THE REGISTERED APPRENTICESHIP OCCUPATIONS AND STANDARDS CENTER OF EXCELLENCE (AOSC)

Magnetic Resonance Imaging Technologist National Occupational Framework

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Introduction to Using This Document

Under the Registered Apprenticeship Technical Assistance Centers of Excellence award, the Urban Institute leads the Occupations and Standards work. One of the main objectives of Urban's project is to create high-quality, well-researched, consensus-based work process schedules that are nonproprietary and widely available. This document is a product of that work and contains three sections: the occupational overview, the work process schedule, and the related technical instruction.

The **occupational overview** is a general introduction, including alternative job titles, any prerequisites, and, if applicable, the total number of hours needed to complete a time-based or hybrid program.

The **work process schedule** outlines the major job functions, competencies, and/or hours an apprentice completes in a registered apprenticeship program. It outlines what apprentices are expected to learn on the job with the support of a mentor or journeyworker (a worker mastering the competencies of an occupation in a particular industry), including both core competencies and those deemed optional by experts in the field. The work process schedule is the foundational document guiding a program.

Urban works with numerous experts to ensure the content is thoroughly researched and vetted to reflect the expectations of industry, educators, labor unions, employers, and others involved in apprenticeship for this occupation. Sponsors and employers can use the work process schedule as their program standards with assurances it has been approved by experts in the field.

The **related technical instruction** presents considerations for the coursework that apprentices will undertake to supplement on-the-job learning. It is intended to serve as a reference to sponsors exploring their options for the accompanying classroom, virtual, or hybrid training.

How to Use the Work Process Schedule

Sponsors can adapt the work process schedule to accommodate their needs for competency- or time-based or hybrid programs. In a **competency-based** apprenticeship, sponsors assess apprentices' progress across core and optional competencies listed in the work process schedule. In a **time-based** apprenticeship, apprentices complete a predetermined number of hours across major job functions and the program overall. In a **hybrid** apprenticeship, sponsors monitor apprentices' hours spent on major job functions and assess their proficiency across competencies.

Each program type has a different method of assessment:

- **For a competency-based program**, apprentices engage in activities and make progress toward proficiency in the identified competencies. Sponsors overseeing apprentices' work assess their mastery of the outlined competencies using the following rating scale:

  4—Competent/proficient (able to perform all elements of the task successfully and independently)

  3—Satisfactory performance (able to perform elements of the task with minimal assistance)

  2—Completed the task with significant assistance

  1—Unsuccessfully attempted the task

  0—No exposure (note the reason—absence, skill isn't covered, etc.)

  The competencies may be completed in any order. Apprentices must perform at a level 4 or 3 in all competencies listed as "core" to complete the apprenticeship program successfully.

- **For a time-based program,** sponsors monitor apprentices' completion of hours in training across major job functions. The total number of hours recommended for this occupation is listed in the occupational overview and is based on guidance from the US Department of Labor. Generally, apprentices must have at least 2,000 hours overall for on-the-job learning, but occupations of greater complexity may require more hours. Sponsors will provide apprentices with supervised work experience and allocate the total number of hours across the major job functions to adequately train their apprentices.

- **The hybrid approach** blends both competency- and time-based strategies. Sponsors measure apprentices' skills acquisition through a combination of completing the minimum number of hours of on-the-job learning successfully demonstrating identified competencies. Sponsors will assess apprentices' proficiencies as described for competency-based programs with a rating scale of 0–4 for every core competency. Generally, apprentices have at least 2,000 hours overall for on-the-job learning, but occupations of greater complexity may require more hours. Sponsors will document apprentices' completion within a minimum and maximum range of hours assigned for each major job function.

Magnetic Resonance Imaging Technologist Occupational Overview

Occupational Purpose and Context

Magnetic Resonance Imaging (MRI) technologists are allied health professionals who assist and guide patients through MRI scans. Their core responsibility is operating MRI scanners to produce internal images of the human body with accurate and reproducible quality. Other responsibilities of MRI technologists include providing instructions for patients, assisting patients on and off the scanning table, administering contrast agents intravenously, monitoring vital signs, keeping the MRI suite clear of ferrous magnetic objects, adjusting the scanner to fix image quality issues, entering medical information and uploading images, and maintaining imaging equipment. MRI technologists monitor patient safety and comfort as they interact with patients when operating the equipment.

Potential Job Titles

MRI tech (magnetic resonance imaging technologist), MRI lead technologist (magnetic resonance imaging lead technologist), research MRI technologist (research magnetic resonance imaging technologist), and MRI technical manager (magnetic resonance imaging technical manager)

Apprenticeship Prerequisites

Typically, entry into an apprenticeship program for MRI technologists follows or is concurrent with a post-high-school didactic coursework and clinical training program. Such a program often culminates in an associate's degree or higher; after the program, the trainee takes a certification examination. The competencies in the following Work Process Schedule emphasize the on-the-job learning a newly certified MRI technologist receives during their apprenticeship with their sponsor, mentor, and employer. MRI technologists may move from a licensed or certified position to another imaging specialist.

Recommended Length of Apprenticeship

The recommended length of on-the-job learning in an MRI technologist apprenticeship program is 2,000 to 3,000 hours. This time is separate from didactic training. Depending on state apprenticeship programs, the apprenticeship can incorporate the training including clinical training in an MRI-specific education program (with this part of the apprenticeship supported by the state), then the early period of paid employment following the successful passage of an MRI national certification examination (with the employer supporting the apprenticeship following certification).

Work Process Schedule

Magnetic Resonance Imaging Technologist

ONET Code: 29-2035.00
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Instructions for Use:

Competency-based programs: In the "performance level achieved" column of the work process schedule (see examples starting on the next page), assess apprentices' performances on each competency with the scale below. No monitoring of hours is required for this approach. See "Guidelines for Competency-Based, Hybrid and Time-Based Apprenticeship Training Approaches," US Department of Labor, Employment and Training Administration, Office of Apprenticeship, October 20, 2015, https://www.apprenticeship.gov/sites/default/files/bulletins/Cir2016-01.pdf.

4—Competent/proficient (able to perform all elements of the task successfully and independently)
3—Satisfactory performance (able to perform elements of the task with minimal assistance)
2—Completed the task with significant assistance
1—Unsuccessfully attempted the task
0—No exposure (note the reason—absence, skill isn't covered, etc.)

Time-based programs: In the "hours" row, specify the number of hours apprentices will fulfill for each job function. No assessment of competencies is required for this approach.

Hybrid programs: In the "performance level achieved" column, assess apprentices' performances on each competency using the 0–4 scale above. In the "hours" row, identify a range of hours apprentices should spend working on each major job function.

Job Function 1: Conducts pre-procedure preparation, including patient screening, education, and safety assessment		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Greets imaging patients appropriately and professionally	Core	
B. Evaluates patient's ability to understand and comply with communication from health care personnel and arranges for a translator as needed	Core	
C. Confirms identification of patients (generally by name and birth date)	Core	
D. Reviews MRI screening questionnaire with patients, making sure there are no contraindications for MRI exam that would result in canceling the procedure (such as certain pacemakers, implantable cardioverter defibrillators, implanted medication pumps, cochlear implants, any implants held by magnets, neurostimulation systems, catheters with ferromagnetic components, bullets or shrapnel, metal foreign bodies in or near the eye, pregnancy, or possible pregnancy)	Core	
E. Consults physician if contraindications that should have resulted in canceling the procedure are discovered	Core	
F. Reviews MRI screening questionnaire of patient concerns such as anxiety and claustrophobia, discusses in-person patient concerns as needed, and confirms medication was taken if indicated	Core	
G. Explains MRI procedures and their biological effects (at a level they can understand) to patients, patient representatives, and family members	Core	
H. Refers questions about diagnosis, treatment, or prognosis to a licensed practitioner	Core	
I. Reviews factors that can affect the MRI procedure but not necessarily cancel it (for example, confirms names and manufacturers of pacemakers and implanted devices and refers to consulting physician as needed)	Core	
J. Identifies factors that may affect image quality if close to the scanned area (e.g., spinal rods, plates, pins, screws or mesh from bone and joint repair, prostheses, body modifications, tattoos, dental fillings, and braces) and makes special preparations	Core	
K. Reviews patient medical history to ensure safe and effective scan	Core	

L. Identifies contraindications to procedures involving contrast agents, such as kidney disease, kidney failure, kidney transplant, or liver disease	Core	
M. Ensures patients remove hearing aids before the scan and confirms removal	Core	
N. Requests patients to remove medication and glucose monitoring patches	Core	
O. Ensures patients remove all metallic belongings, such as watches, jewelry, cellphones, socks, and other clothing with metal threads, and clothing with metal fasteners	Core	
P. Requests patients to dress in appropriate procedure gowns	Core	
Q. Investigates and, as needed, requests patients remove makeup, nail polish, or other cosmetics that may contain metallic particles	Core	
R. Reviews patient weight for table limit	Core	
S. Fills and explains patient consent form, completely answering all patient questions (in some jurisdictions, consent for MRI procedures is not required, or other health care staff are responsible for this activity)	Optional	
T. Scans patients with a ferromagnetic detector (not all sites use metal detectors)	Optional	

Job Function 2: Prepares personnel, MRI system, equipment, and rooms		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Reviews physician's orders, work orders, and schedules to determine procedures	Core	
B. Selects appropriate imaging techniques and coils to produce required images	Core	
C. Prepares MRI room for exam, including cleaning and disinfecting surfaces	Core	
D. Prepares ancillary equipment; labels the equipment with safe, conditional, or unsafe	Core	
E. Ensures availability of assistive devices such as wedges, stools, and lifts	Core	
F. Provides patient comfort items (e.g., warm blankets, pillows)	Core	

G. Screens ancillary equipment, computer work station, oxygen supplies, and other equipment to confirm all are non-ferromagnetic and MRI-approved	Core	
H. Prepares personal protective equipment as needed	Core	
I. Verifies patient readiness with inpatient nurse and requests patient transport as needed (for MRIs in hospitals; may not be a nurse)	Optional	

Job Function 3: Prepares patient for procedure in MRI room		
Hours **(time-based and hybrid programs only):**		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Reviews patient chart and imaging order	Core	
B. Verifies two patient identifiers (such as name and date of birth)	Core	
C. Determines patient concerns regarding the scan	Core	
D. Obtains patient vital signs when indicated	Core	
E. For non-ambulatory patients, safely transfers the patient to the table with appropriate equipment (such as MRI safe wheelchairs) and with appropriate support from other staff according to facility policy	Core	
F. For ambulatory patients, lowers the table to allow the patient to lie down or take other steps to assist the patient onto the table as needed	Core	
G. Places protective pads for the patient (e.g., knees, head, neck)	Core	
H. Guides the patient through the location and use of alarm bell	Core	
I. Provides headphones or earplugs to patients to improve comfort and reduce noise	Core	
J. For anxious patients, takes steps to reduce anxiety, such as using a prone position when feasible, adjusting mirrors so patients can see out, and discussing plans if premature exit becomes necessary	Core	
K. Instructs patients on how to communicate with the technologist through the intercom system	Core	

L. Starts patient IV using sterile/aseptic technique, as allowed by facility policy	Core	
M. Administers contrast agents through infusion pumps/injector according to facility policy, and checks for symptoms of allergic reaction to contrast materials, such as shortness of breath	Core	
N. Directs patients to close their eyes when laser lights turn on	Core	
O. Attaches MRI-compatible physiological monitoring leads to patient's finger, chest, waist, and other body parts, as needed	Core	
P. Provides MRI-compatible CinemaVision MRI goggles as needed, especially for pediatric MRIs	Optional	

Job Function 4: Conducts imaging procedures		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Verifies body part for imaging	Core	
B. Enters patient data	Core	
C. Performs procedural time-out	Core	
D. Positions patient on table and assistive positioning devices to set up correct imaging planes	Core	
E. Verifies informed consent for MRIs performed in research studies	Core	
F. Provides patient comfort items (e.g., pillows)	Core	
G. Attaches MRI-compatible immobilization devices as needed	Core	
H. Selects and prepares appropriate imaging parameters and options to optimize MRI image quality	Core	
I. Engages and monitors operation of MRI system	Core	
J. Communicates with the patient via intercom to identify any discomfort during operation of MRI system	Core	
K. Performs MRI images, including functional brain imaging, real-time organ motion tracking, or musculoskeletal anatomy and trajectory visualization	Core	
L. Inspects images for quality	Core	

M. Repeats imaging procedure, if necessary	Core	
N. Transmits images to Picture Archiving and Communications System (PACS) (note: the accepted federal term is Medical Image Management Processing Systems, or MIMPS)	Core	
O. Verifies transmission of images to PACS/MIMPS	Core	
P. Applies principles of patient safety to all aspects of patient care	Core	
Q. Uses proper ergonomics and appropriate patient transfer devices	Core	
R. Performs ongoing quality assurance activities	Core	
S. Selects appropriate pulse sequences with consideration to established protocols and best practices for data acquisition	Core	
T. Maintains and ensures restricted access to controlled areas	Core	
U. Employs professional judgment to adapt imaging procedures to improve diagnostic quality	Core	
V. Monitors the patient's physical, emotional, and mental status throughout the procedure	Core	
W. Uses appropriate positioning and insulating materials; monitors factors related to patient overheating and exposure to contact burns	Core	
X. Practices standard precautions at all times	Core	

Job Function 5: Avoids and responds to emergencies		
Hours **(time-based and hybrid programs only):**		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Assesses and monitors the door of the MRI system at all times	Core	
B. Identifies life-threatening situations, including cardiac and respiratory distress, evacuates patient immediately from MRI area, and responds with appropriate first aid and/or life support	Core	
C. Assesses whether the patient is a fall risk and responds accordingly	Core	

D. Responds to patient alarm bell to determine the need for discontinuation of procedure	Core	
E. Maintains access to MRI quench button, and uses it in necessary circumstances	Core	
F. Maintains access to MRI power cut-off, and uses it in necessary circumstances	Core	
G. Follows protocols for patient evacuation as necessary	Core	
H. Follows mandatory reporting requirements (in case of and in response to adverse event)	Core	

Job Function 6: Conducts post-procedure patient care and imaging protocols		
Hours **(time-based and hybrid programs only):**		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Reviews images to determine if a critical report call is needed and conducts a critical report call as indicated	Core	
B. Confirms patient is able to get off MRI table safely, and assists with patient mobility as needed	Core	
C. Safely removes the intravenous (IV) line following the administration of contrast agent, following facility protocols	Core	
D. Checks patient for symptoms of allergic reaction to contrast materials, such as rash or shortness of breath	Core	
E. Ensures qualified staff assist the patient in safely leaving the magnet room to change clothes	Core	
F. Uses proper ergonomics and appropriate patient transfer devices	Core	
G. Ensures staff confirm that the patient has appropriate transportation home with a responsible adult, if the patient received medication for claustrophobia or anesthesia	Core	
H. Maintains patient privacy	Core	
I. Writes technologist communication notes explaining unusual characteristics of imaging results to radiologist/reading physician as needed	Core	
J. Verifies exam charge codes	Core	

K. Reports any device malfunction according to protocols of the health care setting	Core	
L. Distributes thank you cards and alerts patients to watch for follow-up surveys	Optional	

Job Function 7: Maintains equipment and supplies		
Hours **(time-based and hybrid programs only):**		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Performs equipment cleaning and replacement between patients	Core	
B. Manages equipment storage	Core	
C. Conducts inventories of stock of clinical supplies, such as venipuncture supplies, contrast media, sterile trays, wipes, and crash carts	Core	
D. Participates in restocking exam room supplies	Core	
E. Tests MRI equipment (e.g., runs American College of Radiology Phantom) to ensure functioning and performance according to specifications	Core	
F. Troubleshoots technical issues related to the MRI system or peripheral equipment such as monitors or coils	Core	
G. Completes work order requests to maintenance staff or information technology staff as needed	Core	

Job Function 8: Performs departmental responsibilities		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Maintains department supplies	Core	
B. Instructs medical staff about MRI environment, equipment operation, and safety protocols in all zones	Core	
C. Coordinates patient medical record requests while upholding HIPAA standards	Core	
D. Coordinates patient care with other departments	Core	
E. Schedules appointments for research subjects and clinical patients in coordination with physicians and office staff	Core	
F. Completes employee health requirements such as flu shots and vaccinations	Core	
G. Coordinates environmental service needs (e.g., mop, linens, and trash removal)	Core	
H. Completes required facility training and participates in drills for emergency procedures such as disruptive behavior, active shooters, bomb threats, and extreme weather events	Core	
I. Completes the required mandatory MRI drills, including quench and fire drills	Core	
J. Completes the required facility training for patient privacy and sexual harassment	Core	
K. Completes time reporting requirements	Core	
L. Completes paid time off and sick leave processes	Core	
M. Prepares for and actively engages in annual performance reviews by reflecting on job performance, setting goals, and responding to feedback	Core	
N. Demonstrates understanding of professional conduct and respectful workplace expectations by completing required training and applying these principles in interactions with patients and coworkers	Core	
O. Assists in supervising MRI clinical students	Optional	

Job Function 9: Maintains professional development		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Maintains professional certifications	Core	
B. Enrolls in and passes appropriate continuing education credits at appropriate durations and in relevant topics	Core	
C. Completes in-service training on imaging equipment and demonstrates competency by operating the equipment according to updated guidelines or manufacturer instructions.	Core	
D. Completes Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) training and demonstrates proper life-saving techniques during drills or competency assessments	Core	
E. Reads and evaluates research relevant to the profession and adopts new best practices	Core	
F. Maintains membership in a professional association and participates in at least one activity annually, such as attending a meeting, webinar, or conference	Optional	

Related Technical Instruction

MRI Technologist

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Instructions for Use:

Registered Apprenticeships must include at least 144 hours of Related Technical Instruction (RTI). Courses offered by accredited colleges and universities may be assigned a credit hour determination rather than a contact hour determination. In general, an academic credit unit is the equivalent of 15 clock hours of instruction.

Development and Use of this RTI Outline: Employers and academic institutions may approach RTI in markedly different ways. Our goal was not to identify the single best way to provide RTI, or to identify a single provider whose content we deemed to be superior. Instead, our goal was to survey a number of education providers, including employers, institutions of higher education, high schools, private continuing education providers, labor organizations, professional associations and, in some cases, municipalities that provide worker training, to identify topics or courses common among those providers that align with the job functions included in this WPS. Because the American Registry of Magnetic Resonance Imaging Technologists recognizes the importance of apprenticeship education and training, and considers completion of an 18 month registered apprenticeship program sufficient to qualify for certification, this RTI outline was based heavily on the requirements published by ARMRIT (https://www.armrit.org/pdf/APP4152024.pdf).

Licensure or certification requirements: New Hampshire, New Mexico, North Dakota, Oregon, Tennessee, and West Virginia require MRI technologists to be licensed. To qualify for licensure, those states require MRI technologists to hold a recognized certification or registration from the American Registry of Magnetic Resonance Imaging Technologists (ARMRIT) or the American Registry of Radiation Technologists (ARRT). In some cases, a credential in a related field, such as diagnostic medical sonography or nuclear medicine, provides an opportunity for an experienced MRI technologist to become certified, registered, or licensed to practice in this field.
Degree requirements for licensure or certification, if applicable: Two organizations offer credentials for MRI technologists—ARRT and the American Registry of Magnetic Resonance Imaging Technologists (ARMRIT). To be eligible for an ARRT credential, individuals must have earned an associate's degree or higher from an institution accredited by an ARRT-approved accrediting agency (see https://www.arrt.org/pages/earn-arrt-credentials/initial-requirements/primary-requirements/education-requirements-primary/arrt-recognized-accreditation-agencies) and must

have completed an ARRT-approved educational program in MRI Technology (see https://www.arrt.org/pages/about-the-profession/learn-about-the-profession/recognized-educational-programs). However, ARMRIT permits individuals who complete a Department of Labor-approved Registered Apprenticeship Program in Magnetic Resonance Imaging to sit for the certification exam if they have documented 2,000 hours of clinical MRI training from the approved apprenticeship program.

Accreditation requirements of instructional provider for licensure or certification, if applicable:

- ARRT requires individuals to have graduated with at least an associate's degree from a college or university that is accredited by and recognized by the US Department of Education. The degree need not be in radiography or MRI; however, to qualify for the ARRT credential, the individual must have completed an MRI program approved by ARRT in addition to completing a degree program. ARRT does provide a secondary pathway to certification, but this pathway is limited to individuals who already hold ARRT certification or registration in an appropriate supporting category, which includes certain certifications offered by the Nuclear Medicine Technology Certification Board (NMTCB) or the American Registry for Diagnostic Medical Sonography (ARDMS).
- ARMRIT requires individuals to have completed an accredited (ARMRIT approved) certification or degree program that includes at least 1,000 hours of documented MRI clinical training; an MRI Registered Apprenticeship Program (registered by the US Department of Labor or a State Apprenticeship Agency approved by the Department of Labor); a non-ARMRIT approved certification or degree program of at least one year of allied health education that includes at least 2,000 hours of documented MRI clinical training and is licensed by their state; be an experienced allied health professional in a related field and complete at least 1,700 hours of documented MRI clinical experience; or prove four years or 6,240 hours of documented full-time MRI clinical experience or possess an associate's degree and 2,000 hours of full-time MRI clinical experience.

Anticipated changes in licensure or certification requirements, if known: Not applicable

Examples of state licensure or certification requirements: New Hampshire, New Mexico, North Dakota, Oregon, Tennessee, and West Virginia require MRI technologists to be licensed.

Examples of RTI providers for this occupation

Professional associations and labor organizations: American Society of Radiologic Technologists (ASRT) offers a paid continuing education course on MR Basics (https://www.asrt.org/main/continuing-education/earn-ce/featured-ce/mr-training). American Registry of Magnetic Resonance Imaging Technologists (ARMRIT) provides education resources through online seminar lectures (https://courses.icpme.us/class_learn?course=522). ARRT also offers online resources in the form of e-books, PDFs, recordings, etc. Both ARMRIT and ARRT resources are targeted toward topics required to meet the continuing education activities needed to maintain their certifications and renewals.

Military: MRI training is offered by the military at Ft. Sam Houston, and those who complete the program are eligible for certification and registration. In addition, individuals who have completed a degree in another field; who hold another similar credential with ARRT, NMTCB, or ARDMS; and who have completed 16 hours of structured education and 125 repetitions of MRI imaging procedures may also qualify for jobs as MRI technicians in the military services (https://www.careersinthemilitary.com/career-detail/magnetic-resonance-imaging-technicians). https://www.cool.osd.mil/army/credential/index.html?cert=mri501&moc=68p).

States/municipalities: Not applicable

Colleges and universities: Two- and four-year degree programs are offered by colleges in related fields.

No-cost online providers: Free and paid courses are available on online learning platforms such as Udemy and Coursera.

Continuing education or specialty education providers: Certificate programs in MRI technology are offered by specialty schools in the medical field. For example, the 24-month accelerated MRI Technologist Training Program, including a mandatory clinical internship, is offered by Aquarius Institute (https://aquariusinstitute.com/mri-technologist-program). Another example is the Tesla Institute of MRI Technology, which offers a 12-to 18-month MRI technologist program. The program can also collaborate with employers to provide training to staff (https://www.teslamrinstitute.org/for-employers).

Prerequisite knowledge, skills or experience typically required by RTI providers for this occupation

Individuals must possess good interpersonal skills, pay close attention to details, and have visual acuity that enables them to identify fine details. Many employers, as well as states that require MRI technologists to be licensed, may require an individual to pass a criminal background check before being enrolled, licensed, or hired.

Introduction to Working in Clinical Settings and Employer Onboarding

Hours: 20–30

Sample learning objectives

- Describe the role of MRI technologists as part of a patient care team and the scope of practice and limitations associated with each member of the team.
- Discuss the role of radiology technologists and MRI technologists in patient imaging.
- Explain the importance of patient privacy and properly respond to requests for information from other members of the health care team, family members, researchers, and others.
- Explain the limitations of MRI technologists in providing information to patients about the results of imaging studies.
- Explain the importance of reviewing, interpreting, and providing accurate and properly written patient care notes.
- Explain the risks of bloodborne pathogens and contagious diseases and steps MRI technologists must take to protect themselves and others from the risks of disease transmission.
- Describe the employer's policies for punctuality, recording work hours, requesting time off, notifying the employer in the event of illness or injury that prevents one from working, and reporting concerns about the employer's policies and practices or those of other employees.
- Explain the employer's policies regarding workplace conduct and ethics.
- Describe the proper procedures for reporting concerns related to patient and peer safety, medical ethics, or the care of patients and their families.
- Demonstrate the ability to dress and groom properly for work in the health care setting.
- Demonstrate the ability to communicate clearly and professionally, work effectively with difficult people, diffuse anger and tension, and engage in active listening to resolve conflicts.

Medical Terminology

Hours: 20

Sample learning objectives

- Identify the meaning of root words, prefixes, suffixes, and combinations typically used in health care settings.
- Correctly define and pronounce commonly used medical terms, symbols, and abbreviations.
- Define, identify, and properly use terminology related to radiography and other imaging modalities, including radiologic oncology.
- Transcribe and interpret radiographic orders and requisitions, as well as the content of patient medical histories, medical procedures, and clinical or diagnostic reports.

Mathematics for Allied Health Professionals

Hours: 30–45

Sample learning objectives

- Demonstrate the ability to convert between metric and English units of measure.
- Correctly use and manipulate exponents.
- Perform calculations involving addition, subtraction, multiplication, and division.
- Convert fractions to decimals and decimals to fractions; add, subtract, multiply, and divide fractions and decimals; and calculate proportions and ratios.
- Calculate rates of change.
- Calculate percentages and use percentages to determine the amount of materials to be used.
- Use scientific notation and manipulate numbers expressed with exponents.
- Use algebraic techniques to solve unknown variables, solve linear equations, follow the correct order of operations, use the distributive law, and solve systems of equations.
- Define the various types and components of triangles, determine interior and exterior triangle angles, use the Pythagorean Theorem to solve problems for right triangles, and determine the perimeter and area of triangles.
- Identify squares, rectangles, parallelograms, trapezoids, hexagons, octagons, pentagons, and quadrilaterals and calculate their perimeter and area.
- Calculate the diameter, radius, circumference, and arc of a circle.
- Use the Laws of Sines and Cosines to determine angles.
- Define and use mean, median, mode, and standard deviation.
- Create and interpret graphs.

Introduction to Magnetic Resonance Imaging

Hours: 45–60

Sample learning objectives

- Describe the roles and responsibilities of the various members of the health care team.
- Compare and contrast ionizing and non-ionizing imaging technologies.
- Describe the important components of effective communication with patients, including patients of different ages and education levels, patients with physical limitations or intellectual disabilities, patients who do not speak English, patients from various ethnic backgrounds, patients of multiple genders, and patients who are exhibiting behaviors associated with fear, anxiety, and stress.
- Describe the professional code of ethics by which MRI technologists must operate.
- Describe key elements of the health care environment, such as the various types of short-term and long-term care facilities in which patients are treated (including hospitals, outpatient clinics, mental health facilities, hospice care, home health care, and telemedicine); payment and reimbursement systems; quality management protocols; and the administrative structure of patient care facilities.
- Describe the role of accreditation and credentialing organizations as well as state and federal regulatory bodies in providing safe and quality MRI and other imaging services.
- Discuss the requirements of the Centers for Medicare and Medicaid Services related to MRI imaging.
- Explain the federal and state laws that protect patient privacy, and the steps health care professionals must take to comply with those laws when managing patient records and sharing patient health information with the appropriate individuals or clinicians.
- Discuss the physics of magnetic resonance imaging and the types of equipment used in clinical settings. Explain the importance of repetition time and time to echo in producing clear images in various tissue types.
- Discuss the risks associated with MRI imaging, such as the dislodging and potentially flying of ferrous objects (such as metal implants), radio-frequency burns, high-decibel acoustic noise damage to hearing, and kidney damage resulting from the use of gadolinium-based IV-contrast agents.
- Describe the basic positions used to capture images based on medical orders, taking into account a patient's disabilities, illnesses, and injuries that may make it difficult for patients to be properly positioned.
- Discuss strategies for performing MRI on individuals who are claustrophobic or who are unable to remain still during imaging procedures, including infants and children.
- Describe adaptive techniques and tools that are used to position patients during MRI imaging.
- Discuss the importance of informed consent and the responsible use of patient images in performing ethical medical research or case studies.

Anatomy and Physiology
Hours: 45–60
Sample learning objectives ▪ Explain the importance of maintaining homeostasis in the body and describe the various mechanisms used by the body's systems to do so. ▪ Use proper nomenclature to describe location or directional aspects of anatomy, to identify body planes, and to identify body cavities. ▪ Name, identify, and describe the function of the components of the body's systems (integumentary, cardiovascular, nervous, respiratory, endocrine, muscular, skeletal, digestive, lymphatic, urinary, reproductive, circulatory, and pulmonary). ▪ Identify anatomical structures as seen in axial, sagittal, and coronal planes. ▪ Explain the chemistry of living systems, including the structure of atoms and molecules; the importance of maintaining the appropriate pH or acid-base balance; the structure and function of cells; intercellular and intracellular movement including by osmosis and diffusion; the chemistry of water, carbon and oxygen; the structure and function of deoxyribonucleic acid and ribonucleic acid and the processes of transcription and translation; and cellular systems for the production and consumption of energy. ▪ Identify the key components of cells, tissues, organs, and organ systems. ▪ Explain the components and processes involved in cellular metabolism. ▪ Describe the most common sources of anatomical or physiological pathology, and the impact of pathology on each of the body's systems. ▪ Demonstrate the use of basic laboratory equipment, including microscopes, dissection tools, spirometers, sphygmomanometers, hydrometers, blood typing and analysis, centrifuges, etc.

Imaging Procedures
Hours: 45–60
Sample learning objectives ▪ Explain the types of tissues which can best (or only) be visualized using MRI technologies. ▪ Explain the physics of magnetic resonance imaging and the impact of fat distribution in the body area being examined in producing clear images. ▪ Explain the contraindications to MRI, such as implanted metallic devices, intraocular metallic foreign bodies, unstable patients, pregnancy, and psychological distress (agitation, claustrophobia, etc.) ▪ Explain the types of imaging modes available, such as 2D, 3D, and 4D acquisition, and the indicated uses of each. ▪ Explain the implications of signal-to-noise (STN) ratios in producing clear images and demonstrate the ability to obtain clear images by optimizing STN. ▪ Differentiate between the common types of MRI coils used in clinical settings and demonstrate the ability to use each type of coil, as well as a general-purpose coil, in the event of a specific coil being unavailable. ▪ Differentiate between T1-weighted images, T2-weighted images, fluid attenuated inversion recovery images (FLAIR), and diffusion-weighted imaging (DWI). ▪ Explain the types of pulse sequences used to image different body structures or to diagnose anatomical defects. ▪ Demonstrate the ability to properly image different body parts and organ systems, such as bones and joints, the heart, the kidneys and adrenal glands, and the brain/neuromuscular system. ▪ Evaluate image quality and make the appropriate adjustments to improve image quality when necessary. ▪ Explain how to properly determine the number of slices needed to properly image the target tissue, organ, or organ system, as well as the options available for reconstructing images. ▪ Explain the use of gadolinium as a contrast medium in imaging studies.

MRI Pathology

Hours: 45–60

Sample learning objectives

- Explain the use of MRI techniques in identifying pathologies, such as sarcomas, brain lesions, musculoskeletal deformities, spinal cord injuries, soft tissue damage, and joint denigration.
- Explain the benefits of MRI over CT scans, radiographic images, and other imaging technologies in the diagnosis of pathology.
- Demonstrate the ability to select the proper imaging sequences to produce images useful in diagnosing injuries or illnesses.
- Explain the challenges in diagnosing and treating MRI-negative (non-lesional) epilepsy.
- Describe the use of MRI in diagnosing cancer.
- Explain the use of MRI in diagnosing diseases of the central nervous system.
- Discuss the use of MRI in diagnosing musculoskeletal deformities, injuries, or degenerations.

Patient Care and Safety in Radiologic Imaging

Hours: 20–30

Sample learning objectives

- Describe the key components of patient-MRI technologist interactions and demonstrate the ability to identify patients correctly, explain the procedure about to take place and information about proper positioning, provide accurate information about the duration of the procedure and any noises or sounds associated with it, and affirm that the appropriate licensed medical provider will communicate test results.
- Maintain a clean, properly stocked, and safe MRI environment.
- Demonstrate the ability to use proper body mechanics to move and position patients.
- Demonstrate the ability to assess a patient's mobility accurately and to use appropriate transfer tools and techniques to move patients from wheelchairs, stretchers, or beds to MRI imaging equipment.
- Demonstrate the ability to ascertain patient status, such as by taking vital signs, engaging in communication, and reviewing patient care notes and laboratory results.
- Describe effective strategies for fall prevention.
- Describe and demonstrate the ability to position or to assist patients in positioning themselves for MRI imaging.
- Demonstrate the ability to assist patients unable to remain still during imaging studies, due to age, disability, pathology, or claustrophobia.

- Describe the importance of magnetic resonance safety and demonstrate the ability to ascertain whether implanted devices or clips are present and to manage patients who require supplemental oxygen supply.
- Describe the process of completing a proper incident report when necessary.
- Describe the types of infections most prevalent in in-patient and out-patient care facilities, and among patients seeking care, as well as the techniques, equipment, and strategies used to reduce the risk of infection.
- Identify common medical emergencies (shock, allergic reaction, excessive bleeding, diabetic emergencies, respiratory and cardiac failure, airway obstruction, cerebral vascular accidents, fainting, and seizures) as well as the appropriate medical response to each.
- Demonstrate the ability to assess and respond to various patient medical emergencies accurately.
- List the sources of absolute and relative contraindications, such as pacemakers, defibrillators, foreign bodies, aneurysm clips, deep brain stimulators, gunshot close to vital structures, cochlear implants, Swan-Ganz catheters, some dental implants, stents, drug-infusion pumps, prosthesis, neuro- or bone-growth stimulators, etc.
- Demonstrate the ability to perform a comprehensive patient interview to identify potential contraindications to magnetic resonance imaging.
- Demonstrate the ability to administer contrast agents orally and intravenously.

Relevant military experience

The military's Tri-Service Radiography Program is presented in two phases and qualifies individuals to become credentialed by ARRT. Phase one for all services is conducted at the Medical Education and Training Campus (METC) at Fort Sam Houston, Texas. Phase 2 is conducted at various locations throughout the US. This program is accredited by the JRCERT, and graduates will be assigned to an aligned military occupation code (AF = 4ROX1, Navy = 8452, and Army = 68P) and will be eligible for ARRT certification and registration. The military's Nuclear Medicine Program is also located at the METC campus. It is a program of Air University, which is accredited by an accrediting agency recognized by the US Department of Education.

Occupational insights

52.6 percent of MRI technologists are women, while 47.4 percent are men. Looking at racial distribution, 69.7 percent are White, followed by Hispanic/Latino at 11 percent, Asian at 10.4 percent, and Black/African American at 5.4 percent (https://www.zippia.com/staff-mri-technologist-jobs/demographics).

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