High Technology Institute of Applied Health Sciences

Academic Reference Standards (ARS)

For

Technology of Radiology and Medical Imaging Program

B. Sc Program

High Technology Institute of Applied Health Sciences

(Badr)

July,2025

1st edition

Contents

Introduction:

The Academic Reference Standards (ARS) for Bachelor of Science in Technology of Radiology and Medical Imaging aims are consistent with the Institute mission and the community it serves and the desired distinctive capabilities of its graduates. The Radiology and Medical Imaging Technologist program aims to educate and prepare students for a career as radiologic technologists.

Radiological technologists, also known as radiographers, perform medical imaging for specific parts of the body. The images are then interpreted by a radiologist for a report. Radiographers prepare patients for imaging; position patients accurately, operate the equipment, and use their knowledge and skills to minimize the radiation dose to the patient.

Throughout the program, students will train to perform radiographic imaging, provide quality patient care, and assist radiologists with diagnostic procedures. NAQAAE support the autonomy and academic freedom of educational institutions and acknowledge the diversity of their missions; hence, institutions are invited to consider adopting reference points that reflect their mission

Four competence domains are included in the competence based academic reference standards for Technology of Radiology and Medical Imaging program specialists. Program to integrate the knowledge of Technology of Radiology and Medical Imaging program specialists with other learning outcomes, aiming at standardizing the role of graduates within the healthcare filed

Academic Reference Standards (ARS) for

Technology of Radiology and Medical Imaging Program

Attributes of the Graduates

The graduate for Bachelor of Science in Technology of Radiology and Medical Imaging program should:

1. Apply foundational knowledge of basic, applied and specialized health sciences to radiology and medical imaging.
2. Adhere to radiation safety principles, quality assurance protocols and infection control standards in all radiographic environments.
3. Perform imaging procedures across multiple modalities.
4. Interpret anatomical structure, pathological findings and imaging data utilizing radiological information systems.
5. Recognize and respond to adverse reactions and urgent scenarios.
6. Communicate and collaborate effectively with all healthcare teams (physicians, nurses, and other professionals) in multidisciplinary settings.
7. Ensure patient confidentiality, comfort, preparation and ethical standards in all radiology procedures.
8. Conduct research, demonstrate diagnostic reasoning, critical thinking, problem-solving and stay updated with global trends, innovations, and best practices in radiology diagnostics.
9. Encourage self-development, continuous education and life-long learning.

Competencies of the Graduates of Technology of Radiology and Medical Imaging Program

Four competence-domains are included in this competence based Academic Reference Standards for **Technology of Radiology and Medical Imaging Program** to integrate the knowledge of medical imaging technology aiming at standardizing the role of graduates within the healthcare field.

Domain 1: Basic Capabilities

1.1- Competency: Integrate essential basic capabilities required to develop health sciences competence.

Sub- competency

1.1.1- Demonstrate an understanding of fundamental knowledge of basic and applied health sciences.

1.1.2- Describe the normal structure of the body and its major organ systems and explain their functions.

1.1.3- Understand the comprehensive knowledge of nuclear physics, plain X-ray, ultrasound, CT, MRI, contrast media, bone densitometry, interventional and cardiovascular techniques .

1.1.4- Interpret anatomical structure, pathological findings and imaging data utilizing radiological information systems.

1. 2- Competency: Utilize information and technology to support health care delivery, communicate, manage information, and support decision making.

Sub- competency

1.2.1. Use computers and software in medical imaging effectively.

1.2.2. Apply statistical skills and evidence based practice in imaging data manipulation and analysis.

1.2.3- Use health informatics to improve the quality of patient care & operate radiological information management systems appropriately.

1.2.4- Use Picture Achieving and Communication systems (PACS).

1.3- Competency: Implement organizational and quality strategies to achieve the ultimate goals of care improvement.

Sub- competency

1.3.1- Contribute to continuous quality management and improvement.

1.3.2- Apply quality control measures to ensure test accuracy and reliability.

1.3.3- Participate in internal and external medical imaging audits and accreditation processes.

Domain 2: Professional and Ethical practice

2.1- Competency: Work collaboratively as a member of the inter-professional health team.

Sub- competency

2.1.1- Exhibit appropriate professional behaviors and relationships in all aspects of medical imaging practice.

2.1.2- Ensure confidentiality, privacy of patients' information, comfort, preparation and ethical standards in all radiology procedures.

2.1.3- Practice in an ethical and professional manner consistent with relevant legislation and regulatory requirements in medical imaging.

2.1.4- Collaborate with other health practitioners (physician, patient, families,…).

2.2- Competency: Demonstrate safe and effective radiology and medical imaging practice.

Sub- competency

2.2.1- Adopt suitable measures for infection control in medical imaging environment.

2.2.2-Adhere to strict biosafety regulations and standards.

2.2.3- Operate equipment safely and troubleshoot medical imaging devices.

2.3- Competency: Conduct research work effectively and efficiently.

Sub- competency

2.3.1. Collect, analyze and interpret medical imaging data using scientific methods.

2.3.2- Design, conduct research projects and manage multiple tasks.

2.4- Competency: Apply quality assurance principles and administrative issues to improve health care services.

Sub- competency

2.4.1- Improve the health service provision by applying a process of continuous quality improvement.

2.4.2- Troubleshoot technical errors and interpret results effectively in medical radiology practice.

2.4.3- Contribute to design and monitor medical radiology quality systems.

Domain 3: Specialized healthcare for Medical Laboratory Technology

3.1- Competency: Apply the proper principles in managing technical radiology and medical imaging practices.

Sub- competency

3.1.1- Perform, maintain and evaluate routine and advanced diagnostic imaging procedures (x-ray, ultrasound and nuclear medicine).

3.1.2- Collect, transport, preserve and store radioactive material according to standard operating procedures.

3.1.3- Apply radiation dose optimization and image quality control techniques.

3.1.4- Apply standard procedures in Contrast Media, bone densitometry, CT and MRI.

3.1.5- Assist in interventional radiology procedures under professional supervision.

3.1.6- Apply technical skills in using medical imaging equipment, tools, devices and materials.

3.1.7- Manage workflow efficiency by coordinating patient scheduling, optimizing resource allocation, and minimizing delays while maintaining a high standard of patient care and staff productivity.

3.2- Competency: Provide advising services and adequate preparation required to achieve radiology and medical Imaging procedures.

Sub- competency

3.2.1- Participate in health promotion campaign.

3.2.2- Perform different education, training, processing, management and monitoring staff.

3.2.3- Educate patients on the purpose, process, potential risks, and expected outcomes of the imaging procedure, using language appropriate to the patient's level of understanding.

3.2.4- Train and monitor junior staff and students in medical imaging procedures.

3.2.5- Coordinate with multidisciplinary healthcare teams to confirm all preparatory requirements are met, including equipment readiness, patient positioning, and adherence to infection control and radiation safety measures.

3.2.6- Implement appropriate physical and psychological preparation measures such as fasting instructions, contrast administration protocols, and anxiety reduction strategies in accordance with established clinical guidelines.

Domain 4: Personal Practice.

4.1- Competency: Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.

Sub- competency

4.1.1- Participate in teamwork harmoniously and exhibit collaborate effectively with colleagues and other health care professionals.

4.1.2-Apply critical and reflective thinking to resolve questions.

4.1.3- Take responsibility for one's action and decision in practice.

4.2- Competency: Effectively communicate with individuals and communities.

Sub- competency

4.2.1- Communicate effectively and develop collaborative relationships with all healthcare team.

4.2.2- Adapt communication style and terminology according to the audience's language proficiency, cultural background, and emotional state, to promote understanding and cooperation.

4.2.3- Apply clear, respectful, and culturally sensitive communication techniques to ensure that patients, families, and community members understand the purpose, process, and implications of radiology and imaging procedures.

4.3- Competency: Express self-awareness and be a life-long learner for continuous professional improvement.

Sub- competency

4.3.1- Revise a personal learning plan to enhance professional practice

4.3.2- Engage in inter-professional activities and collaborative learning.

Glossary

Competency
An observable ability of a professional, integrating multiple components such as knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition.

Competency framework
An organized and structured representation of a set of interrelated and purposeful competency objects.

Competency-based education
An outcomes-based approach to the design, implementation, assessment of learners, and the evaluation of education programs, using an organizing framework of competencies.

Graduate Attributes
Characteristics, qualities, attitudes and dispositions that graduates should possess upon completion of a particular program.

Intended Learning Outcomes (ILOs)
Subject-specific knowledge, understanding and skills intended by the institution to be gained by the learners completing a particular educational activity. The ILOs emphasize what is expected that learners will be able to do as a result of a learning activity.

National Academic Reference Standards (NARS)
Reference points defined by NAQAAE to outline/describe the expected minimum competencies to fulfill the requirements of a program of study.

Academic Standards
Reference points prescribed (defined) by an institution comprising the collective outcomes / competencies to be gained by the graduates of a particular program. The academic standards should surpass the NARS, and be approved by NAQAAE.

National Qualifications Framework (NQF)
A framework that provides a systematic description of all qualifications within the educational systems of the state and categorizes them according to a set of standards that determine the level of learning outcomes for each qualification gained. The NQF is used as a tool for benchmarking, quality assurance, comparison and coordination between the different qualifications.

The Program

A set of educational courses and activities designed by the institution to determine the systematic learning progress. The program also imparts the intended competencies required for the award of an academic degree.

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Matrix of Competencies and Courses

Competency	Courses	
Domain 1: Basic Capabilities		
1.1- Competency: Integrate essential basic capabilities required to develop health sciences competence.		
Sub- competency		
1.1.1-Demonstrate an understanding of fundamental knowledge of basic and applied health sciences.	**General Physics** **Physical Chemistry** **General Microbiology** **Basic histology** **Mechanics** **Mechatronics** **General Pathology**	**AHST 101** **AHST 102** **AHST 103** **AHST 104** **AHST 105** **AHST 107** **AHST 201**
1.1.2- Describe the normal structure of the body and its major organ systems and explain their functions.	**Basic Anatomy Basic Physiology**	**AHST 106** **AHST 109**
1.1.3- Understand the comprehensive knowledge of nuclear physics, plain radiographic techniques, ultrasound, CT, MRI, contrast media, bone densitometry, radiation techniques, pediatric imagining, dental radiology, interventional and cardiovascular techniques.	**-Nuclear Physics I &II** **-Pathology I&II** **-Image Management Technique** **-CT Technology I &II** **-MRI Technology I&II** **- Bone Densitometry Techniques** **- Introduction to Radiology Techniques** **– Plain Radiographic Techniques I&II** **- Ultrasound** **- Contrast media** **- Radiation techniques I&II** **- Pediatric imagining** **- Dental radiology** **- Interventional and cardiovascular techniques I&II**	**TRMI 201+207** **TRMI 205+210** **TRMI 211** **TRMI 301 +308** **TRMI 401 +407** **TRMI 311** **TRMI 203** **TRMI 202+208** **TRMI 206** **TRMI 304** **TRMI 402+408** **TRMI 404** **TRMI 307** **TRMI 403+409**
1.1.4-Interpret anatomical structure, pathological findings and imaging data utilizing radiological information systems	**- Human Anatomy for Radiology Technologist I&II** **- Pathology I&II**	**TRMI 204+209** **TRMI 205+210**

1. 2- Competency: Utilize information and technology to support health care delivery, communicate, manage information, and support decision making.		
Sub- competency		
1.2.1. Use computers and software in the field of medical imaging effectively.	**Basic computer sciences**	**BI 103**
1.2.2. Apply statistical skills and evidence based practice in imaging data manipulation and analysis.	**Basic statistics** **Biostatistics**	**AHST 108** **AHTE BS**
1.2.3- Use health informatics to improve the quality of patient care & operate laboratory information management systems appropriately.	**Health informatics** **Laboratory quality management I&II**	**AHTE HI** **TRMI**
1.2.4- Use Picture Achieving and Communication systems (PACS).	**Image management** **Radiation Information System**	**TRMI 211** **TRMI 303**
1.3- Competency: Implement organizational and quality strategies to achieve the ultimate goals of care improvement.		
Sub- competency		
1.3.1- Contribute to continuous quality management and improvement..	**Introduction to quality** **Total Quality Management**	**BI 106** **TRMI306**
1.3.2- Apply quality control measures to ensure test accuracy and reliability.	**Occupational Health & safety** **Total Quality Management** **Infection control & radiation protection**	**BI 107** **TRMI306** **TRMI 405**
1.3.3- Participate in internal and external medical imaging audits and accreditation processes.	**Total Quality Management** **Health education** **Training**	**TRMI306** **AHTE HE** **TRMI212+312+411**
Domain 2: Professional and Ethical practice		
2.1- Competency: Work collaboratively as a member of the inter-professional health team.		
Sub- competency		
2.1.1- Exhibit appropriate professional behaviors and relationships in all aspects of	**Communication** **Basic of marketing**	**BI 104** **AHTE BMM**

medical imaging practice.	**management**	
2.1.2- Ensure confidentiality and privacy of patients' information, comfort, preparation and ethical standards in all radiology procedures.	**Communication** **Ethical & legal issues**	**BI 104** **TRMI 310**
2.1.3- Practice in an ethical and professional manner consistent with relevant legislation and regulatory requirements in medical imaging.	**Ethical & legal issues**	**TRMI 310**
2.1.4- Collaborate with other health practitioners (physician, patient, families,…).	**Ethical & legal issues** **Training** **Research project**	**TRMI 310** **TRMI212+312+411** **TRMI 410**

2.2- Competency: Demonstrate safe and effective Medical laboratory practice.

Sub- competency		
2.2.1- Adopt suitable measures for infection control in medical imaging environment.	**Occupational Health & safety** **Infection control & radiation protection**	**BI 107** **TRMI 405**
2.2.2-Adhere to biosafety regulations & standards.	**Patient safety & Management I&II**	**TRMI 302+309**
2.2.3- Operate equipment safely and troubleshoot laboratory instruments.	**Training I&II&III** **Maintenance of medical equipment in radiology**	**TRMI212+312+411** **TRMI 305**

2.3- Competency: Conduct research work effectively and efficiently.

Sub- competency		
2.3.1. Collect, analyze and interpret data using scientific methods.	**Training I&II&III** **Scientific writing**	**TRMI212+312+411** **AHTE SW**
2.3.2- Design, conduct research projects and manage multiple tasks.	**Training I&II&III** **Research project** **Scientific writing**	**TRMI212+312+411** **TRMI 410** **AHTE SW**

2.4- Competency: Apply quality assurance principles and administrative issues to improve health care services.

Sub- competency		
2.4.1- Improve the health service provision by applying a process of continuous quality	**Introduction to quality** **Principle of management** **Total Quality Management**	**BI 106** **BI 105** **TRMI 306**

improvement.		
2.4.2- Troubleshoot technical errors and interpret results effectively.	**Maintenance of medical equipment in radiology**	**TRMI 305**
2.4.3- Contribute to design and monitor in radiology quality systems.	**Total Quality Management**	**TRMI 306**

Domain 3: Specialized healthcare for Medical Laboratory Technology

3.1- Competency: Apply the proper principles in managing technical Medical Laboratory practices.

Sub- competency		
3.1.1- Perform, maintain and evaluate routine and advanced diagnostic imaging procedures (x-ray, ultrasound and nuclear medicine).	**-CT Technology I &II** **-MRI Technology I&II** **- Bone Densitometry Techniques** **– Plain Radiographic Techniques I&II** **- Ultrasound** **- Radiation techniques I&II** **- Pediatric imagining** **- Dental radiology** **- Interventional and cardiovascular techniques I&II**	**TRMI 301 +308** **TRMI 401 +407** **TRMI 311** **TRMI 202+208** **TRMI 206** **TRMI 402+408** **TRMI 404** **TRMI 307** **TRMI 403+409**
3.1.2- Collect, transport, preserve and store radioactive material according to standard operating procedures.	**- Contrast media**	**TRMI 304**
3.1.3- Apply radiation dose optimization and image quality control techniques.	**- Nuclear Physics I &II** **-Image Management Technique** **- Radiation techniques I&II**	**TRMI 201+207** **TRMI 211** **TRMI 402+408**
3.1.4- Apply standard procedures in Contrast Media, bone densitometry, CT and MRI.	**- Contrast media** **- CT Technology I &II** **-MRI Technology I&II** **- Bone Densitometry Techniques** **- Radiation techniques I&II**	**TRMI 304** **TRMI 301 +308** **TRMI 401 +407** **TRMI 311** **TRMI 402+408**
3.1.5- Assist in interventional radiology procedures under	**Interventional and cardiovascular techniques I&II**	**TRMI 403+409**

professional supervision.		
3.1.6- Apply technical skills in using medical imaging equipment, tools, devices and materials.	- **Radiation techniques I&II**	**TRMI 402+408**
3.1.7- Manage workflow efficiency by coordinating patient scheduling, optimizing resource allocation, and minimizing delays while maintaining a high standard of patient care and staff productivity.	**Training I&II&III** **Radiation Information System** **Patient safety & Management I&II**	**TRMI212+312+411** **TRMI 303** **TRMI 302+309**

3.2- Competency:

Provide advising services and adequate preparation required to achieve medical laboratory procedure.

Sub- competency		
3.2.1- Participate in health promotion campaign.	**Training I&II&III**	**TRMI212+312+411**
3.2.2- Perform different education, training, processing, management and monitoring staff.	**Health education** **Training I&II&III**	**AHTE HE** **TRMI212+312+411**
3.2.3- Educate patients on the purpose, process, potential risks, and expected outcomes of the imaging procedure, using language appropriate to the patient's level of understanding..	**Health education** **Human rights** **English language**	**AHTE HE** **BI 102** **BI 101**
3.2.4- Train and monitor junior staff and students in laboratory procedures.	**Training I&II&III** **Research project**	**TRMI212+312+411** **TRMI 410**
3.2.5- Coordinate with multidisciplinary healthcare teams to confirm all preparatory requirements are met, including equipment readiness, patient positioning, and adherence to infection control and radiation safety measures.	**Patient safety & Management I&II** **Infection control & radiation protection**	**TRMI 302+309** **TRMI 405**

3.2.6- Implement appropriate physical and psychological preparation measures such as fasting instructions, contrast administration protocols, and anxiety reduction strategies in accordance with established clinical guidelines.	**Patient safety & Management I&II** **Infection control & radiation protection**	**TRMI 302+309** **TRMI 405**

Domain 4: Personal Practice.

4.1- Competency: Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.

Sub- competency		
4.1.1- Participate in teamwork harmoniously and exhibit collaborate effectively with colleagues and other health care professionals.	**Basis of marketing management** **Logistic & supply chain management**	**AHTE BMM** **AHTE LSCM**
4.1.2-Apply critical and reflective thinking to resolve questions.	**Biostatistics**	**AHTE BS**
4.1.3- Take responsibility for one's action and decision in practice.	**Training I&II&III** **Research project**	**TRMI212+312+411** **TRMI 410**

4.2- Competency: Effectively communicate with individuals and communities.

Sub- competency		
4.2.1- Communicate effectively & develop collaborative relationships with all healthcare team.	**Communication** **Training I&II&III**	**BI 104** **TRMI212+312+411**

4.3- Competency: Express self-awareness and be a life-long learner for continuous professional improvement.

Sub- competency		
4.3.1- Revise a personal learning plan to enhance professional practice.	**Training I&II&III**	**TRMI212+312+411**
4.3.2- Engage in inter-professional activities and collaborative learning.	**Training**	**TRMI212+312+411**