



**Petra University**  
**Faculty of Arts and Sciences**  
**Department of Basic Sciences**  
**Course Outline**

**104101 General Physics (1)**

**(3-3-0)**

**Prerequisite : None**

**Course Description:** Vectors, Kinematics of Point Particles, Dynamics of Point Particles (Newton's Laws), Statics; Torque, Circular Motion, Work, Energy and Power, Linear Momentum, Elastic Properties of Matter, Stress and Strain, Vibrational Motion, Simple Harmonic Motion.

Instructor's Name	Office No.	Office Phone	Office Hours	E-mail
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**Course Objectives:**

1. To give a solid grounding in basic physics that will serve as a basis for further study in physics or other scientific fields,
2. During this course, students should develop a qualitative and quantitative understanding of the description of motion and the nature of forces. The class will introduce the concepts of motion, vectors, Newtonian mechanics, momentum, energy, rigid bodies, oscillations and waves.

**Intended Learning Outcomes (ILO'S) :**

After completing this course, students are expected to achieve the following outcomes:

1. Achieve a good understanding of basic concepts and quantities in physics and how to link and apply these concepts to a variety of physical situations in real life.
2. Acquire skills in scientific methods, critical reasoning and problem solving techniques and strategies.
3. Acquire skills needed to read physics literature and to work with tables and physical quantities.
4. Understand and to use physical laws governing real process and to describe them mathematically.
5. Recognize the basic physical principles behind the operation of current technologies.

**B-Intellectual Skills:**

1. Demonstrate knowledge and understanding of the points mentioned above.
2. Develop the ability of solving physics problems logically.
3. Develop the students creativity, thinking, reasoning and estimate skills.
4. To be able to understand and to use physical laws governing real process and to describe them mathematically.

**C-Subject Specific Skills:**

1. Recognize the basic physical quantities and the units associated with them.
2. Solve motion problems using the properties of vectors in one- and two-dimensions.
3. Apply Newton's Three Laws of Motion to solve a variety of problems for linear and circular motion.
4. Use Conservation Laws of Energy, Momentum to solve problems of motion and collisions.
5. Analyze a multitude of physical situations that involve waves and oscillations.

**D-Transferable Skills:**

1. Develop cooperative work habits and communication skills.
2. Develop a sense of responsibility.
3. Understand how the scientific method can be used to increase our knowledge of the world and the universe.

**Teaching Methods:**

Method	Contact Hours
Lectures And Discussions	42 50-minute lectures

**Learning Outcomes Achieved By Each Teaching Method:**

Method	Achieved outcome	Assessed by
Lectures & Discussions	All outcomes	Exams

**Syllabus:**

Chapter & Sec No.	Course Content	Selected Problems	No. of 50-minutes Lect.
<b>1.</b>	<b>Fundamental Quantities and its Units 2</b>		1 Lect.
<b>2.</b>	<b>Motion in One Dimension 23</b>	pp(49-57)	4 Lect.
2.1	Position, Velocity, and Speed 24	3, 4,5	
2.2	Instantaneous Velocity and Speed 28	7	
2.3	Acceleration 31	12, 14	
2.4	Motion Diagrams 34		
2.5	One-Dimensional Motion with	21, 25, 27,32	
2.6	Freely Falling Objects 40	43, 52	
<b>3.</b>	<b>Vectors 58</b>	pp.(71-75)	2 Lect.
3.1	Coordinate Systems 59	1, 2	
3.2	Vector and Scalar Quantities 60		
3.3	Some Properties of Vectors 61	10,15	
3.4	Components of Vectors and Unit Vectors 65	19,27,30,31	
<b>4.</b>	<b>Motion in Two Dimensions 77</b>	pp.(101-110)	4 Lect.
4.1	The Position, Velocity, and Acceleration Vectors 78	1	
4.2	Two-Dimensional Motion with	5, 7, 8	
4.3	Projectile Motion 83	19, 22, 54, 67	
4.4	Uniform Circular Motion 91	29	
<b>5.</b>	<b>The Laws of Motion 111</b>	pp.(140-149)	4 Lect.
5.1	The Concept of Force 112		
5.2	Newton's First Law and Inertial Frames 114		
5.3	Mass 116	1	
5.4	Newton's Second Law 116	3, 7, 11, 14,	
5.5	The Force of Gravity and Weight 119		
5.6	Newton's Third Law 120		
5.7	Some Applications of Newton's Laws 122	18, 24, 25, 33, 68	
5.8	Forces of Friction 131	40, 41, 43, 45	
<b>6.</b>	<b>Circular Motion and Other</b>	pp (172-180)	1 Lect.
6.1	Newton's Second Law Applied to	1, 2, 3, 5, 10, 11,	
<b>7.</b>	<b>Work and Kinetic Energy 181</b>	pp (209-216)	4 Lect.
7.1	Systems and Environments 182		
7.2	Work Done by a Constant Force 183	1	
7.3	The Scalar Product of Two Vectors 186	5, 7, 9	
7.4	Work Done by a Varying Force 188	11, 12, 13, 14, 15,	
7.5	Kinetic Energy and the Work-Kinetic	24, 26, 28,	
7.6	The Nonisolated System-Conservation of Energy 19		
7.7	Situations Involving Kinetic Friction 199	31,32,33,34,35	
7.8	Power 203	36, 37,39, 40	
<b>8.</b>	<b>Potential Energy 217</b>	pp (240-250)	5 Lect.
8.1	Potential Energy 218		
8.2	The Isolated System-Conservation	5,10 11,13,17	