

Course Description Form
University of Mosul **College of Medicine**
Department of Medical Physiology

1.	Course Name:	Medical physics
2.	Course Code:	MCPs102
3.	Semester / Year:	First and Second /2025-2026
4.	Description Preparation Date:	1/9/2025
5.	Available Attendance Forms:	Register attendance in person
6.	Number of Units (Total)	Practical hours=60=2 units Theoretical hours=45=3 units Total=105
7.	Course administrator's name	
1.	Assist. Lect. Huda Daham Badr	Email: huda.badr@uomosul.edu.iq
2.	Assist. Lect. Yahya Salem Alhalema	Email: yahya_ahmed@uomosul.edu.iq
3.	Assist. Lect. Raghda Tareq Abdulateef	Email: raghda.tariq@uomosul.edu.iq
8.	Course Objectives	- Understand the physical functions of human body systems. - Explore principles of medical devices, including X-ray and MRI. - Learn radiotherapy techniques and related applications, including radiation safety. - Understand biomaterials and their use in medical devices. - Develop practical skills and applied knowledge for medical practice.

Knowledge (K)

K1: Differentiate the basic principles of physics applied to medical imaging, radiotherapy, and other diagnostic tools. **(KP1)**

K2: Apply knowledge of diagnostic and therapeutic medical devices, including biomaterials used in medical equipment. **(KP2, PC3)**

K3: Describe the mechanisms of major medical imaging techniques (e.g., X-ray, CT, MRI, Ultrasound, Nuclear Medicine) and radiotherapy technologies. **(KP1, PC3)**

K4: Integrate medical physics knowledge with clinical applications, including patient safety, dose calculation, treatment planning, and understanding radiation risks. **(KP1, PC4, PC7)**

Skills (S)

By the end of this course, students will be able to:

S1: Recall and explain core concepts of medical physics necessary for understanding imaging systems, radiotherapy, and radiation safety. **(KP1, PC3)**

S2: Apply critical thinking and problem-solving skills in clinical and experimental scenarios, including data analysis and experiment design. **(KP4, CSP3, ETW4)**

S3: Develop practical skills in operating medical physics equipment and safely handling radiation sources and biomaterials. **(PC5, PC7, ETW3)**

S4: Communicate scientific results clearly through organized oral presentations and written reports. **(CSP1, CSP4, ETW3)**

Attitude (A)

A1: Actively participate in learning through interaction with lecturers and peers during discussions and laboratory sessions. **(ETW3, ETW4)**

A2: Work effectively in a team, demonstrating collaboration and leadership skills during practical and group activities. **(ETW3, CSP3)**

A3: Respect and appreciate the importance of accurate measurements in medical physics, and maintain all equipment and biomaterials safely and responsibly. **(ETW1, ETW2, PC6)**

A4: Communicate clearly and effectively with colleagues, healthcare professionals, and members of the interprofessional team to ensure patient care and safety. **(CSP1, CSP4, PC4)**

A5: Adhere to radiation safety procedures and understand radiation-related risks to prevent harm to patients and healthcare workers. **(PC7, ETW1)**

9. Teaching and Learning Strategies

1. **Theoretical lectures:** 2 lectures per week covering core concepts in medical physics, imaging systems, radiotherapy, radiation safety, and biomaterials.
2. **Practical laboratory sessions:** 2 hours per week. Students are divided into small groups of 8–10 to perform simple physics experiments such as lenses, mirrors, speed of sound, viscosity, and other basic medical physics applications. Safety protocols are followed.
3. **Analyzing experimental results:** Students review and interpret data from laboratory exercises.
4. **Discussion and comparison:** Students discuss outcomes and compare them with theoretical or expected values.

10. Course Structure

Week	Theoretical Hours	practical Hours	Subject Name	Main Learning Outcome	Learning method	Evaluation method
1	2	2	Introduction to medical physics	Introduction to medical physics	Theoretical lectures And practical lab	- written test - practical test
2	2	2	Biomaterials in Medicine	Understand the applications of biomaterials	Theoretical lectures and practical lab	- written test - practical test
3-4	4	4	Force on and in the body	Force on and in the body	Theoretical lectures and practical lab	- written test - practical test
5-7	6	6	Basic physics of the cardiovascular system	Basic physics of the cardiovascular system	Theoretical lectures and practical lab	- written test - practical test
8-9	4	4	Electricity within the body	Electricity within the body	Theoretical lectures and practical lab	- written test - practical test
10-11	4	4	Heat and cold in medicine	Heat and cold in medicine	Theoretical lectures	- written test - practical test
12-14	6	6	Basic physic of lung and breathing	Basic physic of lung and breathing	Theoretical lectures and practical lab	- written test - practical test
15	2	2	Eyes and vision	Eyes and vision	Theoretical lectures and practical lab	- written test - practical test
16	1	2	Pressure	Pressure	Theoretical lectures	- written test - practical test

17-18	2	4	Sound in medicine	Sound in medicine	Theoretical lectures And practical lab	- written test - practical test
19-20	2	4	Physics of diagnostic x rays	Physics of diagnostic x rays	Theoretical lectures and practical lab	- - written test - practical test
21-22	2	4	Types of rays	Types of rays	Theoretical lectures and practical lab	- written test - practical test
23-24	2	4	Radioactive pollution	Radioactive pollution	Theoretical lectures and practical lab	- written test - practical test
25-26	2	4	x-ray	x-ray	Theoretical lectures and practical lab	- written test - practical test
27-28	2	4	Micro wave spectra	Micro wave spectra	Theoretical lectures and practical lab	- written test - practical test
29-30	2	4	Physics of nuclear medicine.	Physics of nuclear medicine.	Theoretical lectures and practical lab	- written test - practical test

11. Course Evaluation

- 1.first semester practical exam (10%)
- 2.mid year exam theoretical (20%)
- 3.second semester practical exam (10%)
4. quiz 3% +students activities 2% (total5%)
- 5.final exam (theoretical 55%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Medical physics - Cameron
Main references (sources)	Medical physics – Cameron Medical Physics for Medical Students
Recommended books and references (scientific journals, reports...)	Medical Biophysics
Internet sources, Websites	Discussion questions are solved at the end of each practical experience using Internet sites by students

Department stamp

Theoretical lectures:

- **Lecture 1** Introduction to medical physics
- **Lecture 2** Biomaterials in Medicine

Force on and in the body

- **Lecture 3** Statistic
- **Lecture 4** Fractional Forces
- **Lecture 5** Dynamics

Basics Physics of the cardiovascular system.

- **Lecture 6** Work done by the heart
- **Lecture 7** blood pressure and its measurement.
- **Lecture 8** Pressure across the blood vessel wall
- **Lecture 9** Bernoulli's principle
- **Lecture 10** Blood flow laminar and turbulent
- **Lecture 11-12** Poiseuille's law

Electricity within the body .

- **Lecture 13** Electrical potentials of nerves
- **Lecture 14** Electrical signals from muscles-
- **Lecture 15** The electro-myogram (EMG),
- **Lecture 16-17** Electrocardiogram (ECG),
- **Lecture 18** Electroencephalography (EEG).

Heat And Cold in Medicine

- **Lecture 19-20** Physical Bases of Heat and Temperature
- **Lecture 21-22** Thermometry and Temperature Scales
- **Lecture 23** Thermography-Mapping the Body Temperature
- **Lecture 24** Heat Therapy
- **Lecture 25** Use of Cold in Medicine

Basics physics of lungs and breathing .

- **Lecture 26** Measurement of lung volumes
- **Lecture 27** The breathing mechanism
- **Lecture 28** airway resistance,
- **Lecture 29-30** work of breathing

Physics of the eyes and vision.

- **Lecture 31** Defective vision and its correction
- **Lecture 32** Instruments used in ophthalmology

Pressure

- **Lecture 33** pressure, measurement of pressure in the body

Sound in medicine

- **Lecture 34** General properties of sound,
- **Lecture 35** the stethoscope, ultrasound picture of the body,

- **lecture 36** ultrasound to measure motion, physiological effects of ultrasound in therapy

Physics of diagnostic x-rays .

- **Lecture 37** Production of x-ray beams
- **Lecture 38-39** How x-ray absorbed
- **Lecture 40** CT -scan

Physical safety

- **Lecture 41** Types of rays
- **Lecture 42** Radioactive pollution
- **Lecture 43** x-ray
- **Lecture 44** Microwave spectra
- **Lecture 45** Physics of nuclear medicine

Practical hours

1st ,2nd ,3rd Week :The Focal Length of a Convex Lens.

4th ,5th ,6th Week :The Falling of a Small Sphere through a Viscous Medium.

7th ,8th ,9th Week :The Velocity of Sound by Means of Resonance Tube Closed at One End.

10th ,11th ,12th Week: Determination of Surface Tension of Water by Rise in a Capillary Tube.

13th ,14th ,15th Week :The Density of a Liquid by Means of a Loaded Test-Tube.

16th ,17th ,18th Week: The Focal Length of a Concave Mirror.

19th ,20th ,21th ,22th Week The Simple pendulum.

23th ,24th ,25th ,26th Week: The Specific Heat Capacity of a Poor Conductor by the Method of Mixtures .

27th Week: Verify Ohm's Law and Find Unknown Resistance.

28th ,29th ,30th Week: Principles of Operation of Medical Imaging Devices: X-ray, CT, MRI, and Ultrasound