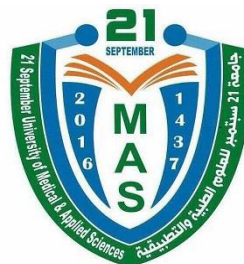


Republic of Yemen
Ministry of Education & Higher Research
Council of Academic Accreditation & Quality Assurance of
Higher Education (CAQA)



**21 september University of Medical
and Applied Science**



Faculty of Applied Medical Science

Department of **Medical Radiology and Imaging Technology**

Program of Radiologic Technology and Medical Imaging

Course Specification of

Quality Assurance in Radiology Department

Course Code. (____)

2024



T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:

Reviewed by:

Dr. -----

Head of the Department:

Dr. Awadh Al-Kubati

Quality Unit:

Dr. Mohammed
Al-shamahi

Dean:

Dr. Abdulsalam
Dalaq

I. General Information:

1.	Course Title:	Quality Assurance in Radiology Department				
2.	Course Code:					
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	3 rd Level / 1 st Semester				
5.	Pre –Requisite (if any):	Clinical Practice I				
6.	Co –Requisite (if any):	None				
7.	Program (s) in which the Course is Offered:	Bachelor of Radiologic Technology and Medical Imaging				
8.	Language of Teaching the Course:	English				
9.	Location of Teaching the Course:	Faculty of Applied Medical Science				
10.	Prepared by:					
11.	Date and Number of Approval by Council:					

II. Course Description:

This course introduces the principles and practices of quality assurance (QA) in the radiology department. Topics include quality control (QC) tests, performance standards, regulatory compliance, and the implementation of QA programs to ensure optimal diagnostic imaging quality and patient safety. The course integrates both theoretical knowledge and practical applications to equip students with the skills necessary to assess and enhance imaging systems' performance and maintain operational efficiency in radiology departments.

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs		
A. Knowledge and Understanding:		I, P or M/A		
a1	Understand the principles and objectives of QA in radiology.	A	A1	Demonstrate an understanding of fundamental knowledge of Biomedical sciences (Biology, Biophysics, Anatomy, Physiology, Sectional anatomy and medical imaging technique).
a2	Identify key performance standards and quality control measures.	A	A2	Explanation of the principles and procedures of medical imaging acquisitions, medical imaging technique and Radiological Technology Sciences as well as patient positioning in computed radiography and MRI technique.
B. Intellectual Skills:				
b1	Analyze quality control test results and interpret performance data.	M	B3	Analyze and evaluate evidence-based information needed in medical imaging practice.
b2	Evaluate compliance with QA protocols and regulatory standards.	M	B1	Assessment of radiation exposure times and intensity of exposure to guarantee the imaging technique is accurate to reduce the risk factors and adapt to patient needs.
C. Professional and Practical skills:				
c1	Perform routine QC tests on radiology equipment.	M	C1	Execute quality management system and standard procedures in radiological technology practice.
c2	Develop and document QA protocols for imaging systems.	M	C2	Apply technical skills in using medical imaging devices, tools, and

				materials in radiological technology practice.
D. Transferable Skills:				
d1	Communicate quality assurance findings effectively.	A	D1	Communicate effectively with clinicians, patients, and support staff.
d2	Collaborate with healthcare teams to maintain QA standards.	A	D4	Function effectively as an individual, as a member, or leader of a team engaged in appropriate activities to the radiologic technology disciplines to accomplish a common goal.
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
a1	Understand the principles and objectives of QA in radiology.	▪ Lectures, readings	▪ Written exams, quizzes
a2	Identify key performance standards and quality control measures.		
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
b1	Analyze quality control test results and interpret performance data.	▪ Problem-based learning, group discussions	▪ Case studies, assignments
b2	Evaluate compliance with QA protocols and regulatory standards.	▪ Case studies, workshops	▪ Reports, presentations
(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
c1	Perform routine QC tests on radiology equipment.	▪ Practical labs, hands-on training	▪ Practical exams, lab reports

c2	Develop and document QA protocols for imaging systems.	Role-playing, project-based learning	Protocol development, reports
(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	Communicate quality assurance findings effectively.	Presentations, group discussions	Presentations evaluations
d2	Collaborate with healthcare teams to maintain QA standards.	Workshops, collaborative projects	Teamwork evaluations, reports

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction to QA in Radiology	– Importance, Objectives, QA vs. QC	1	2	a1, a2
2	Regulatory and Accreditation Standards	– ACR, IAEA, Joint Commission Requirements	1	2	a2, b2
3	Imaging Modalities in QA	– QA in CT, MRI, Ultrasound, Fluoroscopy	1	2	a1, b1
4	Radiation Safety and Dose Monitoring	– Dose limits, ALARA, Patient Safety	1	2	a1, a2
5	Equipment Performance Evaluation	– Mechanical, Electrical, Image Quality Tests	1	2	b1, c1
6	QA Tools and Techniques	– Test Phantoms, Dosimeters, Software	1	2	c1, c2
7	Routine Quality Control Procedures	– Frequency, Standards, Checklists	1	2	a2, c1
8	Mid-term Exam	– All Previous topics	1	2	a1, a2, b1, b2, c1, c2
9	Image Quality Metrics	– Resolution, Contrast, Noise	1	2	b1, c1

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Reviewed by:

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Al-shamahi

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Dalaq

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
10	QA in Digital Imaging	– PACS, DICOM Standards, Network Security	1	2	b2, d2
11	Preventive Maintenance and Troubleshooting	– Equipment Downtime, Troubleshooting Steps	1	2	a2, c1
12	Patient-Centered QA Programs	– Patient Communication, Feedback	1	2	d1, d2
13	Data Management in QA	– Recording, Reporting, Analyzing QA Data	1	2	b1, c2
14	Advances in QA Technologies	– AI Integration, Automation	1	2	a1, b2
15	Developing QA Protocols	– Comprehensive QA Planning	1	2	c2, d1, d2
16	Final Exam	– All topics	1	2	a1, a2, b1, b2
Number of Weeks /and Units Per Semester			16	32	

B. Practical Aspect (Lab/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Performing QC Tests on X-Ray Machines	1	2	c1
2	Evaluating CT Image Quality Using Phantoms	1	2	c1, b1
3	Radiation Dose Measurement with Dosimeters	1	2	a2, c2
4	Case Study: QA in MRI Imaging	1	2	b1, c1
5	QA Protocol for Ultrasound Imaging	1	2	c2, d2
6	Troubleshooting Imaging Artifacts	1	2	b1, c1
7	Analyzing QA Reports and Performance Data	1	2	b2, d2
8	Preventive Maintenance Tasks	1	2	c1, c2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
9	Developing a QA Checklist	1	2	c2, d1
10	Conducting Team-Based QA Audits	1	2	d2
15	Final Practical Exam	1	2	b1, b2, c1, c2, d1, d2,
Number of Weeks /and Units Per Semester				

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	None			
2				
3				
Number of Weeks /and Units Per Semester				

VII. Teaching Strategies:

- Lectures
- Practical Labs
- Case Studies
- Problem-Based Learning

VII. Assessment Methods:

- Written Exams
- Quizzes
- Assignments
- Practical Exams
- Presentation

VII. Assignments:

Prepared by:

Reviewed by:

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Head of the Department:

Dr. Awadh Al-Kubati

Quality Unit:

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Al-shamahi

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No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Research on QA Standards in Radiology	4	2	a2, b2
2	Practical Report on QC Test Results	6	2	b1, c1
3	Case Study Analysis: QA in Digital Imaging	8	2	a1, c1
4	Developing a QA Protocol	10	2	c2, d1
5	Group Presentation: Advances in QA Technologies	12	2	b2, d2
Total			10	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Midterm Exam	6	10	10%	a1, a2
2	Assignments	4	10	10%	a1, a2, b2, c1
3	Practical Exam	10	30	30%	b1, b2, c1, c2, d1, d2,
4	Final Exam	14	50	50%	a1, a2
Total			100	100 %	

IX. Learning Resources:

1- Required Textbook(s) (maximum two):

- 1- Jeffrey Papp, 2018, Quality Management in the Imaging Sciences, Elsevier Health Sciences.
- 2- Satish Kumar Bhargava, 2015, Quality Assurance and Control in Diagnostic Radiology and Imaging, CBS Publishers & Distributors

2- Essential References:

- 1- IAEA Quality Control Guidance Documents
- 2- ACR Guidelines for Quality Assurance Programs

3- Electronic Materials and Web Sites etc.:

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Electronic Materials and Websites

- Online courses on QA from the International Atomic Energy Agency (IAEA)
- Publications from the American College of Radiology (ACR)
- www.iaea.org
- www.acr.org

X. Course Policies: (Based on the Uniform Students' By law (2007))

1	Class Attendance: Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	Tardiness: A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.
3	Exam Attendance/Punctuality: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.

Faculty of Applied Medical Science

Department of **Medical Radiology and Imaging Technology**

Program of Radiologic Technology and Medical Imaging

Course Plan (Syllabus) of

Quality Assurance in Radiology Department

Course Code.

I. Information about Faculty Member Responsible for the Course:						
Name of Faculty Member:		Office Hours				
Location& Telephone No.:	-----					
E-mail:	--@--.--	SAT	SUN	MON	TUE	WED THU

2024/2025

Prepared by:

Reviewed by:
Dr. -----

Head of the Department:
Dr. Awadh Al-Kubati

Quality Unit:
Dr. Mohammed
Al-shamahi

Dean:
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Dalaq

I. General Information:

12.	Course Title:	Quality Assurance in Radiology Department				
13.	Course Code:					
14.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
15.	Level/ Semester at which this Course is offered:	3 rd Level / 1 st Semester				
16.	Pre –Requisite (if any):	Clinical Practice I				
17.	Co –Requisite (if any):	None				
18.	Program (s) in which the Course is Offered:	Bachelor of Radiologic Technology and Medical Imaging				
19.	Language of Teaching the Course:	English				
20.	Location of Teaching the Course:	Faculty of Applied Medical Science				
21.	Prepared by:					
22.	Date and Number of Approval by Council:					

II. Course Description:

This course introduces the principles and practices of quality assurance (QA) in the radiology department. Topics include quality control (QC) tests, performance standards, regulatory compliance, and the implementation of QA programs to ensure optimal diagnostic imaging quality and patient safety. The course integrates both theoretical knowledge and practical applications to equip students with the skills necessary to assess and enhance imaging systems' performance and maintain operational efficiency in radiology departments.

III. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the course, students will be able to:

A. Knowledge and Understanding:

- | | |
|----|--|
| a1 | Understand the principles and objectives of QA in radiology. |
| a2 | Identify key performance standards and quality control measures. |

B. Intellectual Skills:

- | | |
|----|--|
| b1 | Analyze quality control test results and interpret performance data. |
| b2 | Evaluate compliance with QA protocols and regulatory standards. |

C. Professional and Practical skills:

- | | |
|----|--|
| c1 | Perform routine QC tests on radiology equipment. |
| c2 | Develop and document QA protocols for imaging systems. |

D. Transferable Skills:

- | | |
|----|---|
| d1 | Communicate quality assurance findings effectively. |
| d2 | Collaborate with healthcare teams to maintain QA standards. |

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction to QA in Radiology	– Importance, Objectives, QA vs. QC	1	2
2	Regulatory and Accreditation Standards	– ACR, IAEA, Joint Commission Requirements	1	2
3	Imaging Modalities in QA	– QA in CT, MRI, Ultrasound, Fluoroscopy	1	2
4	Radiation Safety and Dose Monitoring	– Dose limits, ALARA, Patient Safety	1	2
5	Equipment Performance Evaluation	– Mechanical, Electrical, Image Quality Tests	1	2
6	QA Tools and Techniques	– Test Phantoms, Dosimeters, Software	1	2

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No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
7	Routine Quality Control Procedures	– Frequency, Standards, Checklists	1	2
8	Mid-term Exam	– All Previous topics	1	2
9	Image Quality Metrics	– Resolution, Contrast, Noise	1	2
10	QA in Digital Imaging	– PACS, DICOM Standards, Network Security	1	2
11	Preventive Maintenance and Troubleshooting	– Equipment Downtime, Troubleshooting Steps	1	2
12	Patient-Centered QA Programs	– Patient Communication, Feedback	1	2
13	Data Management in QA	– Recording, Reporting, Analyzing QA Data	1	2
14	Advances in QA Technologies	– AI Integration, Automation	1	2
15	Developing QA Protocols	– Comprehensive QA Planning	1	2
16	Final Exam	– All topics	1	2
Number of Weeks /and Units Per Semester			16	32

B. Practical Aspect (Lab/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Performing QC Tests on X-Ray Machines	1	2
2	Evaluating CT Image Quality Using Phantoms	1	2
3	Radiation Dose Measurement with Dosimeters	1	2
4	Case Study: QA in MRI Imaging	1	2
5	QA Protocol for Ultrasound Imaging	1	2
6	Troubleshooting Imaging Artifacts	1	2
7	Analyzing QA Reports and Performance Data	1	2
8	Preventive Maintenance Tasks	1	2

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No.	Tasks/ Experiments	Number of Weeks	Contact Hours
9	Developing a QA Checklist	1	2
10	Conducting Team-Based QA Audits	1	2
15	Final Practical Exam	1	2
Number of Weeks /and Units Per Semester			

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours
1	None		
2			
3			
Number of Weeks /and Units Per Semester			

VII. Teaching Strategies:

- Lectures
- Practical Labs
- Case Studies
- Problem-Based Learning

VII. Assessment Methods:

- Written Exams
- Quizzes
- Assignments
- Practical Exams
- Presentation

VII. Assignments:

No.	Assignments	Week Due	Mark
1	Research on QA Standards in Radiology	4	2
2	Practical Report on QC Test Results	6	2
3	Case Study Analysis: QA in Digital Imaging	8	2
4	Developing a QA Protocol	10	2
5	Group Presentation: Advances in QA Technologies	12	2
Total			10

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Midterm Exam	6	10	10%
2	Assignments	4	10	10%
3	Practical Exam	10	30	30%
4	Final Exam	14	50	50%
Total			100	100 %

IX. Learning Resources:

1- Required Textbook(s) (maximum two):

1. Jeffrey Papp, 2018, Quality Management in the Imaging Sciences, Elsevier Health Sciences.
2. Satish Kumar Bhargava, 2015, Quality Assurance and Control in Diagnostic Radiology and Imaging, CBS Publishers & Distributors

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1. IAEA Quality Control Guidance Documents
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Electronic Materials and Websites

- Online courses on QA from the International Atomic Energy Agency (IAEA)
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- www.iaea.org
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