   2. Personal detection devices

D. Dose area product (DAP) meter
   1. Parameters
   2. Interpretation

VII. Surveys, Regulatory/Advisory Agencies, and Regulations

A. General survey procedures
   1. Qualified expert
   2. Records

B. Equipment survey
   1. Conditions
   2. Radiographic and fluoroscopic equipment

C. Area survey
   1. Controlled and uncontrolled areas
   2. Conditions
   3. Recommendations
   4. “Radiation Area” sign posting
   5. Monitors

D. Regulatory agencies

1. Nuclear Regulatory Commission (NRC)
2. Food and Drug Administration (FDA)
3. Environmental Protection Agency (EPA)
4. Occupational Safety and Health Administration (OSHA)
5. State agencies

E. Advisory agencies
   1. International Council on Radiation Protection and Measurements (ICRP)
   2. National Council on Radiation Protection and Measurements (NCRP)
   3. Biological Effects of Ionizing Radiation (BEIR)

F. Radiation safety officer
   1. Qualifications
   2. Responsibilities

VIII. Personnel Monitoring

A. Historical perspective
   1. Evolution of standards
   2. NRC regulations (10 CFR) Part 20 Standards for Radiation Protection
   3. NCRP recommendations
   4. ICRP recommendations

B. Requirements for personnel monitoring
   1. Deep dose equivalent (DDE)
   2. Shallow dose equivalent (SDE)
   3. Eye dose equivalent (EDE)
   4. Total effective dose equivalent (TEDE)

C. Personnel monitors
   1. Types
      a. Thermoluminescent dosimeter (TLD)
         1) Body dosimeter
         2) Ring dosimeter
      b. Optically stimulated luminescent dosimeter (OSLD)
      c. Pocket ionization chamber dosimeter
      d. Digital ionization dosimeter
   2. Proper use

D. Records of accumulated dose
   1. Purpose
   2. Interpretation
   3. Content
   4. Length of recordkeeping
   5. Retrieval from previous employers

E. Effective dose limits
   1. Occupational
   2. Public
   3. Critical organ sites
   4. Embryo and fetus

F. Responsibilities for radiation protection
   1. Radiographer
   2. Radiation safety officer (RSO)
   3. Facility

IX. Application

A. Design
   1. Materials
   2. Primary barrier
   3. Secondary barrier (scatter and leakage)
   4. Half-value layer (HVL)
   5. Factors
      a. Use (U)
      b. Workload (W)
      c. Occupancy (T)
      d. Distance (D)
   6. X-ray and ancillary equipment
      a. Beam-limiting devices
      b. Exposure control devices
      c. On and off switches
      d. Interlocks
      e. Visual/audible monitors (e.g., fluoroscopic timer, “beam on” notification)
      f. Emergency controls
      g. Quality control
         1) Calibration
         2) Standards

B. Regulations and recommendations
   1. Current NRC recommendations and/or regulations
   2. Current NCRP recommendations and/or regulations
   3. Applicable state regulations
   4. Public Law 97-35 (The Patient Consumer Radiation Health and Safety Act of 1981)
   5. Public awareness
      a. Background equivalent radiation time (BERT)
      b. Awareness campaigns (Image Gently, Image Wisely)

C. Cardinal principles in protection
   1. Time
   2. Distance

3. Shielding

D. Emergency procedures

X. Patient Protection

A. Principles (ALARA)

B. Radiation safety practices
   1. Beam restriction
   2. Shielding
   3. Exposure factors
   4. Patient considerations
      a. Positioning (e.g., AP versus PA)
      b. Communication
      c. Pediatric
      d. Morbid obesity
      e. Pregnancy
   5. Immobilization

C. Education
   1. Image Gently®
   2. Image Wisely®
   3. CARES Committee

D. Equipment and accessories
   1. Filtration
   2. Image receptor
   3. Grid

E. Fluoroscopic procedures

F. Mobile radiography

XI. Personnel Protection

A. Exposure sources:
   1. Primary radiation
   2. Scatter radiation

B. Protective devices (e.g., aprons, barriers)

C. Fluoroscopy procedures
   1. Protective curtain
   2. Bucky slot cover
   3. Cumulative timer
   4. Remote control

D. Mobile procedures
    1. Protective garments
    2. Distance
    3. Beam – patient line

Clinical Practice

Objectives:

- Discuss ethics and the characteristics of professional behavior.
- Apply professional communication techniques.
- List the radiography practice standards.
- Demonstrate positive values and a commitment to diversity, equity, and inclusion.
- Explain the elements of procedural performance and radiation protection.
- Recognize the requirements for clinical competency.

Content

I. Professionalism

A. Standards of ethics and professional behavior
   1. ARRT Standards of Ethics incident reporting mechanisms
   2. Student supervision
      a. Direct
      b. Indirect
   3. The patient's expectations, rights, and responsibilities
   4. The radiographer's professional responsibilities

B. Professional communication
   1. Patients
   2. Patient's family or authorized representatives
   3. Health care team
   4. Confidentiality of patient records (Health Insurance Portability and Accountability Act [HIPAA] compliance)

C. Radiography Practice Standards
   1. Scope of Practice
   2. Clinical Performance Standards
   3. Quality Performance Standards
   4. Professional Performance Standards
   5. ASRT's Advisory Opinion Statements
   6. ASRT's Best Practices in Digital Radiography

D. Values
   1. Personal
      a. Values development
      b. Effect on patient care
   2. Societal
      a. Rights and privileges
      b. Community values
      c. Effect on patient care

3. Professional
    a. Values development
    b. Values conflict
    c. Effect on patient care
    d. Effect of social media

E. Diversity, equity, and inclusion
1. Diversity concepts
    a. Individual
    b. Population
    c. Social
2. Socioeconomic factors
3. Gender identity/expression
4. Ethnicity (e.g., language)
5. Race
6. Age
    a. Infant
    b. Child
    c. Adolescent
    d. Young adult
    e. Middle-aged
    f. Geriatric
7. Family structure and dynamics
8. Geographical factors
9. Religion, spirituality, and belief system
10. Lifestyle choices and behaviors
11. Sexual orientation
12. Disability
13. Equity
    a. Structural racism
    b. Social justice
14. Culture of inclusion
    a. Environmental
    b. Organizational

II. Procedural Performance

A. Scheduling and sequencing of exams

B. Order/requisition evaluation and corrective measures

C. Facilities setup

D. Patient assessment, clinical history, education, and care
1. Patient monitoring – emergency and nonemergency
    a. Vital signs

b. Assessment and clinical history
c. Equipment
d. Patient emergencies

2. Patient privacy and confidentiality (HIPAA)
3. Documentation
4. Infection control
   a. Personal protective equipment (PPE)
      1) Types
      2) Proper use
5. Patient education
   a. Appropriate communication style
   b. Age-specific
   c. Cultural sensitivity
   d. Socioeconomic sensitivity
   e. Patient-centered care
6. Medical error reduction
7. Patient safety considerations

E. Imaging
1. Positioning considerations
2. Technical considerations
3. Image acquisition
4. Image analysis

F. Radiation protection
1. Principles (ALARA)
2. Radiation safety practices
   a. Protection of the patient (AAPM recommendations)
   b. Protection of personnel
   c. Protection of others
3. Education
   a. Patient, family members, or authorized representatives
   b. Other members of the healthcare team
4. Equipment and accessories

III. Clinical Competency

*Refer to ARRT Competency Requirements for mandatory and elective requirements.

Additional Concentrations

Objectives:

- Differentiate the equipment used in various imaging concentrations.
- Discuss the dose differences between imaging and radiation therapy doses.
- Compare and contrast the various methods of image creation.
- Explain the basic indications and contraindications for various imaging concentrations.
- List the educational and certification requirements for different imaging concentrations.
- Discuss the image appearance and principles of operation for equipment used in various imaging concentrations.

Content

I. Bone Densitometry

II. Cardiac Interventional

III. Computed Tomography

IV. Magnetic Resonance

V. Mammography

VI. Medical Dosimetry

VII. Nuclear Medicine/Molecular Imaging

VIII. Radiation Therapy

IX. Sonography

X. Vascular Interventional

Optional Content

This section includes instructional content covering specialized or advanced content areas that may not be necessary for all educational programs. This includes additional computed tomography content, advancements in artificial intelligence, and much more detailed sectional anatomy.

Also included is a section on older technologies and technical principles that have been replaced with newer systems. These older systems are still part of the fabric of many communities, and may be included as needed by educational programs.

Basic Principles of Computed Tomography

Objectives:

- Describe the types and components of CT scanners.
- Describe the operations and processes by which CT scanners generate images.
- List the factors and postprocessing operations that affect image appearance.
- Apply radiation protection techniques specific to CT practice.

Content

I. Computed Tomography Scanners

A. Helical

B. Multi-detector

II. Components, Operations, and Processes

A. Data acquisition

1. Methods
   a. Slice-by-slice
   b. Volumetric
2. Beam geometry
   1) Parallel
   2) Fan
   3) Cone
3. Data acquisition system (DAS)
   a. Components
      1) Gantry
      2) Tube
      3) Detectors
      4) Filters
      5) Collimators
      6) Analog-to-digital conversion (ADC)
   b. Functions
      1) Measurement of transmitted beam
      2) Data transmission to computer
4. Data acquisition process
   a. Scanning/raw data/image data
      1) Rays
      2) Views
      3) Profiles
         a) Pixels
         b) Matrices
         c) Voxels
   b. Attenuation
      1) Linear attenuation coefficients

2) CT numbers (Hounsfield numbers)

c. Selectable scan factors
   1) Scan field of view
   2) Display field of view
   3) Matrix size
   4) Scanning interval
   5) Slice thickness
   6) Algorithm
   7) Scan time and rotational arc
   8) Radiographic tube output
   9) Annotation
   10) Region of interest (ROI)
   11) Magnification
   12) Focal spot size and tube geometry

B. Contrast administration
   1. Type
   2. Dosage
   3. Route

C. Factors controlling image appearance
   1. Artifacts
   2. Contrast resolution (window width)
   3. Grayscale manipulation (window level)
   4. Distortion
   5. Noise
   6. Spatial resolution
   7. Temporal resolution

D. Postprocessing
   1. Image reformatting
   2. Image smoothing
   3. Edge enhancement
   4. Window level and width
   5. 3D reconstruction

III. Radiation Protection

A. Patient dose reduction
   1. Technical factor selection
   2. Technical adjustments for children
   3. Scatter radiation reduction

B. Reducing exposure to scatter radiation

C. Measurement units in CT

1. CT dose index (CTDI)
2. Multiple scan average dose (MSAD)
3. Dose length product (DLP)

D. CT immobilization devices
   1. Straps
   2. Head holders
   3. IV arm boards

Sectional Anatomy

Objectives:

- Locate major anatomical structures on CT, MR, and, ultrasound images in the transverse axial, coronal, sagittal, and orthogonal (oblique) cross-sectional imaging planes.
- Explain the relationship of anatomical structures in the head and neck to surrounding structures.
- Describe the function of the anatomical structures in the head and neck.
- Explain the relationship of thoracic structures to surrounding structures.
- Describe the function of anatomical structures located within the thorax.
- Explain the relationship of anatomical structures in the abdomen and pelvis to surrounding structures.
- Describe the function of anatomical structures located within the abdomen and pelvis.
- Describe the function of anatomical structure located in the upper and lower extremities.

Content

I. Anatomical Nomenclature

A. Directional references

B. Body planes
   1. Median/midsagittal
   2. Sagittal
   3. Coronal
   4. Transverse
   5. Longitudinal

C. Body cavities (structural limits, function, contents)
   1. Cranial
   2. Thoracic
   3. Abdominal/pelvic

II. Head and Brain

A. Surface anatomy of the brain
   1. Fissures (sulci)
      a. Longitudinal cerebral
      b. Lateral (Sylvian)
      c. Central (of Rolando)
   2. Convolutions (gyri)
      a. Precentral
      b. Postcentral

B. Sinuses

1. Frontal
2. Maxillary
3. Ethmoidal
4. Sphenoidal

C. Facial bones
   1. Mandible
   2. Maxillae
   3. Zygomas
   4. Nasal bones

D. Facial muscles

E. Cranial bones
   1. Frontal
   2. Ethmoid
      a. Nasal conchae (turbinates)
      b. Nasal septum
   3. Parietal
   4. Sphenoid
      a. Lesser wings
         1) Tuberculum sellae
         2) Sella turcica
         3) Dorsum sellae
         4) Anterior and posterior clinoid process
         5) Optic canals
      b. Greater wings
         1) Foramen rotundum
         2) Foramen ovale
            a) Foramen spinosum
   5. Occipital
      a. Foramen magnum
      b. Internal and external occipital protuberance
      c. Jugular foramen
   6. Temporal
      a. Zygomatic process
      b. External auditory meatus (EAM)
      c. Internal auditory canal
      d. Mastoid process
      e. Petrous portion or ridge

F. Lobes of the brain and midline cerebral hemisphere structures
   1. Frontal
   2. Parietal
   3. Occipital

4. Temporal
5. Insula (Island of Reil)
6. Cerebellum
7. Corpus callosum (genu, rostrum, body, and splenium)
8. Septum pellucidum
9. Sella turcica
10. Pineal gland
11. Falx cerebri
12. Septum pellucidum

G. Cranial nerves
1. Olfactory
2. Optic
3. Oculomotor
4. Trochlear
5. Trigeminal
6. Abducens
7. Facial
8. Vestibulocochlear
9. Glossopharyngeal
10. Vagus
11. Accessory
12. Hypoglossal

H. Brainstem and adjoining structures
1. Diencephalon
   a. Thalamus
   b. Hypothalamus
   c. Optic chiasm
   d. Optic tracts
   e. Infundibulum (pituitary stalk)
   f. Pituitary gland
   g. Mammillary bodies
   h. Pineal gland
2. Midbrain
3. Pons
4. Medulla oblongata
   a. Spinal cord

I. Arteries (Circle of Willis)
1. Vertebral
2. Basilar
3. Internal carotid
4. Anterior and posterior communicating
5. Anterior and posterior cerebral

6. Middle cerebral

J. Veins
   1. Venous sinuses
      a. Superior sagittal sinus
      b. Vein of Galen
      c. Straight sinus
      d. Confluence of sinuses (torcular herophili)
      e. Transverse sinus
      f. Sigmoid sinus
   2. Internal jugular

K. Ventricular system
   1. Lateral ventricles (anterior, body, posterior, inferior or temporal and trigone or antrium)
   2. Interventricular foramen (of Monro)
   3. Third ventricle
   4. Cerebral aqueduct (of Sylvius)
   5. Fourth ventricle
   6. Foramen of Luschka
   7. Foramen of Magendie
   8. Choroid plexus

L. Meninges
   1. Dura mater
      a. Extensions of the dura mater
         1) Falx cerebri
         2) Falx cerebelli
         3) Tentorium cerebelli
         4) Diaphragma sellae
   2. Arachnoid
   3. Pia mater

M. Basal ganglia
   1. Caudate nucleus
   2. Putamen
   3. Globus pallidus
   4. Claustrum
   5. Internal capsule
   6. External capsule
   7. Extreme capsule

N. Orbit
   1. Globe
   2. Lens

3. Optic nerve
4. Lacrimal gland
5. Lateral rectus muscle
6. Medial rectus muscle
7. Superior rectus muscle
8. Inferior rectus muscle
9. Superior oblique muscle
10. Inferior oblique muscle
11. Orbital fat
12. Ophthalmic artery
13. Retinal vein

O. Anatomical structures of brain
1. Diploe
2. Subcutaneous soft tissue
3. Superior sagittal sinus (anterior and posterior)
4. Central sulcus
5. Interhemispheric fissure
6. Falx cerebri
7. Centrum semiovale
8. Corpus callosum (genu, rostrum, body, and splenium)
9. Septum pellucidum
10. Fornix
11. Sylvian fissure
12. Insula
13. Lentiform nucleus (putamen and globus pallidus)
14. Caudate nucleus (head)
15. Internal capsule (anterior, body, and posterior sections)
16. External capsule
17. Claustrum
18. Hippocampus
19. Cerebral peduncles
20. Mammillary bodies
21. Tentorium cerebelli
22. Petrous portion or ridge
23. Cerebellar tonsil
24. Internal auditory canal (IAC)
25. Nasal septum
26. External auditory canal (EAC)
27. Clivus
28. Mastoid air cells

P. Lines of angulation (imaging baselines)
1. Supraorbitomeatal line
2. Orbitomeatal line

3. Infraorbitomeatal line

Q. Anatomical landmarks
1. Glabella
2. Nasion
3. Acanthion
4. Mental point
5. External auditory meatus (EAM)

III. Neck

A. Bones
1. Cervical vertebrae

B. Organs
1. Pharynx
2. Larynx
3. Esophagus
4. Trachea
5. Salivary glands
6. Thyroid gland
7. Parathyroid glands
8. Lymph nodes

C. Vasculature and neurovasculature
1. Carotid arteries
2. Vertebral arteries
3. Jugular veins
4. Carotid sheath

D. Musculature
1. Anterior triangle
2. Posterior triangle

IV. Chest and Mediastinum

A. Bony thorax
1. Thoracic vertebrae
2. Sternum
3. Ribs
4. Costal cartilages
5. Scapulae
6. Clavicles

B. Pulmonary
1. Apices (lung)
2. Diaphragm

3. Angles
4. Hilum
5. Lobes (lungs)
6. Trachea
7. Carina
8. Primary (mainstem) bronchi
9. Secondary bronchi

C. Mediastinum
1. Thymus gland
2. Heart
   a. Arteries
   b. Veins
   c. Chamber
   d. Valves
3. Pulmonary vessels
4. Coronary vessels
5. Ascending aorta
6. Aortic arch
7. Branches of the aortic arch
8. Descending (thoracic) aorta
9. Inferior vena cava
10. Esophagus
11. Trachea
12. Thoracic duct
13. Lymph nodes
14. Azygos vein
15. Hemiazygos vein

D. Breasts

E. Musculature

V. Abdomen

A. Diaphragm and openings
1. Aortic hiatus
2. Caval hiatus
3. Esophageal hiatus

B. Surface landmarks and regions
1. Quadrants
   a. Upper left
   b. Upper right
   c. Lower left
   d. Lower right

C. Addison's planes (regions)
    1. Left hypochrondric
    2. Epigastric
    3. Right hypochondric
    4. Left lumbar
    5. Umbilical
    6. Right lumbar
    7. Left iliac
    8. Hypogastric
    9. Right iliac

D. Branches of the abdominal aorta
    1. Anterior visceral branches
        a. Celiac axis
            1) Left gastric
            2) Splenic
            3) Hepatic
    2. Superior mesenteric
        a. Jejunal and ileal
        b. Inferior pancreaticoduodenal
        c. Middle colic
        d. Right colic
        e. Ileocolic
    3. Inferior mesenteric
        a. Left colic
        b. Sigmoid
        c. Superior rectal
    4. Lateral visceral branches
        a. Suprarenal
        b. Renal
        c. Testicular or ovarian
    5. Parietal branches
        a. Inferior phrenics
        b. Lumbars
        c. Middle sacral
    6. Terminal branches
        a. Common iliacs

E. Tributaries of the vena cava
    1. Anterior visceral
        a. Hepatic veins
    2. Lateral visceral
        a. Right suprarenal
        b. Renal veins

c. Right testicular or ovarian
3. Tributaries of origin
   a. Common iliacs
   b. Median sacral

F. Tributaries of the portal vein
1. Splenic
2. Inferior mesenteric
3. Superior mesenteric
   a. Left gastric
   b. Right gastric
   c. Cystic

G. Abdominal organs and structures
1. Bony structures
   a. Lumbar vertebrae
2. Abdominal cavity
   a. Peritoneum
   b. Peritoneal space
   c. Retroperitoneum
   d. Retroperitoneal space
3. Liver
   a. Hepatic arteries
   b. Portal venous system
4. Gallbladder and biliary system
5. Pancreas and pancreatic ducts
6. Spleen
7. Adrenal glands
8. Urinary system and tract
   a. Kidneys
   b. Ureters
9. Stomach
10. Small intestine
11. Colon
12. Musculature

VI. Pelvis

A. Bony structures
1. Proximal femur
2. Ilium
3. Ischium
4. Pubis
5. Sacrum
6. Coccyx

B. Pelvic vasculature
    1. Arterial
        a. Common iliacs
        b. Internal iliacs
        c. External iliacs
        d. Ovarian/testicular
    2. Venous
        a. External iliacs
        b. Internal iliacs
        c. Common iliacs
        d. Ovarian/testicular

C. Pelvic organs
    1. Urinary bladder
        a. Ureter
        b. Urethra
    2. Small intestine
        a. Terminal ilium and ileocecal valve
    3. Colon
        a. Ascending
        b. Descending
        c. Sigmoid
        d. Rectum
        e. Vermiform appendix
    4. Female reproductive organs
        a. Vagina
        b. Cervix
        c. Uterus
        d. Fallopian tubes
        e. Ovaries
    5. Male reproductive organs
        a. Testes/scrotum
        b. Prostate gland
        c. Seminal vesicles
        d. External to pelvis
            1) Penis

VII. Musculoskeletal

A. Upper extremities
    1. Shoulder
        a. Bony anatomy
            1) Clavicle
            2) Scapula
            3) Humerus
            4) Acromioclavicular joint

b. Muscles and tendons
    1) Deltoid
    2) Supraspinatus
    3) Infraspinatus
    4) Teres minor
    5) Subscapularis
    6) Supraspinatus tendon
    7) Biceps tendon
c. Labrum and ligaments
    1) Glenoid labrum
    2) Glenohumeral ligaments
    3) Coracoacromial ligament
    4) Coracoclavicular ligaments
    5) Bursa (subacromial and subdeltoid)
d. Vascularity

2. Elbow
    a. Bony anatomy
        1) Humerus
        2) Radius
        3) Ulnar
    b. Muscles and tendons
        1) Anterior group
        2) Posterior group
        3) Lateral group
        4) Medial group
    c. Ligaments
        1) Ulnar collateral
        2) Radial collateral
        3) Annular
    d. Neurovasculature
        1) Brachial artery
        2) Radial artery
        3) Ulnar artery
        4) Basilic vein
        5) Cephalic vein
        6) Median cubital vein
        7) Ulnar nerve
3. Hand and wrist
    a. Bony anatomy
    b. Phalanges
    c. Metacarpals
        1) Carpal bones
        2) Radius
        3) Ulnar
    d. Tendons

1) Palmar tendon group
2) Dorsal tendon group
3) Triangular fibrocartilage complex

e. Neurovascular
1) Ulnar artery
2) Ulnar nerve
3) Radial artery
4) Median nerve

B. Lower Extremities
1. Hip
a. Bony anatomy
b. Labrum and ligaments
c. Muscle groups
d. Neurovasculature
2. Knee
a. Bony anatomy
b. Menisci and ligaments
c. Muscles
d. Vasculature
3. Foot and Ankle
a. Bony anatomy
b. Ligaments
c. Tendons
d. Muscles

Artificial Intelligence

The content in this section is a developing area of science, and the language used to describe and differentiate these technologies and techniques is similarly developing. Programs and educators are encouraged to frequently re-examine content in this field to stay current with the latest developments.

Objectives:

- Define terminology associated with artificial intelligence.
- Discuss data and data sets as they apply to artificial intelligence.
- Explain the principles of machine learning, deep learning, natural language processing, and neural networks.
- Outline artificial intelligence applications in health care and medical imaging.
- Recognize the standards and ethics applicable to artificial intelligence in medical imaging.
- Describe artificial intelligence regulation and workflow integration.
- Discuss the role of artificial intelligence in precision medicine.

Content

I. Terminology and concepts

A. Algorithm

B. Automation

C. Artificial intelligence (AI)
   1. Artificial narrow intelligence
   2. Artificial general intelligence
   3. Artificial super intelligence

D. AI-enabled

E. AI-bias

F. Machine learning (ML)
   1. Supervised
   2. Unsupervised
   3. Deep learning (DL)

G. Neural networks
   1. Artificial neural networks (ANN)
   2. Convolutional neural networks (CNN)
   3. Recurrent neural networks (RNN)

H. Software as a medical device (SaMD)

I. Recursion

J. Natural language processing (NLP)
   1. Pattern recognition
   2. Visual perception
   3. Decision making

II. Data and Data Sets

III. Applications in Healthcare

IV. AI in Medical Imaging

A. Order scheduling and patient screening

B. Exam protocoling

C. Image acquisition

D. Image analysis
   1. Automated detection of findings
   2. Automated interpretation of findings

E. Automated clinical decision support (CDS)

F. Image post-processing

V. Ethics, Legality, and Liability

VI. Regulation and Workflow Integration

VII. Precision Medicine

Advancements in Medical Imaging

These traditional medical imaging technologies are considered to be outdated, as they have largely been replaced by newer technologies and techniques. However, in some areas this equipment may still be in use and radiographers may need to understand the principles of its operation. Other programs and instructors may find value in discussing these topics as historical context and to assist in understanding the ongoing development of the field.

Objectives:

- Describe the mechanisms of flat panel and photon-counting imaging detectors.
- Explain slot scan, tomosynthesis, and dual energy imaging systems.
- Discuss multiplanar reconstruction, viewing, and printing techniques for volumetric imaging.

I. Imaging Detectors

A. Flat panel detector advancements (e.g., sampling technology, glass-free substrate, AEC assistance)

B. Photon counting detector (PCD)

II. Imaging Technologies

A. Slot scan

B. Tomosynthesis

C. Dual energy

III. Volumetric Imaging (3D)

A. Multiplanar reconstruction

B. Viewing

C. Printing

IV. Dynamic Digital Receptors (DDR)

Imaging and Radiologic Sciences Resources

This list of resources is to assist educators in sampling the references and study materials available in the medical imaging and radiologic sciences. The resources list should be viewed as a snapshot of available materials and is not exhaustive. Omission of any one title is not intentional. Because the pool of literature and media related to the profession is dynamic, educators are encouraged to find additional sources for recent updates, revisions, and additions to this collection of titles.

Textbooks and Reports

American Association of Physicists in Medicine. Current state of practice regarding digital radiography exposure indicators and deviation indices: Report of AAPM imaging physics committee task group 2323. https://aapm.onlinelibrary.wiley.com/doi/full/10.1002/mp.13212. Published September 2018.

American Association of Physicists in Medicine. AAPM Position Statement on the Use of Patient Gonadal and Fetal Shielding. https://www.aapm.org/org/policies/details.asp?id=468&type=PP. Published April 2019.

Adler AM, Carlton R. *Introduction to Radiologic and Imaging Sciences and Patient Care*. 7th ed. St. Louis, MO: Elsevier; 2018.

Carlton R, Adler A, Balac V. *Student Workbook for Principles of Radiographic Imaging: An Art and A Science*. 6th ed. Boston, MA: Cengage; 2019.

Adolina VF, Lille SL. *Mammographic Imaging: A Practical Guide.* 4th ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins Health; 2018.

Applegate E. *The Sectional Anatomy Learning System: Concepts and Applications*. 3rd ed. St. Louis, MO: Saunders/Elsevier; 2010.

Biedrzycki A. *The Radiography Procedure and Competency Manual.* 3rd ed. Philadelphia, PA: F.A. Davis; 2017.

Bonnick SL. *Bone Densitometry in Clinical Practice: Application & Interpretation.* 3rd ed. New York, NY: Humana Press; 2010.

Browne MN, Keeley SM. *Asking the Right Questions: A Guide to Critical Thinking*. 12th ed. Upper Saddle Rivers, NJ: Prentice Hall; 2017.

Bushberg JT, et al. *The Essential Physics of Medical Imaging*, 4th ed. North American Edition; 2020.

Bushong SC. *Magnetic Resonance Imaging: Physical and Biological Principles.* 4th ed. St. Louis, MO: Mosby; 2015.

Bushong SC. *Radiologic Science for Technologists: Physics, Biology, and Protection.* 12th ed. St. Louis, MO: Elsevier Mosby; 2020.

Callaway WJ. *Mosby's Comprehensive Review of Radiography: The Complete Study Guide and Career Planner.* 8th ed. St. Louis, MO: Elsevier; 2022.

Callaway WJ. *Introduction to Radiologic Technology.* 8th ed. St. Louis, MO**:** CV Mosby; 2019.

Carlton RR, Adler AM.,, Balac V. *Principles of Radiographic Imaging: An Art and a Science.* 6th ed. Boston, MA: Cengage Learning; 2020.

Carroll QB. *Radiography in the Digital Age: Physics – Exposure – Radiation Biology*. 3rd Ed. 2018.

Thomas CC; Carlton RR, Adler AM, Balac V. *Workbook With Lab Exercises for Principles of Radiographic Imaging.* Albany, NY: Cengage Learning; 2019.

Carroll QB, Bowman D. *Adaptive Radiography with Trauma, Image Critique and Critical Thinking*. Albany, NY: Cengage Learning; 2014.

Carter C, Vealé B. *Digital Radiography and PACS*. 3rd ed. St. Louis, MO: Elsevier; 2018.

Chabner DE. *The Language of Medicine.* 12th ed. Philadelphia, PA: W.B. Saunders; 2020.

Dahnert W. *Radiology Review Manual.* 8th ed. Philadelphia, PA: Williams & Wilkins; 2017.

Daldrup-Link HE, Gooding CA. *Essentials of Pediatric Radiology: A Multimodality Approach*. New York, NY: Cambridge University Press; 2010.

Dance DR, Christofides S, Maidment ADA, et al. *Diagnostic radiology physics: A Handbook for Teachers and Students*. Vienna: International Atomic Energy Agency; 2014.

Newman Giger J. Haddad, L. *Transcultural Nursing: Assessment & Intervention*. 8th ed. St. Louis, MO: Mosby; 2020.

DeMaio DN, Herrmann T, Noble L, et al. *Best practices in digital radiography (white paper)*. Albuquerque, NM: American Society of Radiologic Technologists; 2019.

DeMaio DN. *Mosby's Exam Review for Computed Tomography*. 3rd ed. St. Louis, MO: Mosby Elsevier; 2018.

Diestler S. *Becoming a Critical Thinker: A User Friendly Manual*. 7th ed. Upper Saddle River, NJ: Prentice Hall; 2019.

Diller JV. *Cultural Diversity: A Primer for the Human Services*. 6th ed. Belmont, CA: Brooks/Cole, Cengage Learning; 2018.

Doherty R, Purtilo RB. *Ethical Dimensions in the Health Professions.* 6th ed. Louis, MO: Elsevier/Saunders; 2015.

Dutton AG, Ryan TA. *Torres' Patient Care in Imaging Technology.* 9th ed. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2018.

Eisenberg RL, Johnson NM. *Comprehensive Radiographic Pathology*. 7th ed. St. Louis, MO: Mosby; 2020.

Erlich RA, Coakes DM. *Patient Care in Radiography: With an Introduction to Medical Imaging*. 10th ed. St. Louis, MO: Mosby; 2020.

Erkonen WE, Smith WL, eds. *Radiology 101: The Basics and Fundamentals of Imaging.* 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2019.

Fauber TL. *Radiographic Imaging and Exposure*. 6th ed. Elsevier; 2020.

Fosbinder RA, Mason S. *Essentials of Radiologic Science*. 2nd ed. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2017.

Haynes K. *Mosby's Radiography Online: Radiobiology and Radiation Protection*. 3rd ed. Mosby; 2017.

Harvey CP, Allard MJ. *Understanding and Managing Diversity: Readings, Cases, and Exercises*. 6th ed. Upper Saddle River, NJ: Prentice Hall; 2014.

Haynes, KW. *Mosby's Radiography Online: Radiobiology and Radiation Protection.* 3rd ed. St. Louis, MO: Mosby; 2017.

Hirsch B. Artificial Intelligence in Diagnostic Imaging and Radiation Therapy. *Radiol Technol*. 2021 Jul;92(6):577-592. PMID: 34193576.

HCIAC Corporate Roundtable Subcommittee on Artificial Intelligence. *The Artificial Intelligence Era: The Role of Radiologic Technologists and Radiation Therapists*.

Huang HK. *PACS and Imaging Informatics*. 3rd ed. Hoboken, NJ: Wiley-Liss; 2019.

Huda W, Slone RM. *Review of Radiologic Physics*. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2016.

Johnston J, Fauber TL. *Essentials of Radiographic Physics and Imaging*. 3rd ed. St. Louis, MO: Mosby; 2019.

Kelley LL, Peterson CM. *Sectional Anatomy for Imaging Professionals*. 4th ed. St. Louis, MO: Mosby; 2018.

Kelley LL, Peterson CM. *Workbook for Sectional Anatomy for Imaging Professionals.* 4th ed. St. Louis, MO: Mosby; 2018.

Kowalczyk N, Mace JD. *Radiographic Pathology for Technologists*. 8th ed. St. Louis, MO: Mosby/Elsevier; 2021

Lampignano J, Kendrick LE. *Bontrager's Handbook of Radiographic Positioning and Techniques*. 10th ed. St. Louis, MO: Elsevier Mosby; 2020.

Lampignano J, Kendrick LE. *Bontrager's Textbook of Radiographic Positioning and Related Anatomy*. 10th ed. St. Louis, MO: Elsevier Mosby; 2020.

Lampignano J, Kendrick LE. *Workbook for Bontrager's Textbook of Radiographic Positioning and Related Anatomy*. 10th ed. Volumes I and II. St. Louis, MO: Elsevier Mosby; 2020.

Lanca L, Silva A. *Digital Imaging Systems for Plain Radiography.* Springer; 2013.

Lavery J, Hughes W, Doran K *Critical Thinking: An Introduction to the Basic Skills* 7–*American Edition*. 7th ed. Peterborough, Ontario: Broadview Press; 2014.

Long BW, Rollins JH, Smith BJ. *Merrill's Atlas of Radiographic Positions & Radiologic Procedures.* 14th ed. St. Louis, MO: Elsevier/Mosby; 2018.

Long BW, Rollins JH, Smith BJ.. *Merrill's Pocket Guide to Radiography.* St. Louis, MO: Mosby; 2018.

Long BW, Rollins JH, Smith BJ. *Mosby's Radiography Online: Anatomy and Positioning for Merrill's Atlas of Radiographic Positioning & Procedures.* 14th ed. St. Louis, MO: Mosby; 2018.

Long BW, Rollins JH, Smith BJ. *Workbook for Merrill's Atlas of Radiographic Positions & Radiologic Procedures.* 14th ed. St. Louis, MO: Mosby; 2018.

Lazo DL. *Fundamentals of Sectional Anatomy*. 2nd ed. Clifton Park, NJ: Cengage Learning; 2014.

McCance KL, Huether SE. *Pathophysiology: The Biologic Basis for Disease in Adults and Children*. 8th ed. Maryland Heights, MO: Mosby Elsevier; 2018.

McQuillen-Martensen K. *Radiographic Image Analysis*. 5th ed. Philadelphia, PA: Elsevier/Saunders; 2019.

McQuillen-Martensen K. *Workbook for Radiographic Image Analysis*. 5th ed. Philadelphia, PA: Elsevier/Saunders; 2019.

National Center for Transgender Equality. www.transequality.org. Washington D.C.

National Council on Radiation Protection and Measurements. *NCRP Reports.* www.ncrppublications.org. Bethesda, MD.

Novelline RA. *Fundamentals of Radiology.* 7th ed. Cambridge, MA: Harvard University Press; 2018.

Papp J. *Quality Management in the Imaging Sciences*. 6th ed. St. Louis, MO: Mosby Elsevier; 2018.

Pianykh OS. *Digital Imaging and Communications in Medicine (DICOM): A Practical Introduction and Survival Guide*. 2nd ed. New York, NY: Springer; 2012.

Pozgar GD. *Legal and Ethical Issues for Health Professionals*. 5th ed. Burlington, MA: Jones and Bartlett Learning; 2020.

Saia DA. *LANGE Q&A Radiography Examination*. 12th ed. New York, NY: McGraw-Hill/Appleton & Lange; 2020.

Samei E, Peck DJ. *Hendee's Medical Imaging Physics*. 5th ed. Hoboken, NJ: Wiley-Liss; 2019.

Seeram E. *Computed Tomography: Physical Principles, Clinical Applications, and Quality Control*. 4th ed. Philadelphia, PA: Saunders; 2015.

Seeram, E. *Digital Radiography: Principles and Quality Control.* Singapore: Springer; 2013.

Spector RE. *Cultural Diversity in Health & Illness*. 9th ed. New York, NY: Pearson; 2016.

Statkiewicz-Sherer MA, Visconti PJ, Ritenour ER, Haynes KW. *Radiation Protection in Medical Radiography*. 9th ed. Maryland Heights, MO: Mosby Elsevier; 2021.

The Society of Radiographers. *Artificial intelligence: Guidance for clinical imaging and therapeutic radiography workforce professionals*. Published 2021.

U.S. Food and Drug Administration. *Artificial Intelligence and Machine Learning (AI/ML)-Enabled Medical Devices*. Updated September 2021.

U.S. Food and Drug Administration. *Artificial Intelligence and Machine Learning (AI/ML) Software as a Medical Device Action Plan*. Published January 2021.

U.S. Food and Drug Administration. *Public Workshop - Evolving Role of Artificial Intelligence in Radiological Imaging*. Updated August 2021.

Vosper M, England A, Major V. *Graham's Principles and Applications of Radiological Physics*. 7th ed. New York, NY: Churchill Livingstone; 2021.

Wagner JB. Artificial Intelligence in Medical Imaging. *Radiol Technol*. 2019 May;90(5):489-501. PMID: 31088949.

Zelman M, Tompary E, Raymond J, Holdaway P, Mulvihill ML. *Human Disease: A Systemic Approach.* 8th ed. Upper Saddle River, NJ: Pearson Education; 2014.

Journals

Applied Radiology. Anderson Publishing Ltd, Ocean, NJ.

Diagnostic Imaging. United Business Media, San Francisco, CA.

Journal of Interprofessional Care. Taylor & Francis Online.

Journal of Interprofessional Education & Practice. Published by Elsevier, affiliated with University of Nebraska Medical Center, and the official journal of National Academies of Practice (NAP).

Journal of Medical Imaging and Radiation Sciences. Published by Elsevier for the Canadian Association of Medical Radiation Technologists (CAMRT).

Journal of Vascular Technology. Society of Vascular Technology, Lanham, MD.

Radiography. The College of Radiographers, St. Louis, MO.

Radiologic Science and Education. Association of Educators in Imaging and Radiological Sciences, Albuquerque, NM.

Radiologic Technology. American Society of Radiologic Technologists, Albuquerque, NM.

Radiology. Radiological Society of North America, Oak Brook, IL.

Appendix

Curriculum Revision Workgroup

We would like to extend special recognition to the outstanding professionals who volunteered their time as members of the curriculum revision project:

Vesna Balac, Ed.D., R.T. (R)(MR)
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April A. Young, M.Ed., R.T.(R)

We also wish to express our sincere appreciation for the many contributions and suggestions from the professional community over the course of this project.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Clinical Affiliate Assignment Form

Student Name _____ **J**_____

Address of Primary Residence _____
_____
_____

How do you plan to travel to clinical assignments?

_____ Drive/Park _____ Public Transportation

CCP DMI Program Primary Clinical Affiliates

Please list the total miles for each site from address of primary residence (one way commute)

Bryn Mawr Hospital 130 S. Bryn Mawr Avenue Bryn Mawr, PA 19010 Total miles from primary residence _____	**Methodist Hospital** 2301 S. Broad Street Philadelphia, PA 19145 Total miles from primary residence _____
Corporal Michael J. Crescenz VAMC 3900 Woodland Avenue Philadelphia, PA 19104 Total miles from primary residence _____	**Paoli Hospital** 255 W. Lancaster Avenue Paoli, PA 19301 Total miles from primary residence _____
Jefferson Frankford Hospital 4900 Frankford Avenue Philadelphia, PA 19124 Total miles from primary residence _____	**Penn Presbyterian Medical Center** 51 N. 39th Street Philadelphia, PA 19104 Total miles from primary residence _____
Jefferson Torresdale Hospital 10800 Knights Road Philadelphia, PA 19114 Total miles from primary residence _____	**Pennsylvania Hospital** 800 Spruce Street Philadelphia, PA 19107 Total miles from primary residence _____
Lankenau Medical Center 100. E. Lancaster Avenue Wynnewood, PA 19096 Total miles from primary residence _____	**Riddle Hospital** 1068 W. Baltimore Pike Media, PA 19063 Total miles from primary residence _____

Appendix I

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Clinical Affiliate Assignment Form

While considering travel distance to/from your primary residence, please list each of the primary clinical affiliates in preferential order:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

NOTE: Preferences do not guarantee assignment as students are randomly assigned to a primary clinical affiliate. Many factors, including clinical capacities and supervision policies, are considered during final assignments.

If there is any affiliate that assignment would create a hardship or conflict of interest, please note where and why: _____
_____
_____

PROGRAM USE ONLY
Assigned Clinical Affiliate _____

Program Director Signature _____ Date: _____

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Clinical Affiliates & JRCERT Recognized Clinical Preceptors

Bryn Mawr Hospital *Pending Approval for 2023-2024 Academic Year*
130 S. Bryn Mawr Avenue
Bryn Mawr, PA 19010
Clinical Preceptors:

1. Bret Danowski R.T.(R)(ARRT) danowskib@mlhs.org
2. Meghan Korb R.T.(R)(ARRT) korbm@mlhs.org

The Children's Hospital of Philadelphia *(Shared site with Bucks CCC)*
34th Street and Civic Center Boulevard
Philadelphia, PA 19104
Clinical Preceptors:

1. Chris Bloh R.T.(R)(ARRT) bloh@email.chop.edu
2. Melrita Mackey R.T.(R)(ARRT) MACKEYM@email.chop.edu
3. Monica Phillips R.T.(R)(ARRT) PHILLIPSMD@chop.edu
4. Kristen Waida R.T.(R)(ARRT) carmanyk@email.chop.edu

Note: All students will be assigned to CHOP to complete pediatric and level I trauma rotations.

Corporal Michael J. Crescenz VAMC *(Shared site with Holy Family University)*
3900 Woodland Avenue
Philadelphia, PA 19104
Clinical Preceptors:

1. Mark Burrows R.T.(R)(ARRT) Mark.Burrows@va.gov
2. Nyaquoi Dolopei R.T.(R)(ARRT) Nyaquoi.Dolopei@va.gov
3. Gail McCrae R.T.(R)(ARRT) Gail.McCrae@va.gov
4. Thomas Morrison R.T.(R)(ARRT) Thomas.Morrison@va.gov
5. Georgianna Pander R.T.(R)(ARRT) Georgianna.Pander@va.gov
6. Jamie Rhoads R.T.(R)(ARRT) Jamie.Rhoads1@va.gov

Note: Students assigned to this primary affiliate will complete all of their general and advanced imaging rotations here.

Jefferson Frankford Hospital *(Shared site with Bucks CCC & Holy Family University)*
4900 Frankford Avenue
Philadelphia, PA 19124
Clinical Preceptors:

1. Kathleen Friel R.T.(R)(ARRT) Kathleen.Friel@jefferson.edu
2. Jennifer Kelly R.T.(R)(ARRT) Jennifer.Kelly2@jefferson.edu

Note: Students assigned to this primary affiliate will complete additional fluoroscopy, OR, and general radiography rotations at Jefferson Torresdale campus as deemed necessary.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Clinical Affiliates & JRCERT Recognized Clinical Preceptors

Jefferson Torresdale Hospital *(Shared with Bucks CCC & Holy Family University)*
10800 Knights Road
Philadelphia, PA 19114
Clinical Preceptors:

1. Anna Domaradski A.A.S., R.T.(R)(ARRT) Anna.Domaradski@jefferson.edu
2. Kimberly Donnelly R.T.(R)(ARRT) Kimberly.Donnelly@jefferson.edu
3. Colleen Jacoby B.S., R.T.(R)(ARRT) Colleen.Jacoby@jefferson.edu
4. Patrick Kane R.T.(R)(ARRT) Patrick.Kane2@jefferson.edu

Note: Students assigned to this primary affiliate will complete DEXA and general radiography rotations at Jefferson Frankford campus as deemed necessary.

Lankenau Medical Center *Pending Approval for 2023-2024 Academic Year*
100. E. Lancaster Avenue
Wynnewood, PA 19096
Clinical Preceptors:

1. Tara D'Annunzio R.T.(R)(ARRT) d'annunziot@mlhs.org
2. Susan Pannier R.T.(R)(M)(ARRT) panniers@mlhs.org
3. Cristina Varrassi R.T.(R)(ARRT) varrassic@mlhs.org
4. Sarah Vital R.T.(R)(ARRT) vitals@mlhs.org

Main Line Health Broomall *Pending Approval for 2023-2024 Academic Year*
1991 Sproul Road
Broomall, PA, 19008
Clinical Preceptors:

1. Susan Pannier R.T.(R)(M)(ARRT) panniers@mlhs.org

Note: All students will be assigned to MLH Broomall to complete an urgent care rotation.

Methodist Hospital *(Shared site with Thomas Jefferson University)*
2301 S. Broad Street
Philadelphia, PA 19145
Clinical Preceptors:

1. Margaret Briggs R.T.(R)(ARRT) margie.briggs@jefferson.edu
2. Twanna Cannady R.T.(R)(ARRT) twanna.cannady@jefferson.edu
3. Natalie Coppola R.T.(R)(ARRT) natalie.coppola@jefferson.edu

Approved Competency Evaluator (OR only):

4. Eric Corrado eric.corrado@jefferson.edu

Note: Students assigned to this primary affiliate will complete Radiation Therapy rotations at Jefferson Torresdale Hospital.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Clinical Affiliates & JRCERT Recognized Clinical Preceptors

Paoli Hospital *Pending Approval for 2023-2024 Academic Year*
255 W. Lancaster Avenue
Paoli, PA 19301
Clinical Preceptors:

1. Katheryn Kirk Douglass R.T.(R)(ARRT) douglassk@mlhs.org
2. Raynard Guy R.T.(R)(ARRT) guyr@mlhs.org
3. Michelle Kanaly R.T.(R)(ARRT) kanalym@mlhs.org

Penn Presbyterian Medical Center
51 N. 39th Street
Philadelphia, PA 19104
Clinical Preceptors:

1. Lynette Byrd R.T.(R)(ARRT) lynette.byrd@pennmedicine.upenn.edu
2. Karen Cipolloni R.T.(R)(ARRT) karen.cipolloni@pennmedicine.upenn.edu
3. Kristen Desiderio R.T.(R)(ARRT) kristen.desiderio@pennmedicine.upenn.edu
4. Melissa Iorio R.T.(R)(ARRT) melissa.iorio@pennmedicine.upenn.edu
5. Hernando Mongelos R.T.(R)(ARRT) hernando.mongelos@pennmedicine.upenn.edu
6. Shawna Myers R.T.(R)(ARRT) shawna.myers@pennmedicine.upenn.edu
7. Dawn Rase B.A., R.T.(R)(ARRT) dawn.rase@pennmedicine.upenn.edu
8. Kelly Unger B.S., R.T.(R)(ARRT) kelly.unger@pennmedicine.upenn.edu
9. Corey Woods R.T.(R)(ARRT) corey.woods@pennmedicine.upenn.edu

Note: Students assigned to this primary affiliate will complete Interventional Radiology and Radiation Therapy rotations at Pennsylvania Hospital.

Pennsylvania Hospital
800 Spruce Street
Philadelphia, PA 19107
Clinical Preceptors:

1. Jamie Del Viscio R.T.(R)(ARRT) jamie.delviscio@pennmedicine.upenn.edu
2. Leah Griffin R.T.(R)(M)(ARRT) leah.griffin@pennmedicine.upenn.edu
3. Barbara O'Grady R.T.(R)(ARRT) barbara.o'grady@pennmedicine.upenn.edu
4. Sonja Payne R.T.(R)(ARRT) sonja.payne@pennmedicine.upenn.edu
5. Jason Rafferty R.T.(R)(ARRT) jason.rafferty@pennmedicine.upenn.edu
6. Betsy Smith R.T.(R)(ARRT) elizabeth.smith2@pennmedicine.upenn.edu
7. Andrew Upham R.T.(R)(ARRT) andrew.upham@pennmedicine.upenn.edu

Note: Students assigned to this primary affiliate will complete part of their general rotations at Penn Medicine – Rittenhouse (Tuttleman Center).

Penn Medicine – Rittenhouse (Tuttleman Center)
1840 South Street
Philadelphia, PA 19146
Clinical Preceptors:

1. Drew McCullough R.T.(R)(ARRT) drew.mccullough@pennmedicine.upenn.edu
2. Debra Miller-Smith R.T.(R)(ARRT) debra.miller-smith@pennmedicine.upenn.edu
3. Christina Schneider R.T.(R)(ARRT) christina.segaline@pennmedicine.upenn.edu

Note: This site is used for Pennsylvania Hospital student general rotations and is recognized separately due to proximity to main hospital campus.

Riddle Hospital *Pending Approval for 2023-2024 Academic Year*
1068 W. Baltimore Pike
Media, PA 19063
Clinical Preceptors:

1. Jessica Coombe R.T.(R)(ARRT) coombej@mlhs.org

Radiography

1. Introduction

Candidates applying for certification and registration under the primary eligibility pathway are required to meet the Professional Education Requirements specified in the *ARRT Rules and Regulations*. *ARRT's Radiography Didactic and Clinical Competency Requirements* are one component of the Professional Education Requirements.

The requirements are periodically updated based upon a practice analysis which is a systematic process to delineate the job responsibilities typically required of radiographers. The result of this process is a task inventory which is used to develop the clinical competency requirements (see section 4 below) and the content specifications which serve as the foundation for the didactic competency requirements (see section 3 below) and the examination.

2. Documentation of Compliance

Verification of program completion, including Didactic and Clinical Competency Requirements and all degree-related requirements including conferment of the degree, will be completed on the Program Completion Verification Form on the ARRT Educator Website after the student has completed the Application for Certification and Registration.

Candidates who complete their educational program during 2022 or 2023 may use either the 2017 Didactic and Clinical Competency Requirements or the 2022 requirements. Candidates who complete their educational program after December 31, 2023 must use the 2022 requirements.

3. Didactic Competency Requirements

The purpose of the didactic competency requirements is to verify that individuals had the opportunity to develop fundamental knowledge, integrate theory into practice and hone affective and critical thinking skills required to demonstrate professional competence. Candidates must successfully complete coursework addressing the topics listed in the ARRT Content Specifications for the Radiography Examination. These topics would typically be covered in a nationally-recognized curriculum such as the ASRT Radiography Curriculum. Educational programs accredited by a mechanism acceptable to ARRT generally offer education and experience beyond the minimum requirements specified in the content specifications and clinical competency documents.

4. Clinical Competency Requirements

The purpose of the clinical competency requirements is to verify that individuals certified by the ARRT have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills covered by the certification examination, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively during the course of his or her formal education. The following pages identify the specific procedures for the clinical competency requirements. Candidates may wish to use these pages, or their equivalent, to record completion of the requirements. The pages do NOT need to be sent to the ARRT.

4.1 General Performance Considerations

4.1.1 Patient Diversity

Demonstration of competence should include variations in patient characteristics such as age, gender, and medical condition.

4.1.2 Elements of Competence

Demonstration of clinical competence requires that the program director or the program director's designee has observed the candidate performing the procedure independently, consistently, and effectively during the course of the candidate's formal educational program.

4.1.3 Simulated Performance

ARRT defines simulation of a clinical procedure routinely performed on a patient as the candidate completing all possible hands-on tasks of the procedure on a live human being using the same level of cognitive, psychomotor, and affective skills required for performing the procedure on a patient.

ARRT requires that competencies performed as a simulation must meet the same criteria as competencies demonstrated on patients. For example, the competency must be performed under the direct observation of the program director or program director's designee and be performed independently, consistently, and effectively.

Simulated performance must meet the following criteria:

- Simulation of imaging procedures requires the use of proper radiographic equipment without activating the x-ray beam.
- A total of ten imaging procedures may be simulated. Imaging procedures eligible for simulation are noted within the chart (see section 4.2.2).
- If applicable, the candidate must evaluate related images.
- Some simulations are acceptable for General Patient Care (see section 4.2.1). These do not count toward the ten imaging procedures that can be simulated.

4.2 Radiography-Specific Requirements

As part of the education program, candidates must demonstrate competence in the clinical procedures identified below. These clinical procedures are listed in more detail in the following sections:

- Ten mandatory general patient care procedures;
- 36 mandatory imaging procedures;
- 15 elective imaging procedures selected from a list of 34 procedures;
- One of the 15 elective imaging procedures must be selected from the head section; and
- Two of the 15 elective imaging procedures must be selected from the fluoroscopy studies section.

One patient may be used to document more than one competency. However, each individual procedure may be used for only one competency (e.g., a portable femur can only be used for a portable extremity or a femur but not both).

4.2.1 General Patient Care Procedures

Candidates must be CPR/BLS certified and have demonstrated competence in the remaining nine patient care procedures listed below. The procedures should be performed on patients whenever possible, but simulation is acceptable if state regulations or institutional practice prohibits candidates from performing the procedures on patients.

General Patient Care Procedures	Date Completed	Competence Verified By
CPR/BLS Certified		
Vital Signs – Blood Pressure		
Vital Signs – Temperature		
Vital Signs – Pulse		
Vital Signs – Respiration		
Vital Signs – Pulse Oximetry		
Sterile and Medical Aseptic Technique		
Venipuncture*		
Assisted Patient Transfer (e.g., Slider Board, Mechanical Lift, Gait Belt)		
Care of Patient Medical Equipment (e.g., Oxygen Tank, IV Tubing)		

*Venipuncture can be simulated by demonstrating aseptic technique on another person, but then inserting the needle into an artificial forearm or suitable device.

4.2.2 Imaging Procedures

Institutional protocol will determine the positions and projections used for each procedure. When performing imaging procedures, the candidate must independently demonstrate appropriate:

- patient identity verification;
- examination order verification;
- patient assessment;
- room preparation;
- patient management;
- equipment operation;
- technique selection;
- patient positioning;
- radiation safety;
- image processing; and
- image evaluation.

4.2.2 Imaging Procedures (continued)

Imaging Procedures	Mandatory or Elective		Eligible for Simulation	Date Completed	Competence Verified By
	Mandatory	Elective			
Chest and Thorax					
Chest Routine	✓				
Chest AP (Wheelchair or Stretcher)	✓				
Ribs	✓		✓		
Chest Lateral Decubitus		✓	✓		
Sternum		✓	✓		
Upper Airway (Soft-Tissue Neck)		✓	✓		
Sternoclavicular Joints		✓	✓		
Upper Extremity					
Thumb or Finger	✓		✓		
Hand	✓				
Wrist	✓				
Forearm	✓				
Elbow	✓				
Humerus	✓		✓		
Shoulder	✓				
Clavicle	✓		✓		
Scapula		✓	✓		
AC Joints		✓	✓		
Trauma: Shoulder or Humerus (Scapular Y, Transthoracic or Axial)*	✓				
Trauma: Upper Extremity (Non-Shoulder)*	✓				
Lower Extremity					
Toes		✓	✓		
Foot	✓				
Ankle	✓				
Knee	✓				
Tibia-Fibula	✓		✓		
Femur	✓		✓		
Patella		✓	✓		
Calcaneus		✓	✓		
Trauma: Lower Extremity*	✓				

* Trauma requires modifications in positioning due to injury with monitoring of the patient's condition.

4.2.2 Imaging Procedures (continued)

Imaging Procedures	Mandatory or Elective		Eligible for Simulation	Date Completed	Competence Verified By
	Mandatory	Elective			
Head – Candidates must select at least one elective procedure from this section.					
Skull		✓	✓		
Facial Bones		✓	✓		
Mandible		✓	✓		
Temporomandibular Joints		✓	✓		
Nasal Bones		✓	✓		
Orbits		✓	✓		
Paranasal Sinuses		✓	✓		
Spine and Pelvis					
Cervical Spine	✓				
Thoracic Spine	✓		✓		
Lumbar Spine	✓				
Cross-Table (Horizontal Beam) Lateral Spine (Patient Recumbent)	✓		✓		
Pelvis	✓				
Hip	✓				
Cross-Table (Horizontal Beam) Lateral Hip (Patient Recumbent)	✓		✓		
Sacrum and/or Coccyx		✓	✓		
Scoliosis Series		✓	✓		
Sacroiliac Joints		✓	✓		
Abdomen					
Abdomen Supine	✓				
Abdomen Upright	✓		✓		
Abdomen Decubitus		✓	✓		
Intravenous Urography		✓			

4.2.2 Imaging Procedures (continued)

Imaging Procedures	Mandatory or Elective		Eligible for Simulation	Date Completed	Competence Verified By
	Mandatory	Elective			
Fluoroscopy Studies – Candidates must select two procedures from this section and perform per site protocol.					
Upper GI Series, Single or Double Contrast		✓			
Contrast Enema, Single or Double Contrast		✓			
Small Bowel Series		✓			
Esophagus (*NOT* Swallowing Dysfunction Study)		✓			
Cystography/Cystourethrography		✓			
ERCP		✓			
Myelography		✓			
Arthrography		✓			
Hysterosalpingography		✓			
Mobile C-Arm Studies					
C-Arm Procedure (Requiring Manipulation to Obtain More Than One Projection)	✓		✓		
Surgical C-Arm Procedure (Requiring Manipulation Around a Sterile Field)	✓		✓		
Mobile Radiographic Studies					
Chest	✓				
Abdomen	✓				
Upper or Lower Extremity	✓				
Pediatric Patient (Age 6 or Younger)					
Chest Routine	✓		✓		
Upper or Lower Extremity		✓	✓		
Abdomen		✓	✓		
Mobile Study		✓	✓		
Geriatric Patient (At Least 65 Years Old **and** Physically or Cognitively Impaired as a Result of Aging)					
Chest Routine	✓				
Upper or Lower Extremity	✓				
Hip or Spine		✓			
Subtotal					
Total Mandatory exams required	36				
Total Elective exams required		15			
Total number of simulations allowed			10		

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Competency Eligibility Timeline

ACTIVITY/PROCEDURE	COURSE	ELIGIBLE SEMESTER
GENERAL PATIENT CARE		
Vital Signs (Blood Pressure, Temperature, Pulse, Respiration, & Pulse Oximetry)	DMI 131	Fall Year I
Medical Aseptic Technique	DMI 131	Fall Year I
Sterile Aseptic Technique	DMI 132	Spring Year I
Venipuncture	DMI 132	Spring Year I
Assisted Patient Transfer	DMI 131	Fall Year I
Care of Patient Medical Equipment	DMI 131	Fall Year I
CHEST AND THORAX		
Chest Routine, AP Wheelchair & AP Stretcher	DMI 131	Fall Year I
Ribs	DMI 231	Fall Year II
Chest Lateral Decubitus	DMI 131	Fall Year I
Sternum	DMI 231	Fall Year II
Upper Airway (Soft Tissue Neck)	DMI 132	Spring Year I
Sternoclavicular Joints	DMI 231	Fall Year II
UPPER EXTREMITY		
Thumb & Finger	DMI 131	Fall Year I
Hand & Wrist	DMI 131	Fall Year I
Forearm & Elbow	DMI 131	Fall Year I
Humerus & Shoulder	DMI 132	Spring Year I
Clavicle	DMI 132	Spring Year I
Scapula	DMI 132	Spring Year I
AC joints	DMI 132	Spring Year I
Trauma	See body part	See body part
LOWER EXTREMITY		
Toes	DMI 131	Fall Year I
Foot	DMI 131	Fall Year I
Ankle	DMI 131	Fall Year I
Knee	DMI 131	Fall Year I
Tibia-Fibula	DMI 131	Fall Year I
Femur	DMI 132	Spring Year I
Patella	DMI 131	Fall Year I
Calcaneus	DMI 131	Fall Year I
Trauma	See body part	See body part

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Competency Eligibility Timeline

ACTIVITY/PROCEDURE	COURSE	ELIGIBLE SEMESTER
HEAD		
Skull, Facial Bones, Mandible, TMJ, Nasal Bones, Orbits, Paranasal Sinuses	DMI 231	Fall Year II
SPINE AND PELVIS		
Cervical Spine	DMI 132	Spring Year I
Thoracic Spine	DMI 132	Spring Year I
Lumbar Spine	DMI 132	Spring Year I
Cross-Table (Horizontal Beam) Lateral Spine	See body part	See body part
Pelvis	DMI 132	Spring Year I
Hip	DMI 132	Spring Year I
Cross-Table (Horizontal Beam) Lateral Hip	DMI 132	Spring Year I
Sacrum & Coccyx	DMI 132	Spring Year I
Scoliosis Series	DMI 132	Spring Year I
Sacroiliac Joints	DMI 132	Spring Year I
ABDOMEN		
Abdomen Supine	DMI 131	Fall Year I
Abdomen Upright	DMI 131	Fall Year I
Abdomen Decubitus	DMI 131	Fall Year I
Intravenous Urography	DMI 132	Spring Year I
FLUOROSCOPY STUDIES		
Upper GI Series (Single or Double Contrast)	DMI 132	Spring Year I
Contrast Enema (Single or Double Contrast)	DMI 132	Spring Year I
Small Bowel Series	DMI 132	Spring Year I
Esophagus	DMI 132	Spring Year I
Cystography/Cystourethrography	DMI 132	Spring Year I
ERCP	DMI 221	Fall Year II
Myelography	DMI 221	Fall Year II
Arthrography	DMI 221	Fall Year II
Hysterosalpingography	DMI 221	Fall Year II
MOBILE C-ARM STUDIES		
C-Arm Procedure (manipulation to obtain more than 1 projection)	DMI 199	Late Summer Year II
Surgical C-Arm Procedure (manipulation around a sterile field)	DMI 199	Late Summer Year II
MOBILE RADIOGRAPHIC STUDIES		
Chest & Abdomen	DMI 131	Fall Year I
Upper & Lower Extremity	See body part	See body part

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Competency Eligibility Timeline

ACTIVITY/PROCEDURE	COURSE	ELIGIBLE SEMESTER
PEDIATRIC PATIENT (AGE 6 OR UNDER)		
Chest Routine	DMI 231	Fall Year II
Upper Extremity & Lower Extremity	DMI 231	Fall Year II
Abdomen	DMI 231	Fall Year II
Mobile Study	DMI 231	Fall Year II
GERIATRIC PATIENT (AT LEAST 65 YEARS OLD AND PHYSICALLY OR COGNITAVELY IMPARIED AS A RESULT OF AGING)		
Chest Routine	DMI 131	Fall Year I
Upper Extremity & Lower Extremity	See body part	See body part
Hip & Spine	See body part	See body part

Competency eligibility means the student has successfully completed classroom assessment or a Clinical Objective Evaluation (COE) for the respective patient care activity or imaging procedure. Students may not perform clinical competencies in the clinical education setting unless this is verified.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
2023-2024 Academic Calendar*

2023

August 29 –	New Student Hospital Orientation (full day)
August 30	New Student Hospital Orientation (half day)
August 31	DMI Advisory Committee Meeting
September 5	**Fall Semester Begins** Clinical Education I begins (level I students)/Classes begin (level II students)
September 6	Classes begin (level I students)/Clinical Education V begins (level II students)
November 7	**Election Day of Service – College Closed (make-up day 12/5)**
November 24-25	**Thanksgiving Holiday – College Closed**
December 6	**Professional Development/Study Day (Potential Emergency Make-Up Day)**
December 7	Clinical Education I ends (level I students)/Classes end (level II students)
December 8	Classes end (level I students)/Clinical Education V ends (level II students)
December 11-15	Final Examinations
December 16	**Winter Break Begins**

2024

January 11	DMI Advisory Committee Meeting
January 15	**Martin Luther King, Jr. Holiday – College Closed** **Winter Break Ends**
January 16	**Spring Semester Begins** Clinical Education II begins (level I students)/Classes begin (level II students)
January 17	Classes begin (level I students)/Clinical Education VI begins (level II students)
March 4-8	**Spring Break – College Closed**
April 18	Classes end (level II students)/Clinical Education II ends (level I students)
April 22	Classes end (level I students)/Clinical Education VI ends (level II students)
April 23-25	**Professional Development/Study Days (Potential Emergency Make-Up Days)**
April 26- May 2	Final Examinations
May 3	**Spring/Early Summer Intercession Break Begins**
May 4	College Commencement (Class of 2024 Recognition)

2023-2024 DMI Academic Calendar

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
2023-2024 Academic Calendar*

2024 Continued

May 12	**Spring/Early Summer Intercession Break Ends**
May 13	**Early Summer Term Begins (Monday – Thursday only)** Clinical Education III (level I students) & VII (level II students) begin
May 27	**Memorial Day Holiday – College Closed**
June 19	**Juneteenth – College Closed**
June 26	Clinical Education III (level I students) & VII (level II students) end
June 27	Class of 2024 Pinning Ceremony
June 27 – July 1	Final Examinations
July 2 – July 8	**Early Summer/Late Summer Intercession Break**
July 9	**Late Summer Term Begins (Monday – Thursday only)** Classes begin (level I students)/Clinical Education IV begins (level II students)
August 20	Classes end (level I students)/Clinical Education IV ends (level II students)
August 21-22	Final Examinations
August 23	**Late Summer/Fall Intercession Break Begins**
August 27 – **August 28**	New Student Hospital Orientation (full day) New Student Hospital Orientation (half day)
August 29	DMI Advisory Committee Meeting
September 2	**Labor Day Holiday** **Late Summer/Fall Intercession Break Ends**

***Calendar Subject to Change**

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Documented Counseling Form

Student Name _____ **J#**_____

Semester _____ **Year** _____ **Course DMI**_____

Date of Conference _____ **Faculty Name** _____

Step of Disciplinary Process (check one):

☐ **Oral Warning** – may be used as first step in the disciplinary process for less severe conduct violations (e.g., cell phone use, disruptive classroom behavior). Faculty will meet with the student to discuss the behavior and expectations for corrective action. Failure to correct the performance or misconduct may result in further disciplinary action up to and including program dismissal.

☐ **Written Warning** – may be used as second step in the disciplinary process for previous conduct violations or as the first step for more serious violations (e.g., lack of preparation for clinical assignments). Faculty will meet with the student to discuss the behavior and expectations for corrective action. Failure to correct the performance or misconduct will result in further disciplinary action up to and including program dismissal.

☐ **Program Dismissal** – may be used as the final step in the disciplinary process for previous conduct violations or as the first step for severe violations (e.g., practicing outside the legal and ethical framework of the profession).

REASON FOR CONFERENCE:
Include date of violation and location (College campus or clinical affiliate)

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Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Documented Counseling Form

STUDENT COMMENTS:
Include goals for performance improvement

FACULTY COMMENTS:
Include any corrective action discussed

_____ **Date** _____
Faculty Signature

_____ **Date** _____
Student Signature

_____ **Date** _____
Program Director Signature

Copy of completed form will be provided to the student and saved in Program Director files

COMMUNITY COLLEGE OF PHILADELPHIA

INFECTIOUS AGENT AND BLOODBORNE PATHOGEN EXPOSURE POLICY

Purpose and Definition

The purpose of this policy is to describe the management of incidents of exposure to bloodborne pathogens that involve Community College of Philadelphia faculty and staff, during the time when they are performing their work activities and for students when they are participating in College activities related to their educational coursework.

Bloodborne pathogens are microorganisms that are present in human blood or other potentially infectious material and can cause diseases in humans (e.g., Hepatitis B, Hepatitis C, and HIV).

An "exposure" that may place an individual at risk to bloodborne pathogens is defined as a percutaneous injury (e.g., a needle stick or cut with a sharp object), contact with airborne droplets (e.g., tuberculosis), direct contact or prolonged contact with mucous membranes or contact with skin (especially when the exposed skin is chapped, abraded, or afflicted with dermatitis, or the contact is prolonged or involving an extensive area) with blood, tissues, or Other Potentially Infectious Materials (OPIM) that may result from faculty, staff, and students performing their duties.

Other Potentially Infectious Materials (OPIM) refers to the following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; any unfixed tissue or organ (other than intact skin) from a human; HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions. Non-intact skin includes skin with dermatitis, hangnails, cuts, abrasions, chafing, acne, etc.

Policy Statement

In accordance with the Federal Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) the following describes the Community College of Philadelphia's policy developed to manage, record, document, and suppress exposures.

PROTOCOLS FOR STUDENT AND EMPLOYEE INJURY AND EXPOSURE

Faculty, staff or students exposed to an infectious agent or bloodborne pathogen must comply with this *Infectious Agent and Bloodborne Pathogen Exposure Policy*. In this Policy any person (e.g. employee, student, attending clinician, contract worker, security guard, housekeeping personnel) whose activities place them in contact with an individual's blood [e.g. human immunodeficiency virus (HIV)], airborne pathogens (e.g. mycobacterium tuberculosis) or other body fluids either on campus or at an approved clinical or laboratory setting off campus must abide by this policy. This policy also includes contact as a representative of the College to clients on campus requiring first aid.

An exposure to an infectious agent will be managed according to the following procedures:

ON-CAMPUS AND OFF-CAMPUS INCIDENTS AT APPROVED CLINICAL SITES

1. An injured or exposed student, faculty member or staff member must report the incident immediately to his/her supervisor. Students must also report the incident to their faculty Instructor.
2. Immediate first aid should be administered as follows:

Needle stick injury or cut with contaminated object- Wash the affected area immediately with disinfectant soap and water, followed with treatment as wound indicates.

Splashes to Skin, Nose, Mucous Membranes or Mouth - Flush with copious amounts of water for at least 3 minutes.

Splashes to the Eyes- Irrigate with copious amounts of clean water, saline, or sterile irrigants for at least 3 minutes.

STUDENT AND EMPLOYEE PROTOCOL FOR BLOODBORNE PATHOGEN INCIDENTS

Any student or employee who has a potential bloodborne pathogen injury must seek treatment within two hours of exposure. The following highlights the procedures for students and employees to follow for any suspected or actual bloodborne pathogen injury.

The College uses the services of Worknet Occupational Medicine Facility to treat students and employees who have a suspected or actual bloodborne pathogen injury. They are located on the ground floor of Hahnemann Hospital, Broad & Vine Streets, Philadelphia, PA. Their operating hours are from 7:30 a.m. to 5:00 p.m. Monday thru Friday. They provide a free van shuttle service during the hours listed above.

STUDENT PROTOCOL:

WorkNet will provide appropriate medical care at the first visit and for one follow-up visit. Blood tests will be performed at the first visit to screen for appropriate bloodborne illnesses. WorkNet will also contact the source patient for necessary testing. The cost of the first visit, one follow-up visit and blood tests will be paid by the College. If medication is recommended by the attending physician, the cost of this medication is to be paid by the individual.

On-Campus Incidents

The Faculty Instructor will immediately notify security at extension 8111 of the incident. Security will fill out the Bloodborne Pathogen Exposure Incident

FACULTY/STAFF PROTOCOL:

WorkNet will provide appropriate medical care that will be covered under the College's Workers' Compensation Program. Blood tests will be performed at the first visit to screen for appropriate bloodborne illnesses. WorkNet will also contact the source patient for necessary testing. The cost for all visits, blood tests and medication will be paid through the College's Workers' Compensation Program.

On-Campus Incidents

The Immediate Supervisor will notify Security at extension 8111 of the incident. Security will fill out the Bloodborne Pathogen Exposure Incident Report and

continued

Report and copies of the Bloodborne Pathogen Exposure Incident Report must be retained by Security, sent to the Human Resources Department, the Vice Presidents for Student Affairs and the appropriate Deans. Security will then inform the injured or exposed individual of the need to go to WorkNet, the College's Workplace Incident/Injury Medical Facility, within one or two hours of the incident. WorkNet has a complementary van service for transportation from the Main Campus which can be called by Security if necessary. WorkNet Occupational Medicine is located on the first floor of Hahnemann Hospital at Broad and Vine Streets.

Off-Campus Incidents

The on-site Supervisor or Faculty Instructor will fill out the Bloodborne Pathogen Exposure Incident Report and notify the Program's Clinical Site Supervisor who in turn will notify the appropriate Program Director (Allied Health) or the Department Head (Nursing) of the incident. Copies of the Bloodborne Pathogen Exposure Incident Report should be sent to the Human Resources Department, the Program Director/Department Head, the appropriate Dean, and given to the injured or exposed individual. The Faculty Instructor should contact WorkNet, the College's Workplace Incident/Injury Medical Facility at 215-762-8525 to arrange for the injured or exposed individual to be treated as soon as possible. The injured or exposed individual will be responsible for presenting a copy of the Bloodborne Pathogen Exposure Incident Report to WorkNet. WorkNet Occupational Medicine is located on the first floor of Hahnemann Hospital at Broad and Vine Streets. WorkNet is open Monday through Friday from 7:30 AM to 5:00 PM.

copies of the Bloodborne Pathogen Exposure Incident Report must be retained by Security and a copy sent to the Human Resources Department. A copy of the report will also be given to the injured or exposed individual who will be informed to go to WorkNet, the College's Workplace Incident/Injury Medical Facility, within one or two hours of the incident. WorkNet has a complementary van service for transportation from the Main Campus which can be called by Security if necessary. WorkNet Occupational Medicine is located on the first floor of the Hahnemann Hospital at Broad and Vine Streets.

Off-Campus Incidents

The on-site Supervisor will fill out the Bloodborne Pathogen Exposure Incident Report and notify the Program's Clinical Site Supervisor who in turn will notify the appropriate Program Director (Allied Health) or the Department Head (Nursing) of the incident. Copies of the Bloodborne Pathogen Exposure Incident Report should be retained by the Human Resources Department, the on-site Clinical Supervisor, the Program's Clinical Site Supervisor, the Program Director/Department Head and the injured or exposed individual. The on-site Supervisor should contact WorkNet, the College's Workplace Incident/Injury Medical Facility 215-762-8525 to arrange for the injured or exposed individual to be treated as soon as possible. The injured or exposed individual will be responsible for presenting a copy of the Bloodborne Pathogen Exposure Incident Report to WorkNet. WorkNet Occupational Medicine is located on the first floor of Hahnemann Hospital at Broad and Vine Streets. WorkNet is open Monday through Friday from 7:30 AM to 5:00 PM.

Emergency Room

An injured or exposed student has the right to elect to report directly to an emergency room of his/her choosing or to his/her primary care physician. Hahnemann Hospital has an agreement with Community College of Philadelphia to treat any student at the Emergency Room with or without medical insurance.

Refusal of Treatment

An injured or exposed individual has the right to refuse treatment. If an individual refuses care, he/she must sign a Treatment Waiver form located on the back of College's Bloodborne Pathogen Exposure Incident Report. The form must be signed by the individual immediately following the injury or exposure. Copies of the waiver form for a student must be retained by the on-site Clinical Supervisor, the Program's Clinical Site Supervisor, the Program Director/ Department Head and the injured or exposed student. If treatment is refused, a clinical site may refuse to permit the student to continue to report to the clinical site and this could result in dismissal from the program for the exposed student.

Emergency Room

An injured or exposed faculty/staff member should report to WorkNet during working hours (7:30 AM – 5:00 PM). If the incident occurs after working hours or if the injured or exposed faculty/staff member is not in a location convenient to WorkNet the faculty/staff member should report to the nearest emergency room. The cost will be covered by the College's Workers' Compensation Program.

Refusal of Treatment

An injured or exposed individual has the right to refuse treatment. If an individual refuses care, he/she must sign a refusal waiver form located on the back of College's Bloodborne Pathogen Exposure Incident Report. The form must be signed by the individual immediately following the injury or exposure. Copies of the waiver form for a faculty/staff member must be sent to the Benefits Office in the Human Resources Department. If treatment is refused, a clinical site may refuse to permit the faculty member to continue to report to the clinical site.

IMPORTANT STUDENT INFORMATION

FOR BLOODBORNE PATHOGEN INJURIES:

If you have been exposed to a Bloodborne Pathogen or any Other Potentially Infectious Material (OPIM)

YOU MUST REPORT TO A MEDICAL FACILITY <u>WITHIN TWO (2) HOURS of exposure:</u>

(1) If you are in the Philadelphia vicinity, Monday thru Friday during daytime hours, report to WorkNet Occupational Medicine located in Hahnemann Hospital. (2) If you need medical assistance after hours, go to Hahnemann Hospital Emergency Room. Hahnemann Hospital has agreed to treat all of Community College of Philadelphia **Bloodborne Pathogen exposed students with or without medical insurance.** Upon treatment you must state that you are with **"Hahnemann Internal Medicine,"** to insure that you will be scheduled for a second follow-up visit with WorkNet that will be paid by the College. If medication is recommended by the attending physician, the cost of this medication is to be paid by the individual.

INJURY PROTOCOL

1. Protocol for injury is usually:
    a. Identification and documentation of the source individual. Documentation should include: route of exposure, circumstances under which exposure occurred, PPE in use, work practices, location of incident and procedure being performed.
    b. Testing the source individual's blood as soon as feasible to determine Hepatitis B, Hepatitis C, and HIV infectivity.
    c. Written consent to test for HIV should be obtained from the source patient, by the Clinical Site Supervisor, Dean of Students or Program Director (Allied Health or Department Head Nursing).
    d. Counseling should be provided to the injured party to discuss recommendations for treatment, follow-up care and testing and the EAP can be utilized for employees.
    e. HIV prophylaxis treatment should be initiated within two hours of exposure.

2. Certain clinical sites may have established policies for treatment of injuries or an exposure to pathogens. Injured or exposed individuals may elect to follow such policies but the Bloodborne Pathogen Exposure Incident Report must still be completed and sent to the appropriate individuals as stated above.

3. An injured or exposed individual has the right to refuse treatment. If an individual refused care, he/she must sign a refusal waiver form on the back of the College's Bloodborne Pathogen Exposure Incident Report. The form must be signed by the individual immediately following the injury or exposure. Copies of the waiver form should be retained by Security and Human Resources. If treatment is refused the College may refuse to permit the individual to return to campus and/or the clinical site for a stipulated period of time based upon an assessment of the threat of harm to the individual or others.

CASES OF SELF-REPORTED OR SUSPECTED INFECTIONS

An individual who suspects they have contracted an infectious illness (e.g. MRSA, TB) or who suspects they could be in direct contact with someone who has an infectious illness should follow the guidelines as stated below.

1. Students, who are self-reporting, reporting the suspected illness of another individual or employees who suspect a student is infected, should state their concerns to the Dean of Students. The Dean of Students will take the appropriate steps to determine the accuracy of the information. If an incident of infectious illness is confirmed, the infected individual will be asked by the Dean of Students to seek medical attention from his/her own physician. In PA, the state does not require individual incidents of MRSA to be reported to the Health Department. Also, students are not restricted from attending school as long as the wound is covered and the student is receiving treatment.

2. Employees who are self-reporting or reporting the suspected illness of another individual should state their concerns to their immediate supervisor. If an incident of infectious illness is confirmed, the immediate supervisor will contact Human Resources. Human Resources will contact the infected individual and ask that he/she seek medical attention from his/her own physician.

CLEARANCE

Any individual who has been exposed to an infectious or bloodborne pathogen must present evidence of his/her ability to return to work, to school, and to any clinical site according to the following protocol:

1. Students in Nursing and Allied Health Programs should present the information to the Department Head (Nursing) or Program Director (Allied Health). The Department Head or Program Director will be responsible for informing the clinical site that the student has been cleared and may return to the clinical site. Students who fail to provide such clearance may be administratively withdrawn from a program if they are unable to return to class and/or complete their clinical assignment.

2. Students not enrolled in Nursing and Allied Health Programs should present the information to the Dean of Students.

3. Faculty and staff must present information to the Human Resources Department. A statement from the attending physician which clears the employee to return to work is required or the employee will not be permitted to return to work without a clearance notification from the attending physician.

RECORD KEEPING

The Bloodborne Pathogen Exposure Incident Report and all pertinent records will be considered confidential and they will be kept for 30 years in accordance with OSHA guidelines. Records for employees and students will be kept in the Human Resources Department.

COMMUNITY COLLEGE OF PHILADELPHIA

BLOODBORNE PATHOGEN EXPOSURE INCIDENT REPORT

Injured Party's Name _____

Date, Time and Place of Incident _____

_____

Employee/Student ID Number _____

DOB_____

Address _____

Home Phone Number_____

Emergency contact_____

****

Source Client's Name _____

Address_____

Home Phone Number _____

Emergency Contact _____

Witness(es)

Name _____ Phone _____

Name _____ Phone _____

Description of Incident (Please be specific: Who, what, when where and why).

_____

_____

_____

_____

_____

_____

Instructor/Supervisor: _____

Print Signature

Security Guard: _____

Print Signature

Instructions:

- Administer First Aid
- Notify Security at 215-751-8111
- Complete **BOTH SIDES** of this Form
- For Employee Incident – send a copy of this report to Human Resources
- For Student Incident – send a copy to VP Student Affairs, Dean and Human Resources
- Inform Injured/Exposed individual to report to WorkNet or an Emergency Room
- If incident occurs at an Off-site Campus give a copy of the Incident Report to the Student/Faculty/Staff

If injured party refuses care, have them sign the Treatment Waiver that is on the back of this report.

COMMUNITY COLLEGE OF PHILADELPHIA

Read and sign the appropriate statement.

Accept Treatment ____

I have experienced an Exposure to Bloodborne Pathogens at _____. (time and place) I understand that this exposure may have put me at risk for exposure to HIV, Hepatitis B, Hepatitis C and other bloodborne pathogens. I have been informed of the need for immediate evaluation for Post-exposure Prophylaxis for HIV. I am aware that a Licensed Medical Doctor must see me within 2 hours of my exposure (needlestick, cut, splash, etc.) for this evaluation. I plan to be seen by _____

at _____(time and date) . I have also been informed that I should be evaluated in an Emergency Room if it is after 5:00 pm.

Print Name of Injured/Exposed Individual _____

Signature of Injured/Exposed Individual _____

Signature of Witness _____

Date _____

Refuse Care _____ TREATMENT WAIVER

I have experienced an Exposure to Bloodborne Pathogens at _____ (time and place) _____. I understand that this exposure may have put me at risk for exposure to HIV, Hepatitis B, Hepatitis C and other bloodborne pathogens. I have been informed of the need for immediate evaluation for Post-exposure Prophylaxis for HIV. I am aware that a Licensed Medical Doctor must see me within 2 hours of my exposure (needlestick, cut, splash, etc.) for this evaluation. I have also been informed that I should be evaluated in an Emergency Room if my doctor cannot see me within 2 hours.

I acknowledge that I have chosen <u>not to follow this advice</u> and assume full responsibility for the possible deleterious effects of my actions, which are against the Community College of Philadelphia's Policy for Exposures to Bloodborne Pathogens.

Print Name of Injured/Exposed Individual _____

Signature Injured/Exposed Individual _____

Signature of Witness _____

Date _____

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
MRI Safety Screening Questionnaire

Prior to clinical education commencement and any rotation through MRI, students must be screened for magnetic field/radiofrequency hazards in accordance with the American College of Radiology MR safety guidelines. **Students are mandated to notify the program should the status of this form change.**

Student Name: _____ **Date:** _____

A "Yes" or "No" answer is required for each of the following. Please indicate if you have or have not had any of the following:

- ☐ **YES** ☐ **NO** Injury by a metal object or foreign body (e.g., bullet, BB, shrapnel)
  If yes, explain:
  _____
- ☐ **YES** ☐ **NO** Injury to your eye from a metal object
  ☐ **YES** ☐ **NO** If yes, did you see medical assistance?
  If yes, describe what was found:
  _____
- ☐ **YES** ☐ **NO** Foreign body removed from eye
  If yes, describe what was taken out:
  _____
- ☐ **YES** ☐ **NO** Spinal fusion procedure
- ☐ **YES** ☐ **NO** Endoscopy or colonoscopy in last three months

The following items may be harmful to you while in the MRI department and may interfere with an MR clinical rotation. Please indicate if you CURRENTLY HAVE or HAVE EVER HAD any of the following:

Surgically implanted medical devices

- ☐ **YES** ☐ **NO** Any type of electronic, mechanical or magnetic implant
  If yes, list type:
  _____
- ☐ **YES** ☐ **NO** Cardiac pacemaker, defibrillator or other cardiac implant (in place or removed)
- ☐ **YES** ☐ **NO** Aneurysm clip
- ☐ **YES** ☐ **NO** Neurostimulator, diaphragmatic stimulator, deep brain stimulator, vagus nerve stimulator, bone growth stimulator, spinal cord stimulator, or any biostimulator (in-place or removed)
  If yes, list type:
  _____
- ☐ **YES** ☐ **NO** Any type of internal electrodes or wires
- ☐ **YES** ☐ **NO** Cochlear implant
- ☐ **YES** ☐ **NO** Implanted drug pump (e.g., insulin, baclofen, chemotherapy, pain medicine)
- ☐ **YES** ☐ **NO** Spinal fixation device

Surgically implanted medical devices continued

- ☐ **YES** ☐ **NO** Any type of coil, filter or stent
  If yes, list type:

  _____
- ☐ **YES** ☐ **NO** Artificial heart valve
- ☐ **YES** ☐ **NO** Any type of ear implant
- ☐ **YES** ☐ **NO** Penile implant
- ☐ **YES** ☐ **NO** Artificial eye
- ☐ **YES** ☐ **NO** Eyelid spring and/or eyelid weight
- ☐ **YES** ☐ **NO** Any type of implant held in place by a magnet
- ☐ **YES** ☐ **NO** Any type of surgical clip or staple
- ☐ **YES** ☐ **NO** Any IV access port (e.g., Broviac, Port-a-Cath, Hickman, PICC line)
- ☐ **YES** ☐ **NO** Shunt
  If yes, type:

  _____
- ☐ **YES** ☐ **NO** Artificial limb
  If yes, what and where:

  _____
- ☐ **YES** ☐ **NO** Tissue Expander (e.g., breast)
- ☐ **YES** ☐ **NO** IUD
  If yes, type:

  _____
- ☐ **YES** ☐ **NO** Surgical Mesh
  If yes, location:

  _____
- ☐ **YES** ☐ **NO** Radiation Seeds
- ☐ **YES** ☐ **NO** Any implanted items (e.g., pins, rods, screws, nails, plates, wires)

Removable medical devices

- ☐ **YES** ☐ **NO** Hearing aid
- ☐ **YES** ☐ **NO** Removable drug pump (e.g., insulin, Baclofen, Neulasta)
- ☐ **YES** ☐ **NO** Any type of ear implant
- ☐ **YES** ☐ **NO** Artificial eye
- ☐ **YES** ☐ **NO** Any type of implant held in place by a magnet
- ☐ **YES** ☐ **NO** Any type of surgical clip or staple
- ☐ **YES** ☐ **NO** Medication patch (e.g., nitroglycerine, nicotine)
- ☐ **YES** ☐ **NO** Artificial limb
  If yes, what and where?

  _____

Removable medical devices continued

- ☐ **YES** ☐ **NO** Removable dentures
- ☐ **YES** ☐ **NO** Diaphragm, pessary
  If yes, type:

  _____
- ☐ **YES** ☐ **NO** Have you recently ingested a "pill cam"?
  If yes, date "pill cam" was ingested:

  _____

Personal

- ☐ **YES** ☐ **NO** Body piercings
  If yes, location:

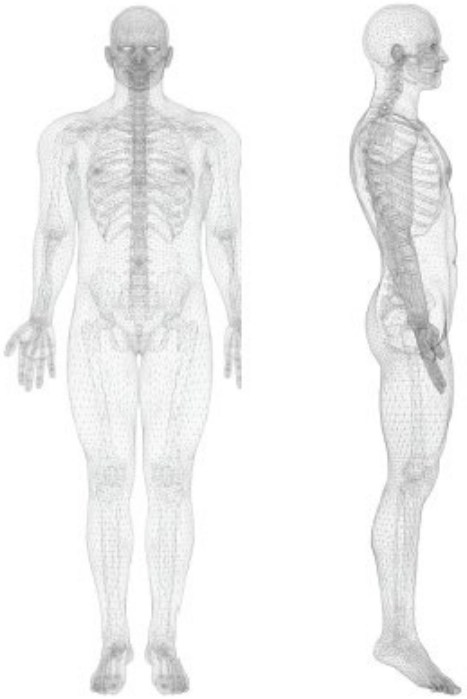
  _____
- ☐ **YES** ☐ **NO** Wig, hair implants
- ☐ **YES** ☐ **NO** Tattoos or tattooed liner
- ☐ **YES** ☐ **NO** Any hair accessories (e.g., bobby pins, barrettes, clips, extensions, weaves)
- ☐ **YES** ☐ **NO** Jewelry
- ☐ **YES** ☐ **NO** Metal-containing clothing material and/or underwear
- ☐ **YES** ☐ **NO** Magnetic cosmetics and hair care (e.g., magnetic eyelashes, magnetic nail polish)
- ☐ **YES** ☐ **NO** Electronic monitoring or tagging equipment (e.g., ankle monitor)
- ☐ **YES** ☐ **NO** Fitness tracker/biomonitor (e.g., Fitbit)
- ☐ **YES** ☐ **NO** Any other type of surgically implanted medical devices, removable medical devices or personal items not covered above?
  If yes, type:

  _____

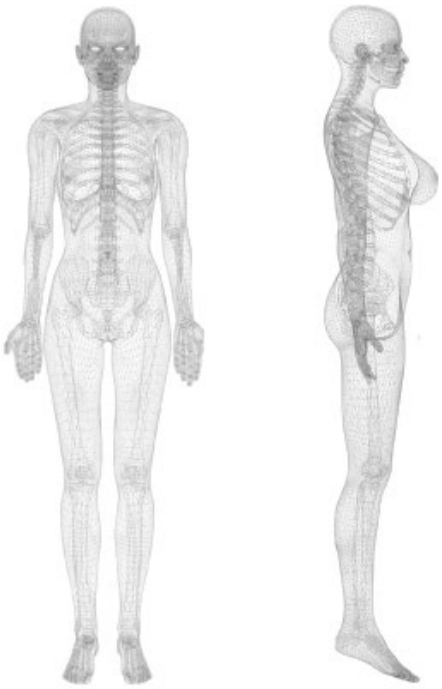
MR Hazard Checklist

Please mark the location of any implant, device or metallic foreign body inside your body or site of surgical operation.

Male:



Female:



Prior to entering the MRI department for a scheduled clinical rotation, students must remove all ferromagnetic items including, but not limited to:

- all jewelry and piercings (e.g., necklaces, pins, rings)
- all body piercings
- all hair pins, bobby pins, barrettes, clips, etc.
- all dentures, false teeth, partial dental plates
- eyeglasses and hearing aids
- watches, cell phones and pagers
- all cards with magnetic strips (e.g., credit cards, bank cards, etc.)

If you are unable to remove any of the above items, please notify the MR technologist during screening.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
MRI Safety Screening Questionnaire

I have read and understand the entire content of this form. I also understand any item answered "Yes" must be brought to the attention of MRI screening personnel prior to entering the MRI department. Failure to do so puts me at risk for injury.

An up-to-date copy of this MRI screening form must be provided to the MRI department prior to the start of your rotation. Students are required to remit to any additional MR screening protocols required at the clinical affiliate. Students are also required to notify the program immediately if any of the above information changes. Failure to do so may result in disciplinary action according to the Code of Conduct.

_____ **Date** _____
Student Signature

_____
Assigned Clinical Affiliate

Reviewed by:

_____ _____
Program Official Name (Please Print) Title

_____ **Date** _____
Program Official Signature

Comments:

U.S. NUCLEAR REGULATORY COMMISSION

Revision 3
June 1999

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 8.13

(Draft was issued as DG-8014)

INSTRUCTION CONCERNING PRENATAL RADIATION EXPOSURE

A. INTRODUCTION

The Code of Federal Regulations in 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," in Section 19.12, "Instructions to Workers," requires instruction in "the health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed." The instructions must be "commensurate with potential radiological health protection problems present in the work place."

The Nuclear Regulatory Commission's (NRC's) regulations on radiation protection are specified in 10 CFR Part 20, "Standards for Protection Against Radiation"; and 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to "ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv)." Section 20.1208 also requires licensees to "make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman." A declared pregnant woman is defined in 10 CFR 20.1003 as a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

This regulatory guide is intended to provide information to pregnant women, and other personnel, to help them make decisions regarding radiation exposure during pregnancy. This Regulatory Guide 8.13 supplements Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" (Ref. 1), which contains a broad discussion of the risks from exposure to ionizing radiation.

Other sections of the NRC's regulations also specify requirements for monitoring external and internal occupational dose to a declared pregnant woman. In 10 CFR 20.1502, "Conditions Requiring Individual Monitoring of External and Internal Occupational Dose," licensees are required to monitor the occupational dose to a declared pregnant woman, using an individual monitoring device, if it is likely that the declared pregnant woman will receive, from external sources, a deep dose equivalent in excess of 0.1 rem (1 mSv). According to Paragraph (e) of 10 CFR 20.2106, "Records of Individual Monitoring Results," the licensee must maintain records of dose to an embryo/fetus if monitoring was required, and the records of dose to the embryo/fetus must be kept with the records of dose to the declared pregnant woman. The declaration of pregnancy must be kept on file, but may be maintained separately from the dose records. The licensee must retain the re-

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the NRC staff in its review of applications for permits and licenses. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

Written comments may be submitted to the Rules and Directives Branch, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
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7. Transportation
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10. General

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quired form or record until the Commission terminates each pertinent license requiring the record.

The information collections in this regulatory guide are covered by the requirements of 10 CFR Parts 19 or 20, which were approved by the Office of Management and Budget, approval numbers 3150-0044 and 3150-0014, respectively. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

B. DISCUSSION

As discussed in Regulatory Guide 8.29 (Ref. 1), exposure to any level of radiation is assumed to carry with it a certain amount of risk. In the absence of scientific certainty regarding the relationship between low dose exposure and health effects, and as a conservative assumption for radiation protection purposes, the scientific community generally assumes that any exposure to ionizing radiation may cause undesirable biological effects and that the likelihood of these effects increases as the dose increases. At the occupational dose limit for the whole body of 5 rem (50 mSv) per year, the risk is believed to be very low.

The magnitude of risk of childhood cancer following in utero exposure is uncertain in that both negative and positive studies have been reported. The data from these studies "are consistent with a lifetime cancer risk resulting from exposure during gestation which is two to three times that for the adult" (NCRP Report No. 116, Ref. 2). The NRC has reviewed the available scientific literature and has concluded that the 0.5 rem (5 mSv) limit specified in 10 CFR 20.1208 provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers associated with radiation exposure during pregnancy.

In order for a pregnant worker to take advantage of the lower exposure limit and dose monitoring provisions specified in 10 CFR Part 20, the woman must declare her pregnancy in writing to the licensee. A form letter for declaring pregnancy is provided in this guide or the licensee may use its own form letter for declaring pregnancy. A separate written declaration should be submitted for each pregnancy.

C. REGULATORY POSITION

1. Who Should Receive Instruction

Female workers who require training under 10 CFR 19.12 should be provided with the information contained in this guide. In addition to the information contained in Regulatory Guide 8.29 (Ref. 1), this information may be included as part of the training required under 10 CFR 19.12.

2. Providing Instruction

The occupational worker may be given a copy of this guide with its Appendix, an explanation of the contents of the guide, and an opportunity to ask questions and request additional information. The information in this guide and Appendix should also be provided to any worker or supervisor who may be affected by a declaration of pregnancy or who may have to take some action in response to such a declaration.

Classroom instruction may supplement the written information. If the licensee provides classroom instruction, the instructor should have some knowledge of the biological effects of radiation to be able to answer questions that may go beyond the information provided in this guide. Videotaped presentations may be used for classroom instruction. Regardless of whether the licensee provides classroom training, the licensee should give workers the opportunity to ask questions about information contained in this Regulatory Guide 8.13. The licensee may take credit for instruction that the worker has received within the past year at other licensed facilities or in other courses or training.

3. Licensee's Policy on Declared Pregnant Women

The instruction provided should describe the licensee's specific policy on declared pregnant women, including how those policies may affect a woman's work situation. In particular, the instruction should include a description of the licensee's policies, if any, that may affect the declared pregnant woman's work situation after she has filed a written declaration of pregnancy consistent with 10 CFR 20.1208.

The instruction should also identify who to contact for additional information as well as identify who should receive the written declaration of pregnancy. The recipient of the woman's declaration may be identified by name (e.g., John Smith), position (e.g., immediate supervisor, the radiation safety officer), or department (e.g., the personnel department).

4. Duration of Lower Dose Limits for the Embryo/Fetus

The lower dose limit for the embryo/fetus should remain in effect until the woman withdraws the declaration in writing or the woman is no longer pregnant. If a declaration of pregnancy is withdrawn, the dose limit for the embryo/fetus would apply only to the time from the estimated date of conception until the time the declaration is withdrawn. If the declaration is

not withdrawn, the written declaration may be considered expired one year after submission.

5. Substantial Variations Above a Uniform Monthly Dose Rate

According to 10 CFR 20.1208(b), "The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (a) of this section," that is, 0.5 rem (5 mSv) to the embryo/fetus. The National Council on Radiation Protection and Measurements (NCRP) recommends a monthly equivalent dose limit of 0.05 rem (0.5 mSv) to the embryo/fetus once the pregnancy is known (Ref. 2). In view of the NCRP recommendation, any monthly dose of less than 0.1 rem (1 mSv) may be considered as not a substantial variation above a uniform monthly dose rate and as such will not require licensee justification. However, a monthly dose greater than 0.1 rem (1 mSv) should be justified by the licensee.

D. IMPLEMENTATION

The purpose of this section is to provide information to licensees and applicants regarding the NRC staff's plans for using this regulatory guide.

Unless a licensee or an applicant proposes an acceptable alternative method for complying with the specified portions of the NRC's regulations, the methods described in this guide will be used by the NRC staff in the evaluation of instructions to workers on the radiation exposure of pregnant women.

REFERENCES

1. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure," Regulatory Guide 8.29, Revision 1, February 1996.

2. National Council on Radiation Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, NCRP Report No. 116, Bethesda, MD, 1993.

APPENDIX

QUESTIONS AND ANSWERS CONCERNING PRENATAL RADIATION EXPOSURE

1. Why am I receiving this information?

The NRC's regulations (in 10 CFR 19.12, "Instructions to Workers") require that licensees instruct individuals working with licensed radioactive materials in radiation protection as appropriate for the situation. The instruction below describes information that occupational workers and their supervisors should know about the radiation exposure of the embryo/fetus of pregnant women.

The regulations allow a pregnant woman to decide whether she wants to formally declare her pregnancy to take advantage of lower dose limits for the embryo/fetus. This instruction provides information to help women make an informed decision whether to declare a pregnancy.

2. If I become pregnant, am I required to declare my pregnancy?

No. The choice whether to declare your pregnancy is completely voluntary. If you choose to declare your pregnancy, you must do so in writing and a lower radiation dose limit will apply to your embryo/fetus. If you choose not to declare your pregnancy, you and your embryo/fetus will continue to be subject to the same radiation dose limits that apply to other occupational workers.

3. If I declare my pregnancy in writing, what happens?

If you choose to declare your pregnancy in writing, the licensee must take measures to limit the dose to your embryo/fetus to 0.5 rem (5 millisievert) during the entire pregnancy. This is one-tenth of the dose that an occupational worker may receive in a year. If you have already received a dose exceeding 0.5 rem (5 mSv) in the period between conception and the declaration of your pregnancy, an additional dose of 0.05 rem (0.5 mSv) is allowed during the remainder of the pregnancy. In addition, 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to make efforts to avoid substantial variation above a uniform monthly dose rate so that all the 0.5 rem (5 mSv) allowed dose does not occur in a short period during the pregnancy.

This may mean that, if you declare your pregnancy, the licensee may not permit you to do some of your normal job functions if those functions would have allowed you to receive more than 0.5 rem, and you may not be able to have some emergency response responsibilities.

4. Why do the regulations have a lower dose limit for the embryo/fetus of a declared pregnant woman than for a pregnant worker who has not declared?

A lower dose limit for the embryo/fetus of a declared pregnant woman is based on a consideration of greater sensitivity to radiation of the embryo/fetus and the involuntary nature of the exposure. Several scientific advisory groups have recommended (References 1 and 2) that the dose to the embryo/fetus be limited to a fraction of the occupational dose limit.

5. What are the potentially harmful effects of radiation exposure to my embryo/fetus?

The occurrence and severity of health effects caused by ionizing radiation are dependent upon the type and total dose of radiation received, as well as the time period over which the exposure was received. See Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Exposure" (Ref. 3), for more information. The main concern is embryo/fetal susceptibility to the harmful effects of radiation such as cancer.

6. Are there any risks of genetic defects?

Although radiation injury has been induced experimentally in rodents and insects, and in the experiments was transmitted and became manifest as hereditary disorders in their offspring, radiation has not been identified as a cause of such effect in humans. Therefore, the risk of genetic effects attributable to radiation exposure is speculative. For example, no genetic effects have been documented in any of the Japanese atomic bomb survivors, their children, or their grandchildren.

7. What if I decide that I do not want any radiation exposure at all during my pregnancy?

You may ask your employer for a job that does not involve any exposure at all to occupational radiation dose, but your employer is not obligated to provide you with a job involving no radiation exposure. Even if you receive no occupational exposure at all, your embryo/fetus will receive some radiation dose (on average 75 mrem (0.75 mSv)) during your pregnancy from natural background radiation.

The NRC has reviewed the available scientific literature and concluded that the 0.5 rem (5 mSv) limit

provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers. If this dose limit is exceeded, the total lifetime risk of cancer to the embryo/fetus may increase incrementally. However, the decision on what level of risk to accept is yours. More detailed information on potential risk to the embryo/fetus from radiation exposure can be found in References 2-10.

8. What effect will formally declaring my pregnancy have on my job status?

Only the licensee can tell you what effect a written declaration of pregnancy will have on your job status. As part of your radiation safety training, the licensee should tell you the company's policies with respect to the job status of declared pregnant women. In addition, before you declare your pregnancy, you may want to talk to your supervisor or your radiation safety officer and ask what a declaration of pregnancy would mean specifically for you and your job status.

In many cases you can continue in your present job with no change and still meet the dose limit for the embryo/fetus. For example, most commercial power reactor workers (approximately 93%) receive, in 12 months, occupational radiation doses that are less than 0.5 rem (5 mSv) (Ref. 11). The licensee may also consider the likelihood of increased radiation exposures from accidents and abnormal events before making a decision to allow you to continue in your present job.

If your current work might cause the dose to your embryo/fetus to exceed 0.5 rem (5 mSv), the licensee has various options. It is possible that the licensee can and will make a reasonable accommodation that will allow you to continue performing your current job, for example, by having another qualified employee do a small part of the job that accounts for some of your radiation exposure.

9. What information must I provide in my written declaration of pregnancy?

You should provide, in writing, your name, a declaration that you are pregnant, the estimated date of conception (only the month and year need be given), and the date that you give the letter to the licensee. A form letter that you can use is included at the end of these questions and answers. You may use that letter, use a form letter the licensee has provided to you, or write your own letter.

10. To declare my pregnancy, do I have to have documented medical proof that I am pregnant?

NRC regulations do not require that you provide medical proof of your pregnancy. However, NRC regulations do not preclude the licensee from requesting medical documentation of your pregnancy, especially if a change in your duties is necessary in order to comply with the 0.5 rem (5 mSv) dose limit.

11. Can I tell the licensee orally rather than in writing that I am pregnant?

No. The regulations require that the declaration must be in writing.

12. If I have not declared my pregnancy in writing, but the licensee suspects that I am pregnant, do the lower dose limits apply?

No. The lower dose limits for pregnant women apply only if you have declared your pregnancy in writing. The United States Supreme Court has ruled (in *United Automobile Workers International Union v. Johnson Controls, Inc.*, 1991) that "Decisions about the welfare of future children must be left to the parents who conceive, bear, support, and raise them rather than to the employers who hire those parents" (Reference 7). The Supreme Court also ruled that your employer may not restrict you from a specific job "because of concerns about the next generation." Thus, the lower limits apply only if you choose to declare your pregnancy in writing.

13. If I am planning to become pregnant but am not yet pregnant and I inform the licensee of that in writing, do the lower dose limits apply?

No. The requirement for lower limits applies only if you declare in writing that you are already pregnant.

14. What if I have a miscarriage or find out that I am not pregnant?

If you have declared your pregnancy in writing, you should promptly inform the licensee in writing that you are no longer pregnant. However, if you have not formally declared your pregnancy in writing, you need not inform the licensee of your nonpregnant status.

15. How long is the lower dose limit in effect?

The dose to the embryo/fetus must be limited until you withdraw your declaration in writing or you inform the licensee in writing that you are no longer pregnant. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

16. If I have declared my pregnancy in writing, can I revoke my declaration of pregnancy even if I am still pregnant?

Yes, you may. The choice is entirely yours. If you revoke your declaration of pregnancy, the lower dose limit for the embryo/fetus no longer applies.

17. What if I work under contract at a licensed facility?

The regulations state that you should formally declare your pregnancy to the licensee in writing. The licensee has the responsibility to limit the dose to the embryo/fetus.

18. Where can I get additional information?

The references to this Appendix contain helpful information, especially Reference 3, NRC's Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," for general information on radiation risks. The licensee should be able to give this document to you.

For information on legal aspects, see Reference 7, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children—What Can the Employer Do?" which is an article in the journal *Radiation Protection Management*.

You may telephone the NRC Headquarters at (301) 415-7000. Legal questions should be directed to the Office of the General Counsel, and technical questions should be directed to the Division of Industrial and Medical Nuclear Safety.

You may also telephone the NRC Regional Offices at the following numbers: Region I, (610) 337-5000; Region II, (404) 562-4400; Region III, (630) 829-9500; and Region IV, (817) 860-8100. Legal questions should be directed to the Regional Counsel, and technical questions should be directed to the Division of Nuclear Materials Safety.

REFERENCES FOR APPENDIX

1. National Council on Radiation Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, NCRP Report No. 116, Bethesda, MD, 1993.

2. International Commission on Radiological Protection, *1990 Recommendations of the International Commission on Radiological Protection*, ICRP Publication 60, Ann. ICRP 21: No. 1-3, Pergamon Press, Oxford, UK, 1991.

3. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure," Regulatory Guide 8.29, Revision 1, February 1996.[1] (Electronically available at www.nrc.gov/NRC/RG/index.html)

4. Committee on the Biological Effects of Ionizing Radiations, National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation* (BEIR V), National Academy Press, Washington, DC, 1990.

5. United Nations Scientific Committee on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation*, United Nations, New York, 1993.

6. R. Doll and R. Wakeford, "Risk of Childhood Cancer from Fetal Irradiation," *The British Journal of Radiology*, 70, 130-139, 1997.

7. David Wiedis, Donald E. Jose, and Timm O. Phoebe, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children—What Can the Employer Do?" *Radiation Protection Management*, *11*, 41-49, January/February 1994.

8. National Council on Radiation Protection and Measurements, *Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus, or Nursing Child*, NCRP Commentary No. 9, Bethesda, MD, 1994.

9. National Council on Radiation Protection and Measurements, *Risk Estimates for Radiation Protection*, NCRP Report No. 115, Bethesda, MD, 1993.

10. National Radiological Protection Board, *Advice on Exposure to Ionising Radiation During Pregnancy*, National Radiological Protection Board, Chilton, Didcot, UK, 1998.

11. M.L. Thomas and D. Hagemeyer, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 1996," Twenty-Ninth Annual Report, NUREG-0713, Vol. 18, USNRC, 1998.[2]

[1]Single copies of regulatory guides, both active and draft, and draft NUREG documents may be obtained free of charge by writing the Reproduction and Distribution Services Section, OCIO, USNRC, Washington, DC 20555–0001, or by fax to (301)415–2289, or by email to <DISTRIBUTION@NRC.GOV>. Active guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161. Copies of active and draft guides are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202)634–3273; fax (202)634–3343.

[2]Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402–9328 (telephone (202)512–1800); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202)634–3273; fax (202)634–3343.

FORM LETTER FOR DECLARING PREGNANCY

This form letter is provided for your convenience. To make your written declaration of pregnancy, you may fill in the blanks in this form letter, you may use a form letter the licensee has provided to you, or you may write your own letter.

DECLARATION OF PREGNANCY

To:_____

In accordance with the NRC's regulations at 10 CFR 20.1208, "Dose to an Embryo/Fetus," I am declaring that I am pregnant. I believe I became pregnant in_____ (only the month and year need be provided).

I understand the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 0.5 rem (5 millisievert) (unless that dose has already been exceeded between the time of conception and submitting this letter). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy.

_____

(Your signature)

_____

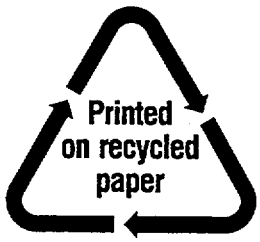
(Your name printed)

_____

(Date)

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. A regulatory analysis prepared for 10 CFR Part 20, "Standards for Protection Against Radiation" (56 FR 23360), provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of the "Regulatory Analysis for the Revision of 10 CFR Part 20" (PNL-6712, November 1988) is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street NW, Washington, DC, as an enclosure to Part 20 (56 FR 23360).



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Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Energized Lab Rules

The DMI 131, 132 and 231 supervised radiographic laboratory sessions will take place in the W2-14 classroom/laboratory. Faculty may also utilize the lab space for other DMI courses throughout the program. Lab attendance and participation is a vital aspect of the student's educational process. The classroom/laboratory is available to all students in the DMI Program to study, use the student computers, and to practice positioning skills for Clinical Objective Evaluations (COEs). This is a privilege and students must abide by the following rules. Failure to adhere to the energized lab rules/radiation safety requirements is a Code of Conduct violation. Violations will result in disciplinary action, up to and including dismissal from the program.

Students are expected to:

- Wear dosimeters at all times. Any student reporting to class/lab without a dosimeter will be asked to leave and the session will be marked as an absence.
- Come prepared to lab with course appropriate positioning and technique references.
- Be present for the entire lab period or be marked absent. Attendance will be taken at the beginning and end of the scheduled session. Students will be marked absent accordingly.
- Take proper care of all radiographic equipment. Students must follow proper warm-up procedures, return equipment to its proper location and turn radiographic equipment OFF after use.
- Be under faculty supervision at all times. Students may not enter the energized lab without faculty approval/presence. Only DMI Program Faculty may unlock the classroom/lab and must manage all classroom/lab time.
- Only take x-ray exposures approved by faculty (e.g., phantom imaging, QC testing) under direct supervision.
- Follow faculty guidelines and manipulate energized equipment without exposing oneself, fellow classmates, or faculty to the primary beam of ionizing radiation at any time. Students are strictly prohibited from irradiating any animate object.
- Follow radiation safety policies and observe through the protective window/behind the lead lined wall during x-ray activation.
- Partake in all laboratory activities, taking turns as "patients" and "technologists".
- Utilize their own right and left radiographic markers during practice sessions and lab COEs.
- Practice proper hand hygiene and aseptic technique with all lab equipment.
- Refrain from socializing, keep noise levels to a minimum and avoid disruptive behavior.
- Refrain from eating and/or drinking near the lab equipment and computers.
- Clean up and dispose of garbage prior to leaving.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Energized Lab Rules

- Refrain from writing and drawing on the white boards. White boards may be used for educational purposes only.
- Use student computers for course purposes ONLY. Students may only visit faculty approved websites (e.g., MyCCP, Canvas, ASRT). Students must turn computers OFF after use (complete shutdown each day is required for proper updates to automatically occur). The podium computer, Clear Touch panels, and printer are for faculty use ONLY.
- Wear headphones or ear buds when completing assignments that contain audio/video.
- Take proper care of all radiographic films used for image analysis purposes. The film library is for faculty use only. Removal of films from the lab is strictly prohibited.
- Return anatomical models, radiographic cassettes, calipers, markers, sandbags, sponges, and other accessories to the proper shelf or storage cabinet after use.
- Place classroom chairs/tables in proper location/order in preparation for the next day of class/lab.
- Return reference books and/or periodicals to their proper storage location after use. Should a student wish to borrow books or periodicals for home study, the materials must be signed out with faculty approval and must be signed in with faculty upon their return.

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Competency Eligibility Verification Form

Student Name _____ **J**_____

Faculty initials indicate the student has successfully completed the classroom assessment or Clinical Objective Evaluation (COE) for the respective patient care activity or imaging procedure. Students may not perform clinical competencies in the clinical education setting unless they have passed the respective assessment or COE.

Activity/Procedure	Date Completed	Faculty Initials	Activity/Procedure	Date Completed	Faculty Initials
GENERAL PATIENT CARE					
Vital Signs – Blood Pressure			Sterile Aseptic Technique		
Vital Signs – Temperature			Medical Aseptic Technique		
Vital Signs – Pulse			Venipuncture		
Vital Signs – Respiration			Assisted Patient Transfer		
Vital Signs – Pulse Oximetery			Care of Patient Medical Equipment		
CHEST AND THORAX					
Chest Routine			*Chest Lateral Decubitus*		
Chest AP Wheelchair			*Sternum*		
Chest AP Stretcher			*Upper Airway (Soft Tissue Neck)*		
Ribs			*Sternoclavicluar Joints*		
UPPER EXTREMITY					
Thumb or Finger			**Shoulder**		
Hand			**Clavicle**		
Wrist			*Scapula*		
Forearm			*AC joints*		
Elbow			**Trauma**	See Body Part	
Humerus					
LOWER EXTREMITY					
Toes			**Femur**		
Foot			*Patella*		
Ankle			*Calcaneus*		
Knee			**Trauma**	See Body Part	
Tibia-Fibula					

Community College *of* Philadelphia
Diagnostic Medical Imaging Program
Competency Eligibility Verification Form

Activity/Procedure	Date Completed	Faculty Initials	Activity/Procedure	Date Completed	Faculty Initials
HEAD					
Skull			*Nasal Bones*		
Facial Bones			*Orbits*		
Mandible			*Paranasal Sinuses*		
Temporomandibular Joints					
SPINE AND PELVIS					
Cervical Spine			**Hip**		
Thoracic Spine			**Cross-Table Lateral Hip**		
Lumbar Spine			*Sacrum and/or Coccyx*		
Cross-Table Lateral Spine	See Body Part		*Scoliosis Series*		
Pelvis			*Sacroiliac Joints*		
ABDOMEN					
Abdomen Supine			*Abdomen Decubitus*		
Abdomen Upright			*Intravenous Urography*		
FLUOROSCOPY STUDIES					
Upper GI Series			*ERCP*		
Contrast Enema			*Myelography*		
Small Bowel Series			*Arthrography*		
Esophagus			*Hysterosalpingography*		
Cystography/Cystourethrography					
MOBILE C-ARM			**MOBILE RADIOGRAPHIC**		
C-Arm Procedure			**Chest**		
Surgical C-Arm Procedure			**Abdomen**		
			Upper or Lower Extremity		
PEDIATRIC PATIENT			**GERIATRIC PATIENT**		
Chest Routine			**Chest Routine**		
Upper or Lower Extremity			**Upper or Lower Extremity**		
Abdomen			*Hip or Spine*		
Mobile Study					