



University of Baghdad
Alkindy College of Medicine
Academic Year 2022-2023

Department of Physiology

Course Title:	Medical physics الفيزياء الطبية
Year:	First Year (Semester One)
Course Code:	MPHYS 102
Credit Hours:	3 Credits
Coordinator:	Assist.Prof. Dr.Nawal Fattah Naji
Co-Coordinator	lecturer. Dr Mohammed Abdulameer
Google Class-code	
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1- COURSE DESCRIPTION:

Modern medicine is underpinned by technological developments, many of which have their root in fundamental physics. This course will provide an introduction to the rich field of medical physics.

2- COURSE OBJECTIVES

To provide the students with information regarding medical physics and medical physiology.

3- Course syllabus Map:

Year	Subject	Lec.	Disc.	Pract.	Credit
I	S1-Medical physics	20	10	30	3

4- Details of Topics:

- **Materials:**

Theory: 20 lectures/one lecture per week

Wk	Lecture Titles	Objectives	المحاضر
1	Force in & on the body	✓ Define: Gravitational Force , Electrical Force, Nuclear force, physiological effects of electricity	د. نوال فتاح ناجي
2	.Skeleton design and bone strength	✓ Stress/strain relationships ✓ Lubrication of bone joints ✓ Measurement of bone mineral in the body	
3	Heat and Energy Requirements of People	✓ Heat and Life ✓ Energy from Food ✓ Regulation of Body Temperature . ✓ Control of Skin Temperature.	
4	Heat therapy	✓ Heat therapy, use of cold in medicine (Cryosurgery) ✓ physical basis of heat and temperature, ✓ thermometry and temperature scales, thermograph- mapping the body's temperature.	

5	Mechanical work and energy	<ul style="list-style-type: none"> ✓ Work, potential energy, kinetic energy and strain energy ✓ Applications of the principle of conservation of energy 	
5	Power and energy effect on human body	<ul style="list-style-type: none"> ✓ Explain Power and energy effect on human body ✓ Energy of nuclear radiations 	
6	Physics of cardiovascular system	<ul style="list-style-type: none"> ✓ Pressure across the blood vessel wall, 	د.اخلاص جواد عامر
6	Bernoulli's principle applied to the cardiovascular system.	<ul style="list-style-type: none"> ✓ Bernoulli's principle blood flow laminar and turbulent, poiseullies law. 	
7	Electricity within the body.	<ul style="list-style-type: none"> ✓ Define Electrical potential of nerves. ✓ Physical properties of neurons 	
8	Electrical signals from muscle ,heart and brain	<ul style="list-style-type: none"> ✓ Explain electrical signals from muscles-the electro-myogram(EMg), electrocardiogram(EGC), electroencephalography(EEG). 	
9	Physics of eye and vision	<ul style="list-style-type: none"> ✓ Explain the Physics of eye ✓ General laws for lenses and mirrors and their relationship to eyes. 	
9	Physics of eye and vision	<ul style="list-style-type: none"> ✓ Defective vision and its correction, instruments used in ophthalmology 	
10	Physics of ear and hearing	<ul style="list-style-type: none"> ✓ Define hearing ✓ Explain Physics of ear and hearing. 	
11	Structure of the atomic nucleus	<ul style="list-style-type: none"> ✓ Introduction (structure and behavior of atomic nuclei) ✓ Nuclear reactions ✓ Radioactive decay reactions 	د.محمد عبد الامير عبد الرضا
12	Physics of Nuclear Medicine	<ul style="list-style-type: none"> ✓ Explain of Alpha radiation (α), Beta ray or negatron (β^-) and Gamma ray(γ) ✓ production of Radionuclides 	
12	Radioactive isotopes in Medicine	<ul style="list-style-type: none"> ✓ Explain the Radioactive isotopes and thier uses in Medicine 	
13	Physics of Radiation Therapy.	<ul style="list-style-type: none"> ✓ Dose Units Used in Radiotherapy ✓ Principles of Radiation Therapy ✓ Radiotherapy Treatment Planning Brachytherapy 	
14	Radiation protection .	<ul style="list-style-type: none"> ✓ Explanation of the mechanism of radiation protection. 	
14	Physics of Diagnostic X-Rays	<ul style="list-style-type: none"> ✓ Production of X-Ray Beams X-ray unit consists 	
15	Attenuation of X-Ray	<ul style="list-style-type: none"> ✓ Define: Attenuation of x-ray ✓ Measurements of attenuation ✓ Half value layer (HVL) ✓ (Linear and Mass) attenuation coefficient 	

Discussion: 1 hours per week

Wk	Titles
3	Magnetic resonance imaging (MRI)
6	The physics of positron emission tomography
7	Nanotechnology in medicine
9	uses radioisotopes in medicine for Diagnostic and therapeutic
11	Radiation protection

Practical: 30 lectures/two hours per week

Wk	Titles	Venue
1	The measurement of Young's modulus for a wire	Medical physics lab
2	Determine The surface tension of water by the capillary tube method	
3	The specific heat capacity of a liquid by an electrical heating method	
4	Use of boyles law apparatus to verify boyles law and to measure the atmospheric pressure	
5	Determine The focal length of a concave mirror	
6	Determine The focal length of convex lens using concave mirror	
7	Calculate The wave length of sodium light using a diffraction grating	

8	Investigation The velocity of sound by means of a resonance tube closed at one end	
9	Determine The internal resistance of a cell using a potentiometer	
10	Using of cathode ray oscilloscope in the measurements of D.C. voltage	
11	Flow of water through a capillary tube to deduce the viscosity of water	
12	Hooks law to verify the tension and compression	
13	The wavelength of He-Ne laser	
14	The refractive index of a liquid by real and apparent depth using a travelling microscope	
15	Verifying of Ohms law	

➤ **Scoring System is: (Total 100%)**

- ❖ 5% for active participation, assignment & quizzes that delivered in class
- ❖ 15% for Mid-course exam.
- ❖ 10% for active participation, assignment & quizzes that delivered in Practical
- ❖ 70% for the Final exam.
 - ✓ 20% practical
 - ✓ 50% written

Assessment methods

Course Assessment

- 1- Formative Assessment: The formative assessment is continuous as well as end-of-course assessment. It will not count towards pass/fail at the end of the course, but will provide feedback to the teachers and students.**
- 2- Summative Assessment: Total score is 100%, students will have theory and practical examinations. The pass mark is 50% for the final mark.**

Methods of instruction

- Lectures
- Tutorial
- Seminar
- Group projects
- Assignments
- Group Discussion

-Reference Books

- 1. Medical physics by J.R. Cameron**
- 2. Review of Radiologic Physics, by Walter Huda**
- 3. Guyton and hall textbook of medical physiology 13th edition by John E. Hall – ELSEVIER**
- 4. Ganong's review of medical physiology 25th edition- LANGE**

Suggested Websites

- ❖ <http://www.moh.gov.iq/>
- ❖ <https://aapm.onlinelibrary.wiley.com/doi/full/10.1120/jacmp.v14i6.4476>
- ❖ https://library.med.utah.edu/kw/pharm/hyper_heart1.html
- ❖ <https://www.rad.washington.edu/academics/academic-sections/msk/muscle-atlas/>
- ❖ <http://muscle.ucsd.edu/>
- ❖ <http://homes.bio.psu.edu/faculty/strauss/anatomy/nerv/nervous.htm>
- ❖ <http://cvphysiology.com/>

Suggested Journals:

- Al Kindy Medical Journal

- The Journal of General Physiology
- Anatomy & Physiology
- The Journal of Physiology

Attendance & absenteeism

Attendance is mandatory for the student. The student must be on time and present for all activities. In case of absenteeism (even excused absence), the students would expose to the following:

- 1. Probation:** when the student misses **5%** of the total hours (3 hour).
- 2. Primary warning:** when the student misses **7%** of the total hours (4 hours).
- 3. Final warning:** when the student misses **9%** of the total hours (5 hours).
- 4. Dismissal without excuse:** when the student misses **10%** of the total hours (6hours).
- 5. Dismissal with excuse:** when the student misses **15%** of the total hours (9 hours).