

**Jordan University of Science & Technology**  
**Faculty of Science & Art**  
**Department of Physics**

<b>Title &amp; Instructors</b>									
<b>Course Title</b>	<b>Premedical Physics</b>								
<b>Course Number</b>	<b>Phys 104</b>								
<b>Coordinator</b>	<b>Dr. Adnan Jaradat</b>								
<b>Office Location</b>	<b>PH 4 L0</b>								
<b>Office Phone</b>									
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<b>E-mail</b>	<b>jaradat@just.edu.jo</b>								
	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Instructor</th> <th style="text-align: center;">E-mail</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><b>Dr. Adnan Jaradat</b></td> <td style="text-align: center;"><b>jaradat@just.edu.jo</b></td> </tr> <tr> <td style="text-align: center;"><b>Prof. Dr. Ahmad Alsaad</b></td> <td style="text-align: center;"><b>Alsaad11@just.edu.jo</b></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Instructor	E-mail	<b>Dr. Adnan Jaradat</b>	<b>jaradat@just.edu.jo</b>	<b>Prof. Dr. Ahmad Alsaad</b>	<b>Alsaad11@just.edu.jo</b>		
Instructor	E-mail								
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<b>Course Description</b>
<p>This premedical general course of physics introduces the students to mechanical aspects of physics such as force, gravitation, Density, Newton's first and third laws, equilibrium, Newton's second law, Friction, torque, static equilibrium, center of gravity, Levers and muscles. Elasticity including Stress, Strain and Young's Modulus are also presented. The students will understand the temperature scales, molecular masses, pressure, and the principle of ideal gas law. Human metabolisms, Radiation, Temperature regulation in warm – blooded animals are other phrases need for the premedical student. Fluid mechanics including Archimedes' Principle, Continuity Equation, Streamline Flow, and Bernoulli's Equation will be presented. The role of gravity in the circulation, Blood pressure using the sphygmomanometer will be given. Viscosity, Flow in the circulatory systems and Centrifugation are applications on fluids. The structure of nerve cells, the resistance and the capacitance of an axon, electroencephalography and electrocardiograph are given as applications. Sound waves including the nature and speed of sound, sound detectors, auditory response, and ultrasound are presented. Light including the index of reflection, reflection and refraction, total internal reflection principles will be given. Concentration on the X-Ray diffraction and the structure of biological molecules are given as applications. In geometric optics; Mirrors, lenses, and the power of the lenses will be given. The aberrations, human eye, tomography, imaging a slice, optical defects of the eye will be given as applications. The students will handle some applications in radioactivity in details, half-life, dating in archaeology and geology, radioactive decays as part of their knowledge in physical phenomena. Ionizing radiation will also be explained including the interaction radiation with matter, radiation units, harmful of radiation, chronic radiation exposure and radiation in medicine.</p>

<b>Student Learning Outcomes (SLOs)</b>			
<b>Upon successful completion of this course, students should be able to:</b>			
<b>SLOs</b>	<b>Related ILOs</b>	<b>Evaluation Criteria</b>	
		<b>Type of Criteria</b>	<b>Weight (%)</b>
1. Understand the physical meaning of the mechanical quantities including the basic principles of laws governing the kinematics and dynamics, including applications in elasticity and fluids.	<b>1, 2, 3</b>	<b>MCQ</b>	<b>15%</b>
2. Explain the nature of temperature on the microscale and macroscale in relevance to pressure including application in human and animal bodies.	<b>1,2</b>	<b>MCQ</b>	<b>20%</b>
3. Point out the medical outcomes, such as nerve cells and axons including Electroencephalography and Electrocardiograph applications.	<b>1,2</b>	<b>MCQ</b>	<b>20%</b>
4. Understand the nature of sound and Ultrasound; their applications (auditory response and micrograph) as application to the vibrations and waves.	<b>1</b>	<b>MCQ</b>	<b>15%</b>
5. Know the principles (geometric and wave natures) governing the light including its applications in diagnostic and treatment of human eye function.	<b>1,2</b>	<b>MCQ</b>	<b>15%</b>
6. Understand radiation and ionizing radiation in their nature and their benefit and harmfulness in human life.	<b>2, 3</b>	<b>MCQ</b>	<b>15%</b>

## Text book

Physics by Kane and Sternheim 3<sup>rd</sup> Edition, John Wileys & Sons, New York, 1988.

## References

- 1- College Physics by Knight, Jones, and Field
- 2- College Physics by Serway & Faughn.
- 3- Contemporary College Physics by Jones & Childers.

## **COURSE CONTENT:**

<b>CH.</b>	<b>Topic</b>	<b>Number of Lectures</b>	<b>Suggested Problems</b>
<b><u>3:</u></b> 3, 5, 6, 7, 8, 12	Concepts of Velocity and Acceleration Newton's Laws (1 <sup>st</sup> . and 3 <sup>rd</sup> .) Newton's Laws (2 <sup>nd</sup> .) Applications with friction.	5	<b><u>CH:3</u></b> 45, 46, 48, 52, 54, 73, 75, 78, 79, 81
<b><u>4:</u></b> 1, 2, 5, 6, 7	Torque Application of torques and forces Equilibrium Human Muscles	4	<b><u>CH:4</u></b> 9, 13, 14, 31, 40, 41
<b><u>8:</u></b> 1, 2	Elasticity Stress and Strain Young's Modulus and its applications	3	<b><u>CH:8</u></b> 3, 5, 7, 15, 17, 20, 21
<b><u>10:</u></b> 1, 3	Temperature Scales and Definition of pressure	2	<b><u>CH:10</u></b> 1, 3, 4, 15, 17, 19
<b><u>13:</u></b> 1, 2, 3, 5	Archimedes' Principle Continuity equation Bernoulli's Equation The role of gravity in the circulation	5	<b><u>CH:13</u></b> 1, 3, 5, 7, 9, 12, 15, 18, 22, 25, 29, 30

<b><u>16:</u></b> 2, 4, 8 <b><u>18:</u></b> 1, 2	Electric field and electric potential between two parallel plates. Nerve Cell. The axon.	4	<b><u>CH:16</u></b> 16, 23, 40, 42, 44 <b><u>CH:18</u></b> 1, 2, 3, 4, 6, 9
<b><u>22:</u></b> 1, 3, 5, 6, 8	The nature and speed of sound. Intensity of sound wave and the Log Scale. Auditory response. Sound detectors. Ultrasound.	5	<b><u>CH:22</u></b> 3, 7, 8, 20, 21, 22, 26, 36, 39, 41
<b><u>23:</u></b> 1, 4, 5	Nature and speed of Light. The index of refraction. Refraction of light (Snell's law). Total internal reflection.	4	<b><u>CH:23</u></b> 1, 3, 4, 12, 14, 16, 18, 19, 20
<b><u>24:</u></b> 2, 3, 4, 7	Lenses, Thin lenses. Image formation. Power of a lens. The human eye and defects	3	<b><u>CH:24</u></b> 4, 5, 7, 10, 12, 13, 15, 18, 19, 20
<b><u>30:</u></b> 1, 2	Radioactivity Half-life and decay Production of x-ray	4	<b><u>CH:30</u></b> 1, 4, 10, 11
<b><u>31:</u></b> 1, 2, 3, 4, 5	Ionizing radiation and its units. Interaction of radiation with matter Exposure and absorbed dose Harmful effects of radiation in medicine Chronic radiation exposure	5	<b><u>CH:31</u></b> 4, 6, 7, 15, 19, 27, 29, 32, 35, 41
<b>Total number of lectures</b>		<b>44</b>	

<b>Assessment</b>		
<b>Assessment Type</b>	<b>Expected Due Date</b>	<b>Weight</b>
<b>Evaluation</b>		
<b>Quizzes</b>		
<b>Research Activity</b>		
<b>OSCE</b>		
<b>Mini-OSCE</b>		
<b>First Exam</b>		<b>25%</b>
<b>Second Exam</b>		<b>25%</b>
<b>Final Exam</b>		<b>50%</b>
<b>Total</b>		<b>100%</b>

### **List of Intended Learning Outcomes (ILOs):**

1. Demonstrate sufficient understanding of the structural organization and functions of the following systems of the human body: circulatory, respiratory, gastrointestinal, endocrine, hematopoietic and lymphatic, musculoskeletal, nervous, and genitourinary systems.
2. Conceptualize the cellular, molecular, genetic and biochemical mechanisms that maintain the body's homeostasis and their derangements in disease states.
3. Apply their knowledge of human physiology to solve questions regarding major clinical cases and diseases.
4. Attain appropriate and systematic clinical history of different medical conditions and settings.
5. Demonstrate proficiency in performing clinical skills and procedures.
6. Perform relevant physical examination on patients professionally and ethically.
7. Identify the major signs and symptoms of disease states, recognizing risk factors and etiologies, in an interdisciplinary approach to differentially diagnose patients.
8. Order and interpret results of relevant basic diagnostic procedures, such as laboratory investigations and conventional image procedures.
9. Apply safe and accurate methods of pharmacotherapy of major disease states.
10. Critically appraise research studies guided by evidence-based medicine.
11. Demonstrate ability to work in diverse settings and communities.