هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Basics of Radiotherapy
Course Code:	374329-2
Program:	Program of Bachelor in Radiological Sciences -374000-Level 6
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University
Version:	3
Last Revision Date:	4th September 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th level/3rd Year)					
4. Course general Description:					
The course concerns with basic facts about the cell and tumors and how they are developed. It also enables the students from basics of radiation therapy physics and different radiation therapy modalities used in the treatment of tumors, with reference to the steps that follow in the treatment process.					
5. Pre-requirements for this course (if any)**:**					
Radiation Biology 374227-2					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course is designed to enable the student to: 1. Recognize the different tumors and their staging, grading, and classifications. 2. Identify clinical treatment planning, dosimetry, and volume definition. 3. Know the different uses of each radiation therapy modalities.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**32**	**100%**
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**32**
2.	**Laboratory/Studio**	**-**
3.	**Field**	**-**
4.	**Tutorial**	**-**
5.	**Others (specify)**	**-**
Total		**32**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recall the basic information of oncology.	K1	**Lectures**	**Direct Assessment** Written exams (Quiz Midterm exam Final exam)
1.2	Explain the principles and physics of radiation therapy.	K1		**Direct Assessment** Written exams (Quiz Midterm exam Final exam)
1.3	Identify radiation therapy instrumentations.	K2		**Direct Assessment** Written exams (Quiz Midterm exam Final exam)
2.0	**Skills**			
2.1	Distinguish different radiotherapy modalities used in tumors treatment.	S2	**Small Group Discussion**	**Direct assessment** Assignments **Indirect assessment** Survey
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	**Tumors overview I : (**Chapter 1, page No 1-20 of the Principles and Practice of Radiation Therapy) a. Cells and the nature of disease. b. Etiology. c. Nomenclature of the tumors. d. Benign and malignant tumors.	**2**
2.	**Tumors overview II : (**Chapter 3, page No 42-55of the Principles and Practice of Radiation Therapy) a. Classification of cancer: ○ Staging. ○ Grading. b. Physical examination. c. Medical imaging.	**2**
3.	**Radiation Therapy I :** Definition - Goal of Radiation Therapy- Radiotherapy Team - History of Radiation Therapy. **(**Chapter 4, page No 58-65 of the Principles and Practice of Radiation Therapy)	**2**
4.	**Radiation Therapy II:** Mechanism of Action – Effect on different types of cancers-Dose Fractionation. **(**Chapter 4, page No 70-75 of the Principles and Practice of Radiation Therapy)	**2**
5.	**Radiotherapy III : Acute and Late Side Effects**. (Chapter 5, page No 79-88 of the Khan's the Physics of Radiation Therapy)	**2**
6.	**Treatment Planning I: (**Chapter 9-11, page No 133-169 of the Khan's the Physics of Radiation Therapy) a. Dose Distribution. b. Dosimetric Calculations. c. Determination and Definition of Treatment Volume.	**2**
7.	**Treatment Planning II: (**Chapter 12-13, page No 170-255 of the Khan's the Physics of Radiation Therapy) a. Isodose Distributions. b. Patient Data Acquisition, Treatment Verification, and Inhomogeneity Corrections. c. Field Shaping, Skin Dose, and Field Separation.	**2**
8.	**Simulation in radiotherapy I: (**Chapter 22, page No 451-479 of the Principles and Practice of Radiation Therapy). a. Simulation Process. b. Patient Positioning and Immobilization.	**2**
9.	**Simulation in radiotherapy II: (**Chapter 22, page No 451-479 of the Principles and Practice of Radiation Therapy). a. Multi-Modality Imaging. b. PET/CT Simulator.	
10.	**Electron Beam Therapy (**Chapter 14, page No 268-316 of the Khan's the Physics of Radiation Therapy)	**2**
11.	**Brachytherapy** a. Low Dose Rate Brachytherapy **(**Chapter 15, page No 309-347 of the Khan's the Physics of Radiation Therapy) b. High Dose Rate Brachytherapy. **(**Chapter 23, page No 487-502 of the Khan's the Physics of Radiation Therapy)	**2**

12.	**Radiation Protection in Radiotherapy**. (Chapter 16, page No 360-381 of the Khan's the Physics of Radiation Therapy)	**2**
13.	**Radiotherapy Machines I:** (Chapter 19-20, page No 413-453 of the Khan's the Physics of Radiation Therapy) a. Three - Dimensional Conformal Radiation Therapy. b. Intensity-Modulated Radiation Therapy.	**2**
14.	**Radiotherapy Machines II:** (Chapter 21-22, page No 454-474 of the Khan's the Physics of Radiation Therapy) a. Stereotactic Radiotherapy and Radiosurgery. b. Stereotactic Body Radiation Therapy.	**2**
15.	**Radiotherapy Machines III:** (Chapter 26-27, page No 510-535 of the Khan's the Physics of Radiation Therapy) a. Image-Guided Radiation Therapy. b. Proton Beam Therapy.	**2**
16.	**Revision**	**2**
Total		**32**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Activity (Quiz)	5^{th}	10
2.	Mid-term Examination	$7^{th} – 8^{th}$	30
3.	Activity (assignment)	12^{th}	10
4.	Final Examination	17^{th} -18^{th}	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Principles and Practice of Radiation Therapy** Washington, M. Charles and Leaver, Dennis 4thEdition Elsevier ISBN: 978-0-323-28752-4 **Technical Basis of Radiation Therapy: Practical Clinical Applications** Seymour H. Levitt • James A. Purdy, Carlos A. Perez • Philip Poortmans 5th Edition Springer ISBN: 978-3-642-11571-4
Supportive References	**Khan's the Physics of Radiation Therapy** Khan M. Faiz and Gibbons P. John

	5thEdition WOLTERS KLUWER ISBN: 978-1-4511-8245-3
Electronic Materials	http://www.arrt.org https://www.asrt.org/asrt.htm http://www.auntminnie.com http://www.air.asn.au http://user.shikoku.ne.jp/tobrains/exam/Angi http://chorus.rad.mcw.edu/ http://www.emory.edu/X-RAYS/Sprawls/
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms with 30 seats.
Technology equipment (projector, smart board, software)	Blackboard, Projector, and Smart Board.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders	Direct
Effectiveness of Students assessment	Students, peer review	Direct
Quality of learning resources	Student, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**11TH**
DATE	**24TH MAY 2022**

Course Specification
(Bachelor)

Course Title:	Magnetic Resonance Imaging Physics and Instrumentation
Course Code:	374413-3
Program:	Program of Bachelor in Radiological Sciences -374000-Level 6
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University
Version:	3
Last Revision Date:	4th September 2023

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A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th level/3rd Year)					
4. Course general Description:					
This course is designed to introduce the magnetic resonance imaging (MRI) basics. The student will develop and understand MRI components, physics, image information and the environment safety. At the end of this course, students will be qualified and ready to deal with MRI scanners.					
5. Pre-requirements for this course (if any)**:**					
Diagnostic Radiography Instrumentation (374226-3).					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
To build up the necessary knowledge and skills to perform MRI.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**64**	**100%**
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**32**
2.	**Laboratory/Studio**	**32**
3.	**Field**	**-**
4.	**Tutorial**	**-**
5.	**Others (specify)**	**-**
Total		**64**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the basic theory and origin of nuclear magnetic resonance.	K1	Lectures	**Direct:** Written (Midterm and final exams)
1.2	Describe the process of image formation and acquisition.	K1	Lectures	**Direct:** Written (Midterm and final exams)
1.3	Describe all different parts of MRI machines.	K2	Lectures	**Direct:** Written (Midterm and final exams)
1.4	Describe the different pulse sequences used in MRI.	K3	Lectures	**Direct:** Written (Midterm and final exams)
2.0	**Skills**			
2.1	Communicate effectively when differentiating between different parameters and trade-offs during MRI procedures.	S4	Lectures, and groups discussions	**Direct method** - Written (Midterm exam and Final exam), - Presentation - Practical exam
2.2	Identify the image contrast based on the pulse sequence.	S2	Lectures, and groups discussions	**Direct method**

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
				- Written (Midterm exam and Final exam), - Presentation - Practical exam
2.3	Demonstrate the ability to act as a decision maker and prepare patients safely for MRI examinations.	S3	Lectures, and groups discussions	**Direct method** - Written (Midterm exam and Final exam), - Presentation - Practical exam
3.0	**Values, autonomy, and responsibility**			
3.1	Commit professional standards during medical radiology practice.	V1	Lectures, and groups discussions	**Direct method** Presentation

C. Course Content

No	List of Topics	Contact Hours
1	**1. Basic principle (1):** a) Atomic structure. b) Motion of the atom. c) MR Active nuclei. d) Alignment. e) Precession. f) The Larmor equation. g) Resonance. **2. Practical demonstration.** MRI in practice, Chapter 1, Pages 2-17.	4
2	**1. Basic principle (2):** a) The MR signal. b) The free induction decay (FID). c) Pulse Timing parameters. d) Relaxation. e) T1 recovery. f) T2 decay. **2. Practical demonstration.** MRI in practice, Chapter 1, Pages 18-23. MRI in practice, Chapter 2, Pages 24-30.	4
3	**1. Imaging weighting and contrast:** a) Image weighting. b) Image contrast: • T1 contrast.	4

	• T2 contrast. • Proton density contrast. c) Contrast mechanisms. d) Relaxation times in different tissues. • T1 relaxation time. • T2 relaxation time. • T2* relaxation time. e) Pulse sequences. 2. **Practical demonstration.** MRI in practice, Chapter 2, Pages 25, 36-57.	
4	**1. Spatial encoding and image formation (1):** a) Introduction. b) Gradients. c) Slice selection. d) Frequency encoding. e) Phase encoding. f) Sampling. 2. **Practical demonstration.** MRI in practice, Chapter 5, Pages 128-157.	4
5	**1. Spatial encoding and image formation (2):** a) K-space description. b) K-space filling. c) Fast Fourier transform. d) K space traversal. e) Types of acquisition. **2. Practical demonstration.** MRI in practice, Chapter 6, Pages 158-208.	4
6	**1. Parameters and trade-offs:** a) Signal to noise ratio (SNR). b) Contrast to noise ratio (CNR). c) Spatial resolution. d) Scan time. e) Trade-offs. f) Decision making. **2. Practical demonstration.** MRI in practice, Chapter 7, Pages 209-241.	4
7	**1. Introduction to Pulse Sequences:** a) Spin Echo. b) Gradient Echo. **2. Practical demonstration.** MRI in practice, Chapter 3, Pages 58-67. MRI in practice, Chapter 4, Pages 89-105.	4
8	**1. MR Instrumentation (1):** a) Magnetism. b) Permanent magnets. c) Electromagnets. d) Superconducting magnets.	4

	e) Fringe fields. **2. Practical demonstration.** MRI in practice, Chapter 9, Pages 311-325.	
9	**1. MR Instrumentation (2):** a) Shim coils. b) Gradient coils. c) Radiofrequency coils. d) The pulse control unit. e) Patient transportation system. f) Operator interface. **2. Practical demonstration.** MRI in practice, Chapter 9, Pages 326-345.	4
10	**1. MR safety (1):** a) Introduction. b) The main magnetic field. c) Projectiles. d) Medical emergencies. e) Implants and prosthesis. **2. Practical demonstration.** MRI in practice, Chapter 10, Pages 346-369.	4
11	**1. MR safety (2):** a) Pacemakers. b) Gradient magnetic fields. c) Radiofrequency fields. d) Claustrophobia. e) Quenching. **2. Practical demonstration.** MRI in practice, Chapter 10, Pages 346-369.	4
12	**1. MR safety (3):** a) Safety education. b) Patient monitoring. c) Monitors and devices in MRI. d) Site planning. **2. Practical demonstration.** MRI in practice, Chapter 10, Pages 346-369.	4
13	**1. Pulse Sequences (Advanced 1):** a) Spin echo: • Fast spin echo. • Inversion recovery. • STIR. • FLAIR. **2. Practical demonstration**. MRI in practice, Chapter 3, Pages 68-88.	4
14	**1. Pulse Sequences (Advanced 2):** a) **Gradient echo:** • Conventional GRE. • The steady state.	4

	• Coherent GRE. • Incoherent GRE. • SSFP. • Balanced GRE. • Fast GRE. **2. Practical demonstration.** MRI in practice, Chapter 4, Pages 94-122.	
15	**1. Pulse Sequences (Advanced 3):** a) EPI b) Parallel Imaging **2. Practical demonstration.** MRI in practice, Chapter 4, Pages 122-127.	4
16	**Revision**	4
Total		**64**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	5th	10
2.	Mid-term Examination	7th	30
3.	Activity (presentation)	12th	10
4.	Final practical evaluation	15th – 16th	10
5.	Final theoretical Examination	18th -19th	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	MRI in practice Catherine Westbrook, John Talbot 5th edition Wiley Blackwell eBook ISBN: 978-1-119-39200-2
Supportive References	MRI from Picture to Proton Donald W. McRobbie, Elizabeth A. Moore, Martin J. Graves and Martin R. Prince. 3rd edition Cambridge University Press eBook ISBN: 9781107706958
Electronic Materials	Search engines (Saudi Digital Library, PubMed, Google Scholar).
Other Learning Materials	N/A

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show, Blackboard and A/V
Other equipment (depending on the nature of the specialty)	MRI Simulator

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders	Direct
Effectiveness of Students assessment	Students, peer review	Direct
Quality of learning resources	Student, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**11TH**
DATE	**24TH MAY 2022**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:**Nuclear Medicine Physics and Instrumentations**
Course Code:**374322-3**
Program:**Program ofBachelor in Radiological Sciences -374000-Level 6**
Department:**Department of Radiological Sciences**
College:**College of Applied Medical Sciences**
Institution:**Taif University**
Version:**3**
LastRevision Date:**4th September 2023**

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A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2. Course type					
A.	☐University	☐College	☐√Department	☐Track	☐Others
B.	√☐Required		☐Elective		
3. Level/year at which this course is offered:(6th Level/ 3rd year)					
4. Course general Description:					
The course provides subjects that describe the basic principles of radioactivity, radionuclides, and radiopharmaceuticals. The course also describes the basic principles of different nuclear medicine instrumentations.					
5. Pre-requirements for this course (if any)**:**					
Diagnostic Radiography Instrumentation (374226-3).					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course is designed to provide student with the basic principles of nuclear medicine physics and instrumentation.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	64	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distancelearning	-	-

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	32
2.	**Laboratory/Studio**	32
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		64

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the theoretical physics of nuclear medicine imaging technology.	K1	Lectures	**Direct Assessment:** - Quiz & Written exam
1.2	Describe the structure of different nuclear medicine instrumentations (Gamma Camera, SPECT and PET).	K 2	Lectures	**Direct Assessment:** - Quiz & Written exam
1.3	Identify radioisotopes used in diagnostic and therapeutic nuclear medicine studies.	K1	Lectures	**Direct Assessment:** - Quiz & Written exam
2.0	**Skills**			
2.1	Develop knowledge of safe handling nuclear medicine instruments	S 2	Problem Solving	**Direct Assessment:** - Presentations
2.2	Develop knowledge of safe handling nuclear medicine radioisotopes.	S 1	Problem Solving	**Direct Assessment:** - Presentations
2.3	Operate properly the nuclear medicine imaging instrumentations.	S 5	Self-learning	**Direct Assessment:** - Presentations
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	• Basic isotope notation. • Radionuclide production. Chapter 1, Pages 1-5	**4**
2.	Radioactive decay. Chapter 1, Pages 1-5	**4**
3.	Radionuclide generator systems. • Radionuclides for imaging. Chapter 1, Pages 5- 19	**4**
4.	Radionuclide generator systems. • Radio pharmacy quality control. Chapter 1, Pages 5- 19	**4**
5.	Unsealed radionuclides used for therapy. Chapter 1, 19- 20	**4**

6.	• Geiger- Mueller Counter. • Ionization chamber. Chapter 2, 23-27	4
7.	• Sodium iodide well counter. • Single-probe counting system. • Dose calibrator. Chapter 2, 23-27	4
8.	Gamma scintillation camera (1) Chatper 2, Pages 28- 32	4
9.	Gamma scintillation camera (2) Chapter 2, Pages 32- 38	4
10.	Single photon emission tomography. Chapter 2, Pages 38- 42	4
11.	Single photon emission tomography. • SPECT/CT. Chapter 2, Pages 38- 42	4
12.	• Positron Emission Tomography PET. • PET/CT. Chapter 2, Pages 43- 54	4
13.	• Positron Emission Tomography PET. • PET/MRI. Chapter 2, Pages 43- 54	4
14.	Instrumentation Quality Control Chapter 2, Pages 55- 62	4
15.	Technical Artifacts Chapter 2, Pages 62- 69	4
16.	**General Revision**	4
Total		**64**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	4th	10%
2.	Midterm written exam	8th	30%
3.	Presentation	11th	10%
4.	Practical report	16th	10%
5.	Final written Exam	18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Essentials of nuclear medicine imaging FredA.MettlerJr., MiltonJ.Guiberteau. 6th Edition 2012 Saunders ISBN: 978-1-4557-0104-9
Supportive References	Nuclear Medicine and Pet/CT: Technology and Techniques DavidGilmore, KristenM.Waterstram-Rich Mosby August 29th, 2016 ISBN: 9780323356220
Electronic Materials	1. http://www.radiography.com/ 2. http://www.radiologyinfo.org/glossary/ 3. http://www.aeirs.org/resources.html 4. http://www.emory.edu/X-RAYS/Sprawls/ 5. http://www.dimag.com/
Other Learning Materials	https://www.radiologycafe.com/frcr-physics-notes/molecular-imaging/gamma-camera/

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with 30 seats. Equipment LAB. Hot LAB.
Technology equipment (projector, smart board, software)	Data show.
Other equipment (depending on the nature of the specialty)	Radioactive generators. Radioactive sources. Radiation Detectors. Gamma camera components. Nuclear medicine imaging simulator.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders	Direct
Effectiveness of	Students, peer review	Direct, Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Studentsassessment		
Quality of learning resources	Student, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	11TH
DATE	24TH MAY 2022

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Research Methodology**
Course Code:	**374324-2**
Program:	**Program of Bachelor in Radiological Sciences -374000-Level 6**
Department:	**Department of Radiological Sciences**
College:	**College of Applied Medical Sciences**
Institution:	**Taif University**
Version:	**3**
Last Revision Date	**4th September 23**

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A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level/ 6th and 3rd Year)					
4. Course general Description:					
The research methodology course is a collection of fundamental knowledge, information and skills about how researchers select, conduct, and publish research projects.					
5. Pre-requirements for this course (if any)**:**					
Clinical practice in Radiography (1) (374318-3).					
6. Co-requirements for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
- Define research; explain and apply research terms; describe the research process and the principle activities and skills associated with the research process. - Describe and compare the major quantitative and qualitative research methods.					
- Understand the importance of research ethics and integrate research ethics into the research process. - Construct a strong research proposal that will act as the launching for the students' next semester's research project.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	32 hours due 16 weeks	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	32 hours due 16 weeks
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the principles of scientific research terms, definitions, designs, steps and different reference styles.	**K1**	Lectures	Midterm exam Final exam
1.2	Explain key concepts of scientific research, study sample and relevance of ethics in global health research.	**K3**	Lectures	Midterm exam Final exam
...				
2.0	**Skills**			

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
2.1	Apply different research designs and sampling techniques	**S2**	Small group discussion	**Direct method:** **- Written exams** **Indirect method:** **- Survey.**
2.2	Analyze different types of samples and variables.	**S3**	Small group discussion	**Direct method:** **- Written exams** **Indirect method:** **- Survey.**
...				
3.0	Values, autonomy, and responsibility			
3.1	Adhere a commitment to ethical standards during performing different types of scientific research as groups.	**V1**	Project-based learning	Presentation Indirect survey
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to scientific research:** a. Definition and goals of scientific research. b. Types of scientific research. c. Types of Data. Chapters; 1. Pages 1-4. (Textbook-1)	**2**
2.	**Ethics in scientific research:** a. Ethics in Radiology. b. Ethical approval. c. Research consent. Chapter; 6. Pages 24-25 (Textbook-1)	**4**
3.	**Scientific research steps (1):** a. Observe and ask a question. b. How to make a research background. c. Formulate the hypothesis. Chapters; 2-3. Pages 5-14. (Textbook- 1)	**2**
4.	Scientific research steps (2): a. Conduct an experiment. b. Analyze the data. c. Obtain the results.	**4**

	d. Interpret the results (Discussion). e. Publishing the article. Chapter; 5. Pages 19-23.(Textbook- 1) Chapter; 7. Pages 27-32. (Textbook- 1) Chapters; 8-9. Pages 33-42. (Textbook- 1)	
5.	**Sampling technique and data collection (1):** a. Pilot survey. b. Quota sampling. c. Simple Random Sample. Chapter; 12. Pages 50-52 (Textbook- 1)	**4**
6.	**Sampling technique and data collection (2):** a. Systematic Random sample. b. Stratified Random sample. c. Multistage Sample. Chapter; 12. Pages 50-52 (Textbook- 1)	**4**
7.	**Variable types:** Dependent and independent variables. Chapters; 7. Pages 27-28 (Textbook- 1)	**2**
8.	**Data collection tools:** a. Questionnaire. b. Check list. c. Other data collection methods. Chapter; 6. Pages 95-120. (Textbook- 2)	**4**
9.	**How to write a research article (manuscript):** a. Title. b. Introduction. c. Aim of the study and objectives. d. Material and methods. e. Results. f. Discussion. g. Limitations. h. Conclusion and summary. i. Recommendations. j. References. k. Appendix. Chapter; 16. Pages 65-69. (Textbook- 1) Chapter; 14. Pages 344-359. (Textbook-2)	**4**
10.	**References:**	**2**

	a. Reference and citation. b. Comparison between different styles of references. Chapter; 4. Pages 15-17. (Textbook- 1)	
11.		
12.		
13.		
14.		
15.		
16.		
Total		**32**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Library activity	4th	5%
2.	Midterm written exam	8th	30%
3.	Presentation	10th	5%
4.	Final written exam	14th - 16th	60%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Research Methodology: A step-by-Step guide for beginners. Ranjit Kumar. 5th Edition Chapters (section); 9-17. Pages;210-570. Los Angles SAGE. ISBN:987-1-5264-4989-4 - The Good Research Guide: for small-scale Social Research Project. Martyn Densccombe. 4th Edition Chapters; 1-5. Pages; 1-185. ISBN-13: 978-0335241385.
Supportive References	N/A.

Electronic Materials	SPSS Survival Manual, Step by step guide to data analysis using SPSS for Windows. Julie Pallant. 3rd Edition. Chapters; 1-5. Pages;1-121. Ligare Book Printer. Sydney. ISBN 0-33-520890-8.
Other Learning Materials	N/A.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom.
Technology equipment (projector, smart board, software)	Data show. Internet access
Other equipment (depending on the nature of the specialty)	Saudi Digital Library (SDL).

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders	Direct
Effectiveness of Students assessment	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**11TH**
DATE	**24TH MAY 2022**

Course Specification
(Bachelor)

Course Title: Ultrasound Imaging Techniques
Course Code: 374323-3
Program: Program of Bachelor in Radiological Sciences -374000-Level 6
Department: Department of Radiological Sciences
College: College of Applied Medical Sciences
Institution: Taif University
Version: 3
Last Revision Date: 4th September 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2. Course type					
A.	☐University	☐College	✓☐Department	☐Track	☐Others
B.	☑Required		☐Elective		
3. Level/year at which this course is offered:(6th Level/3rd year)					
4. Course general Description:					
The course is designed to enable the students to enumerate, outline, and discuss the ultrasound procedures performed in a medical ultrasound department, as well as the indications, patient preparation for various types of sonographic examinations according to international ultrasound technique protocols, and apply these techniques to reduce common artifacts and improve ultrasound image quality.					
5. Pre-requirements for this course (if any)**:**					
• **Ultrasound Physics and Instrumentation (374312-3).** • **Pathology (375314-4).**					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
Upon completion of this course students will be able to: 1. Recognize the sonographic landmarks and anatomical correlations that relate to the abdomen, pelvic and small parts. 2. Use live patient models to acquire and evaluate sonographic images of the aorta, IVC, abdomen, and pelvic organs. 3. Become familiar with the diagnostic criteria for gynecology and obstetrics sonography. 4. Understand basic concepts of FNA, FAST scan and Elastography.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	64	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	32
2.	**Laboratory/Studio**	32
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		64

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with course	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the basic scanning technique principles, instrumentations, general sonographic terms (Anechoic, acoustic enhancement, and acoustic shadowing), and biopsy sampling methods with the aid of an ultrasound machine as guidance.	K1	Lectures	**Direct Assessment:** - Written exam
1.2	Define anatomical structures, different pathological conditions demonstrated on ultrasound images, and biological effects of ultrasound.	K3	Lectures	**Direct Assessment:** - Written exam
2.0	**Skills**			
2.1	Utilize sonographic examinations of different body parts for routine and emergency cases (FAST sonography).	S1	Problem Solving Problem-based learning	**Indirect Assessment:** - Survey.
3.0	**Values, autonomy, and responsibility**			
3.1	Commit to the professional standards to perform required patient preparation and gathering adequate data necessary for diagnosis to be performed.	V1	Group work	**Direct Assessment:** - Presentations

C. Course Content

No	List of Topics	Contact Hours

1.	**Introduction:** Principles of ultrasound scanning techniques. Chapters; 1-3 Pages 1-25 (Textbook-1)	**4**
2.	Scanning protocols. Chapters; 1-3 Pages 1-25 (Textbook-1)	**4**
3.	**Blood vessels U/S:** Aorta. Chapters; 6-7. Pages 53-65 (Textbook-1)	**4**
4.	**Blood vessels U/S:** IVC. Chapters; 6-7. Pages 53-65 (Textbook-1)	**4**
5.	**Abdominal U/S:** Liver. Chapters; 8-9. Pages 71-91. (Textbook-1)	**4**
6.	Liver. Chapters; 8-9. Pages 71-91. (Textbook-1)	**4**
7.	**Abdominal U/S:** Gallbladder. Chapters; 8-9. Pages 71-91. (Textbook-1)	**4**
8.	**Abdominal U/S:** a. Spleen. b. Pancreas. Chapters; 10-11. Pages 111-125. (Textbook-1)	**4**
9.	**Abdominal U/S:** Renal sonography. Chapters; 13-14. Pages 151-175. (Textbook-1)	**4**
10.	**Small parts U/S:** Thyroid. Chapters; 15 & 19. Pages 187-193 & 297-307. (Textbook- 1)	**4**
11.	**Small parts U/S:** a. Breast. b. Testicular U/S. Chapters; 15 & 19. Chapter; 3. Pages 193-225. (Textbook-2)	**4**
12.	Gynecology U/S. Chapter; 3. Pages; 133-174. (Textbook- 2)	**4**
13.	Obstetrics and newborn U/S. Chapter; 2. Pages; 9-129. (Textbook-2)	**4**

14.	1.Biopsy sampling techniques and cross-infection. 2. Focused assessment with sonography in trauma (FAST). Chapter; 22. Pages 317-320. (Textbook-1)	4
15.	Elastography. Chapters; 1-3 Pages 1-25 (Textbook-4)	4
16.	**General Revision**	4
Total		64

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	6th	10%
2.	Midterm written exam	8th	30%
3.	Assignment	12th	10%
4.	Final practical exam	17th	10%
5.	Final written Exam	18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Manual diagnostic ultrasound. P.E.S.Palmer. 2014 Illustrated edition. 1995. Chapters; 1-11,13-19 & 22. Pages; 1-350. WHO ISBN-13: 978-9241544610. Manual of diagnostic ultrasound. ElisabettaBuscarini, Harald Lutz and Paoletta Mirk. 2014 2nd Edition, Vol 2. Chapters; 2-4. Pages; 1-196. WHO. ISBN: 9789241548540. Clinical sonography: A practical guide. RogerC.Sanders. 2015 5th edition. Chapters; 1-4. Pages;1-720. LippincottWilliams and Wilkins. ISBN13: 9781451192520

Supportive References	Textbook of Diagnostic Ultrasonography; Clinical Sonography: A Practical Guide. SandraL., Hagen-Ansert RogerC.Sanders 1997 3rd Edition. Chapters; 1-2. Pages;1-60. LippincottWilliams and Wilkins. ISBN-13: 978-1451192520.
Electronic Materials	1. http://123 sonography.com 2. http://www.radiologyinfo.org/glossary/ 3. http://www.radsciresearch.org 4. https://www.meded.virginia.edu/courses/rad/edus/technique1.html
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom. The ultrasound lab contains ultrasound scanners equipped with color Doppler, printers, phantoms, and acoustic gel for practical sessions.
Technology equipment (projector, smart board, software)	Data show. Phantoms for teaching purposes. LCD screen for practical session demonstration.
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders	Direct
Effectiveness of Students assessment	Students, peer review	Direct, Indirect
Quality of learning resources	Student, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**11TH**
DATE	**24TH MAY 2022**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-155

Field Experience Specification

Course Title:	**Clinical Practice in Radiography (2)**
Course Code:	**374328-3**
Program:	**Program of Bachelor in Radiological Sciences -374000-Level 6**
Department:	**Department of Radiological Sciences**
College:	**College of Applied Medical Sciences**
Institution:	**Taif University**
Field Experience Version Number:	**3**
Last Revision Date:	**4th September 2023**

Table of Contents

A. Field Experience Details:

1. Credit hours: (3).		
2. Level/year at which Field Experience is offered: (6th Level / 3rd Year).		
3. Time allocated for Field Experience activities		
(16) Weeks	Monday for girls Thursday for boys	(8) Hours
4. Corequisite (or prerequisites if any) to join Field Experience		
Clinical Practice in Radiography (1) (374318-3).		
5. Mode of delivery		
☒ In-person/onsite	☐hybrid (onsite/online)	☐Online

B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
1.0	**Knowledge and understanding**				
1.1	-	-	-	-	-
2.0	**Skills**				
2.1	Utilize communication skills when perform the radiographic procedure for chest, abdomen, skull, dental, mammogram and fluoroscopy	S4	Problem solving Problem-based learning Practical Training	**Direct method:** Continuous Assessment. Logbook assessment Practical Exam OSPE **Indirect method:** - Surveys	Department teaching staff Field Supervisor
2.2	Choose appropriate technique with proper care according to the patient's condition.	S1	Problem solving Problem-based learning Practical Training		Department teaching staff Field Supervisor
2.3	Inspect images accurately to create high quality images for chest, abdomen, skull, dental,	S2	Problem solving Problem-based learning Practical Training		Department teaching staff Field Supervisor

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
	mammogram and fluoroscopy				
2.4	Analyze informed decisions about clinical practice within the accepted departmental protocols.	S3	Problem solving Problem-based learning Practical Training		Department teaching staff Field Supervisor
2.5	Demonstrate the ability to operate the X-ray machine properly.	S5	Problem-solving Problem-based learning Practical Training		Department teaching staff Field Supervisor
3.0	**Values, autonomy, and responsibility**				
3.1	Apply ethical standards, honesty, and respect when practice.	V1	Collaborative learning	**Direct method:** Presentation **Indirect method:** - Surveys	Department teaching staff Field Supervisor
3.2	Demonstrate collaborative relation with patients, radiographers, and other health staff.	V2	Collaborative learning		Department teaching staff Field Supervisor
...					

*Assessment methods (i.e., practical test, field report, oral test, presentation, group project, essay, etc.).

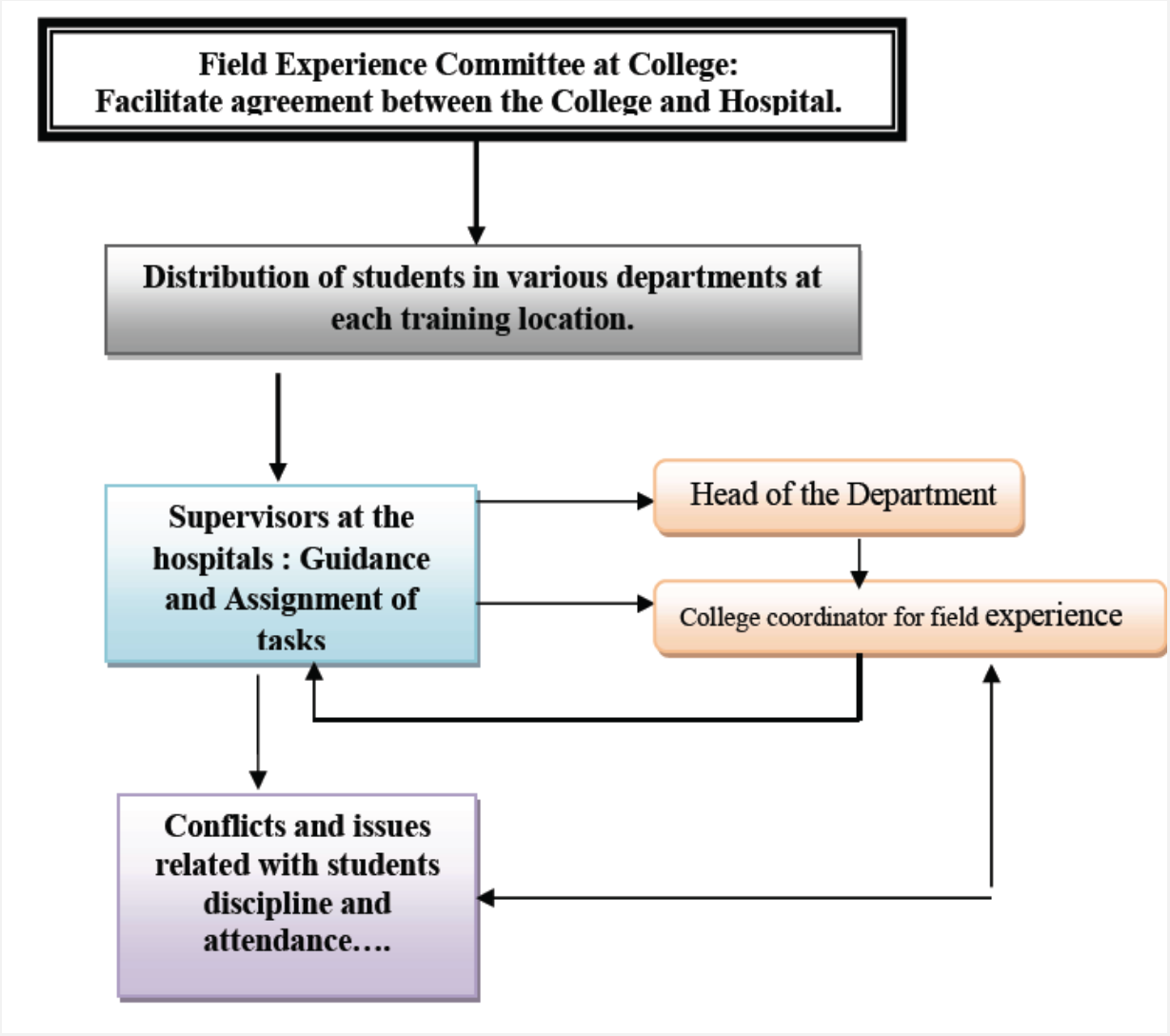
C. Field Experience Administration

1. Field Experience Flowchart for Responsibility

Including units, departments, and committees responsible for field experience identifying by the interrelations.

- Confidential instructor evaluation questionnaire on completion of the course.

- Student interview.
- Student feedback report to be analyzed by the course instructor and submit the results to the department head.
- External evaluators.



2. Distribution of Responsibilities for Field Experience Activities

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	√	√		√	√
Selection of supervisory staff	√	√		√	√
Provision of the required equipment	√	√		√	√
Provision of learning resources	√	√			√
Ensuring the safety of the site	√	√		√	√
Commuting to and from the field experience site			√		
Provision of support and guidance		√		√	√
Implementation of training activities (duties, reports, projects ...)		√			√
Follow up on student training activities		√		√	√
Monitoring attendance and leave		√		√	√
Assessment of learning outcomes		√			√
Evaluating the quality of field experience	√	√	√	√	√
Others (specify)	-	-	-	-	-

3. Field Experience Location Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
King Abdul-Aziz Specialist Hospital.	Training letter. Student ID. Medical Uniform. TLD. Proper appearance.	None.
King Faisal Specialist Hospital.		None.
Children's Hospital at Taif.		Infection control certificate.
Al-Hada Military Hospital.		Training application Security check.
Prince Mansoor Military Hospital.		Training application Security check.
Prince Sultan Military Hospital.		Training application Security check.

*E.g. provides information technology, equipment, laboratories, halls, housing, learning sources, clinics ... etc.
** E.g. Criteria of the institution offering the training or those related to the specialization, such as safety standards, dealing with patients in medical specialties ... etc.

4. Decision-Making Procedures for Identifying Appropriate Locations for Field Experience

- Start with a meeting with the faculty teaching staff, discussing the main objectives of the trainee rounds and putting some suggestions.
- Hospitals are chosen for capacity, availability of radiological modalities, and located within Taif city.
- Students are distributed according to the hospitals' capacity.

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
Isolation of highly infected patients.	- Avoid direct contact with the patient. - Avoid direct contact with contaminated areas (e.g. pressure ulcer). - Wear face mask, gloves, overhead and overshoes cover.	- Enforce student's knowledge in infection control.
Radiation exposure.	- Always keep in shielded environment or wear shielding garment. - Keep a safe distance from the radiation source. - Minimize the exposure time as low as possible. - Apply ALARA (as low as reasonably achievable) principle. - Monitor your radiation dose regularly.	- Enforce students' knowledge in radiation protection training. - Personal dosimeters.

D. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Training Committee	Direct
The extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect
Safety	Teaching Staff, Field Supervisors	Direct
Training facilities/site	Students, Faculty	Direct, Indirect

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council /Committee	**DEPARTMENT COUNCIL**
Reference No.	**11TH**
Date	**24TH MAY 2022**