Course Description Form

1.Course Name:
Medical Physics
2.Course Code:
Phcls25-115
3.Semester / Year:
First semester/2025
4.Description Preparation Date:
01. 9.2025
5.Available Attendance Forms:
Theoretical Lectures/Practical Laboratory
6.Number of Credit Hours (Total) / Number of Units (Total)
3/2
7.Course administrator's name
Theoretical
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Practical
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8. Course Objectives	
Course Objectives	1. Concepts of basic physics. 2. Application of physics in medical fields. 3. Principles of some medical devices working

9. Teaching and Learning Strategies	
Strategy	Interactive lectures (and enrichment links via the online classroom). Practical laboratory experiments (enhance applied skills). Classroom discussions and case analyses (stimulate critical thinking and connect concepts). Student presentations (enhance self-directed learning). Homework.

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theory	A1:The student explains matter properties and Charles's gas law	Matter and Charles law.	Theoretical lectures	Paper-based exams
	2 pract.	B1: That the are student constructs precise scientific graphs and reports.	Explain how to plot a graph and make a laboratory report	laboratory work	Report
2	1 Theory	A2: That the student distinguishes between heat and energy in medicine.	Temperature in medicine, Heat and energy	Theoretical lectures	Paper-based exams
	2 pract.	B2: That the student calculates the acceleration of gravity using a pendulum.	Simple pendulum	laboratory work	Report
3	1 Theory	A3: That the student describes the diffusion mechanism and its drug effect.	Diffusion	Theoretical lectures	Paper-based exams
	2 pract.	That the student measures the focal length of a convex lens	The focal length of convex lens	laboratory work	Report
4	1 Theory	A4: That the student analyzes the basic laws of thermodynamics.	thermodynamics	Theoretical lectures	Paper-based exams
	2 pract.	B4: The student calculates the viscosity of liquids	the viscosity of a liquid	laboratory work	Report
5	1 Theory	A5: That the student interprets the components of the ECG cycle.	Electrocardiogram ECG	Theoretical lectures	Paper-based exams
	2 pract.	B5: That the student estimates the speed of sound waves.	Speed of sound	laboratory work	
6	1 Theory	A6: That the student applies Kirchhoff and Planck radiation laws.	Radiation: terms & law (Kirshoffs law; planks law; Stefan-Boltzman law; Wiens law)	Theoretical lectures laboratory work	Paper-based exams
	4 pract.	B6:That the student plots the radioactive decay curve and half-life	Study the Decay curve and find the half-life of water	laboratory work	Report

7	1 Theory	A7: That the student illustrates electromagnetic waves and optics.	Electromagnetic waves; Maxwell equations; physical optics	Theoretical lectures	Paper-based exams
	2 pract.	B7: That the student quantifies the loss in optical fibers due to bending.	Optical Fiber Loss (bend) Measurement	laboratory work	Report
8	1 Theory	A8: That the student outlines the operation of CT scan imaging.	Computed Tomography CT scan	Theoretical lectures	Paper-based exams
	2 pract.	B8: That the student examines drug purity using a spectrophotometer.	Spectrophotometer	laboratory work	Report
9	1 Theory	A9: That the student evaluates the function of cardiac pacemakers.	Implantable Cardiac Pacemakers	Theoretical lectures	Paper-based exams
	4 pract.	B9: That the student computes the surface tension of medical liquids	Measuring surface tension (differential height capillary method)	laboratory work	Report
10	2 Theory	A10: That the student demonstrates the use of glucose monitoring devices.	Medical Devices for: Blood Glucose Monitoring ,Parenteral Infusion Devices , Cardiac Output Measurement	Theoretical lectures	Seminar
	2 pract.	B10: That the student calculates the density of various liquid formulations.	Calculate the density of liquids	laboratory work	Report
11	2 Theory	A11: That the student identifies X-ray spectra and their biological effects.	X-Ray and X-Ray spectra; absorption of X-Ray; U.V and IR effects; medical and biological effects of radiation	Theoretical lectures	Paper-based exams
	4 pract.	B11: That the student compares densities of two liquids using a loaded tube.	Comparing the densities of two liquids	Theoretical lectures	Report
12	1 Theory	A12: That the student analyzes the electrical activity of the brain (EEG	Electroencephalography EEG	Theoretical lectures description	Seminar

13	1 theory	A13: That the student contrasts MRI with other medical imaging techniques.	Magnetic Resonance Imaging MRI	Theoretical lectures	Paper-based exams
	2 Pract.	B12: That the student measures the local atmospheric pressure	Calculating atmospheric pressure	laboratory work	Report

Course Evaluation	
Mid-Term Theoretical Exam20 Marks(Paper-based mid-term exam) Practical Assessment20 Marks (Includes: Attendance, quizzes, and practical laboratory training) Final Theoretical Exam60 Marks 100	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Callister Jr, W. D., & Rethwisch, D. G. (2020). *Materials science and engineering: an introduction*. John wiley & sons. Davidovits, P. (2024). *Physics in biology and medicine*. Elsevier. Armitage E. Practical Physics in S.I.2nd edition, 2009, John Murray, London
Main references (sources)	Callister Jr, W. D., & Rethwisch, D. G. (2020). *Materials science and engineering: an introduction*. John wiley & sons. Davidovits, P. (2024). *Physics in biology and medicine*. Elsevier. Armitage E. Practical Physics in S.I.2nd edition, 2009, John Murray, London

Recommended books and references (scientific journals, reports...)	