

Course Description Template for the subject | **Medical Physics**

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| University/College Name | Al-Ayen University, Iraq / College of Medicine |
| Subject Name | Medical Physics |
| Academic Stage | First Stage |
| Available Attendance Modes | Lecture and Discussion |
| Subject System | Yearly |
| Academic Year for Preparing this Description" | 2023-2022 |

| Week | Lecture title | Objective |
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| 1 | Terminology | <ul style="list-style-type: none"> • Terminology • Modeling (Physical medicine) • Measurement (Physical therapy) |
| 2 | Physics of the Skeleton | <ul style="list-style-type: none"> • What is Bone Made of • How Strong Are Your Bones? • Lubrication of Bone Joints |
| 3 | Physics of Diagnostic X-Rays Pressure | <ul style="list-style-type: none"> • Production of X-Ray Beams • How X-Rays Are Absorbed • Making an X-Ray Image • Radiation to Patients from X-Rays • Producing Live X-Ray Images -Fluoroscopy • X-Ray Slices of the Body • Radiographs Taken Without Film |

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| 4 | Pressure | <ul style="list-style-type: none"> • Measurement of Pressure in the Body • Pressure Inside the Skull • Eye Pressure • Pressure in the Digestive System • Pressure in the Skeleton • Pressure in the Urinary Bladder • Pressure effects While Diving • Hyperbaric Oxygen Therapy (HOT) • Pressure in the Digestive System |
| 5 | Heat and Cold in Medicine | <ul style="list-style-type: none"> • Physical Basis of Heat and Temperature • Heat therapy • Thermometry and Temperature Scales • Thermography-Mapping the Body's Temperature • Heat Therapy • Use of Cold in Medicine • Cryosurgery • Safety With Cryogenics |
| 6 | Sound in medicine | <ul style="list-style-type: none"> • Introduction • General properties of sound • The Body as a Drum (Percussion in Medicine) • The Stethoscope • Ultrasound Pictures of the Body • Ultrasound to Measure Motion • percussion in medicine • Ultrasound picture of the body • Physiological Effects of Ultrasound in Therapy |
| 7 | Forces on and in the Body | <ul style="list-style-type: none"> • Static • Frictional Forces • Dynamics |

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| 8 | Cardiovascular Instrumentation | <ul style="list-style-type: none"> • Major Components of the cardiovascular system • . Work Done by the Heart. • Blood Pressure and Its Measurement. <ul style="list-style-type: none"> • Pressure Across the Blood Vessel Wall (Transmutable Pressure). • Bernoulli's Principle Applied to the Cardiovascular System. • How Fast Does Your Blood Flow? • Blood Flow-Laminar and Turbulent. • Heart Sounds. • The Physics of Some Cardiovascular Disease. • Some Other Functions of Blood |
| 9 | The Physics of the Lungs and Breathing (Respiratory system) | <ul style="list-style-type: none"> • The Air ways • How the Blood and Lungs Interact • . Measurement of Lung Volume <ul style="list-style-type: none"> • Pressure-Airflow-Volume Relationships of the Lungs • Physics of the Alveoli • The Breathing Mechanism • Airway Resistance |
| 10 | Physics of ear and hearing | <ul style="list-style-type: none"> • Introduction • The Outer Ear • The Middle Ear • The Inner Ear |
| 11 | Work and power | <ul style="list-style-type: none"> • Heat losses from the body |
| 12 | Nuclear medicine imaging devices | <ul style="list-style-type: none"> • Rectilinear scanner • Gamma cameras: • Positron emission tomography (PET) • Radiation doses in nuclear medicine |
| 13 | Physics of Nuclear medicine | <ul style="list-style-type: none"> • Review of Basic Characteristics and Units of Radioactivity • Sources of Radioactivity for Nuclear Medicine • Statistical Aspects of Nuclear Medicine |

Practical sessions

| Week | The title of the experiment | Objective |
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| 1 | Essential electric instruments in medical physics lab. | To understand how medical instruments work |
| 2 | A simple graphical method for determining the resistance of voltmeter | To know medical application from this experiment |
| 3 | A simple graphical method for determining both the e.m.f and the internal resistance of a cell. | To know medical application from this experiment |
| 4 | Measurement of d.c. voltage by using cathode ray Oscilloscope | To know medical application from this experiment |
| 5 | Measurement of a.c. voltages by using the cathode ray oscilloscope | To know medical application from this experiment |
| 6 | The focal length of a convex lens by a graphical method | To know medical application from this experiment |
| 7 | Temperature measurement using clinical mercury thermometer and electronic thermometer | To know medical application from this experiment |
| 8 | Pulmonary function test: | To know how used spirometer |
| 9 | Measurement of forced vital capacity | To know how used spirometer |
| 10 | Measurement of VC/IVC, MMV and ventilator profile test | To know how used spirometer |
| 11 | LASER application for measuring the width of a single slit | To know medical application from this experiment |
| 12 | Radiation detection | To know medical application from this experiment |

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| 13 | Physics of blood pressure measurement | To know how used sphygmomanometer |
| 14 | Electrical sphygmomanometer | To know how used sphygmomanometer |
| 15 | Electrocardiography (ECG) | The ECG is helpful in diagnosing and monitoring the origins of pathologic rhythms; myocardial ischemia; myocardial infarction; atrial and ventricular hypertrophy; atrial, atrioventricular, and ventricular conduction delays; and pericarditis |
| 16 | Comparing the viscosities of two liquids using Ostwald's viscometer | To know medical application from this experiment |
| 17 | Visual acuity | Visual acuity (VA) is a measure of the clarity or sharpness of vision, especially for distant vision |
| 18 | Color photometer | Determination of hemoglobin concentration |
| 19 | audiometer | To know medical application from this experiment |
| 20 | study of flow characteristics | To know blood flow |