

## **Medical Physics**

**A course that links physics topics to medicine and studies the functioning of the human body with physical laws.**

**Theoretical: It begins with the study of levers, body movement and heat, then followed by the study of energy and its types, pressure, rays and their relationship to the body and includes calculations and scientific problems.**

**Practical: Physical experiments are conducted in the laboratory in student groups and usually prepare reports containing theories, explanations, measurements, calculations in addition to the graph**

## **Different Learning Methods in the Department of Dentistry**

**A- Auditory method: This method depends on communicating information in the form of sounds that are heard by the learner for analysis and storage.**

**B- Visual method: in which information is communicated by displaying color images, videos or any form of visual educational aids.**

**C- Reading method: It is one of the methods that depend on reading information to understand and store it.**

**D. Interdisciplinary professional education where dental students collaborate with other healthcare professionals, to promote a holistic approach to patient care.**

## **Different evaluation methods for students in the Department of Dentistry**

**Daily tests with multiple-choice questions for subjects that require practical skills.**

**B- Daily exams with practical questions.**

**C- Semester and final exams.**

**D- Setting grades for the assigned homework .**

**H- Grades of participation of questions competing for the subjects of study.**

**G- Daily evaluation of the student's work in scientific laboratories and educational clinics.**

## **Learning Outcomes for Dental Courses**

**Using health information technology in oral and dental health care effectively.**

**Apply appropriate professional, ethical and legal standards in the provision of patient care in accordance with health care rules and regulations.**

**Providing graduates with scientific knowledge and professional skills in the fields of oral and dental surgery, dental prosthesis, dental preservation,**

orthodontics, pediatric dentistry, periodontal pathology and surrounding tissues, as well as community dentistry.

Knowledge of the principles of oral and dental health and understanding of the development, prevention and treatment of related diseases

**Health promotion and disease prevention to serve the community.**

Integrating basic and medical sciences into healthcare practice.

Develop decision-making and problem-solving skills in healthcare.

Evaluate the state of oral and dental health and the medical condition of the patient, request the necessary diagnostic analyzes, and interpret the results of various analyzes to reach the appropriate diagnosis.

Prepare a care plan for the prevention and treatment of diseases taking into account the needs of the patient.

Demonstrate competence in performing procedures safely in all aspects of dentistry and prevent injuries arising from treatment.

Providing graduates with theoretical knowledge and laboratory and clinical skills that increase the effectiveness of diagnosis.

Preparing dental graduates and training them to become distinguished in various fields of dentistry.

### Lesson name and units

<i>Subject</i>	<i>1<sup>st</sup> Semester hours/week</i>		<i>2<sup>nd</sup> Semester hours/week</i>		<i>Units</i>	<i>Code</i>
	<i>Theory</i>	<i>Practical</i>	<i>Theory</i>	<i>Practical</i>		
<b>4. Medical Physics</b> فيزياء طبيه	2	2	2	2	6	MP104

### A- Basic information

<b>1-Subject title</b>	<b>Medical Physics</b>	
<b>2-Number of credits</b>	Theory:4	Laboratory:2
<b>3-Number of contact hours</b>	Theory:2h/wk.	Laboratory:2h/wk.
<b>4-Subject time</b>	First Year	

Number	Title of the lectures	Hours
1	<b>Terminology</b> Terms: Medical Physics, physical medicine, Physical therapy, Health	2
2	Physics, Radiological Physics, clinical physics. Modeling, Accuracy, Precision, False Positive, False Negative.	2
3	<b>Force on &amp; in body:</b>	2
4	Static forces :( type of levers with medical examples). Dynamic forces (Centrifuge)	2
5	<b>Physics of the skeleton:</b> Bones:(Function of bones, Composition of bone, bone remodeling, compact and trabecular bone)	2
6	Stress-strain curve :( compressive and tensile stress, young modulus). Bone joints :( Synovial fluid, coefficient of a joint).	2
7	<b>Heat and cold in medicine:</b> Physical basis of heat and temperature, Temperature scales, Converting Temperatures, Temperature in Dentistry, Thermal expansion, (Linear, Area, Volume Thermal Expansion), Thermometry, Heat therapy,	2
8	Thermography, Cold in medicine and cryosurgery. Thermal conductivity.	2
9	<b>Energy, work and power of the body:</b> First law of thermodynamic. Energy change in the body (Met, Basal metabolic rate (BMR).	2
10	Work and power. Efficiency heat losses from the body. Anaerobic phase and aerobic phase. Hypothalamus (body's thermostat).Heat lost by (radiation, convection, evaporation of sweat and respiration).	2
11	<b>Pressure:</b> Definition, absolute pressure, gauge pressure, negative pressure, unit of pressure. Measurement of pressure in the body	2
12	(Manometer).Pressure inside the skull. Eye pressure. Pressure in the skeleton. Pressure in the urinary bladder.Boyle's law: (pressure while diving).HOT (hyperbaric oxygen therapy).	2
13	<b>Electricity within the body:</b> Electrical potential of nerves (resting potential, action potential in myelinated and unmyelinated nerves) Electromyogram	2
14	(EMG). Electrical potential in the heart (electrocardiogram ECG). Electroencephalogram (EEG)	2
15	<b>Sound in medicine:</b> Properties of sound.	2
16	Stethoscope (including heart sound).mechanism of hearing	2
17	<b>Ultrasound</b> (A-scan, B-scan, M-scan and Doppler effect). Physiological	2
18	effect of ultrasound in therapy.	2
19	<b>Light in medicine:</b> Light nature, Planck Equation, (Reflection, Refraction and	2

20	Absorption of Light, Properties of light), Diffuse reflection, Specular reflection, Phototherapy, Application of ultraviolet and infrared light in medicine, Tanning and Skin Cancer.	2
21	<b>Laser in medicine.</b> What is laser? Application of laser in medicine	2
22	Atomic Transitions, Population inversion, Laser Typical Characteristics, General Applications of Laser, Laser Dental Applications, Reshape gum tissue, Laser aided teeth whitening, Laser Drill.	2
23	<b>Physics of eye and vision:</b> Focusing element of the eye (cornea, lens).	2
24	Element of the eye (pupil, aqueous humor, vitreous humor, sclera). Visual acuity, Snellen chart, optical density.	2
25	<b>Physics of diagnostic X-ray:</b> Properties of X-ray, production of X-ray. Absorption of X-ray, contrast	2
26	media-ray image (penumbra, grid, and intensifying screens). Radiation to patients from X-ray (filters).	2
27	<b>Physics of nuclear medicine:</b> Radioactivity decay, half-life, units. Basic instrumentation and its medical application (GM-tube, Photomultiplier tube, scintillation detector, solid state detector). Therapy with radioactivity. Radiation doses in nuclear medicine.	2
28		2
29	<b>Physics of radiation therapy:</b> The dose units (Rad and Gray). Principles of radiation therapy. Brach therapy, quality factor (QF).	2
30		2
<b>Total</b>		<b>60</b>

### **Laboratory sessions**

Lab number	Study unit title	Hours
1	Guidelines of Medical Physics Lab and Rules must be obeyed by the students	2
2	Graphing Techniques	2
3	Ohm's law:	2
4	- verify ohm's law - to find the value of different values of resistance	2
5	<b>Semiconductors (junction diode):</b> To determine the characteristics of the semiconductors	2
6	Comparison between omic and non-omic resistance	2
7	<b>Cathode Ray Oscilloscope</b> -Measurement of deflection sensitivity of D. C. voltage.	2
8	-Measurement of deflection sensitivity of A. C. voltage	2

9	<b>The focal length of convex lens:</b> -Rough value of focal length of different convex lenses,	2
10	-A graphical method of measuring of focal length, Comparison between these methods and the given value.	2
11	<b>Hook's law:</b> -To verify Hook's law and determine the force constant of the	2
12	spring. -To determine the work done by stretching the spring.	2
13	<b>Focal length of concave mirror:</b> -Locating the radius of curvature	2
14	-Determining the focal length	2
15	General review and 1 <sup>st</sup> course exam	
16	<b>Laser applications:</b> -To measure the width of a single slit by using a laser	2
17	-To measure the wavelength of laser by using a certain single slit	2
18	<b>Boyle's law:</b> -To verify Boyle's law	2
19	-To measure the pressure of the atmosphere	2
20	<b>Inverse Square law:</b> - To verify the inverse square law	2
21	- Radiation shielding by different thicknesses of of a certain material	2
22	<b>Viscosity of a liquid</b> - To determine the viscosity of a medium using a small sphere falls with a constant terminal velocity.	2
23	- To verify Stokes' law	2
24	<b>Velocity of the sound</b> - To measure the velocity of the sound by using a resonance tube, closed at one end, at room temperature.	2
25	- Calculated the theoretical and practical values of the velocity of sound and comparing between them.	2
26	<b>The focal length of a converging lens</b> - To determine the focal length of a converging lens by lens displacement method using conjugate foci.	2
27	- To calculate curvature value of this converging lens	2
28	<b>Simple Pendulum</b> -To determine the periodic time and its variation with the	2
29	length of the pendulum -To calculate the acceleration of free fall	2
30	General review and 2 <sup>nd</sup> course exam	2

<b>Total</b>		<b>60</b>
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