

Course Title	Course Code	Number of Study Hours			Year	Level	Prerequisites
		Theoretical	Laboratory	Credit			
Properties of Matter and Heat	221PHYS	3	2	4	2 <sup>nd</sup>	3 <sup>rd</sup>	-----

**(1) Brief Course Description**

This course provides an introduction of basic properties of solids and liquids, including some properties of gases. In addition, we'll take a brief look at surface tension, viscosity, and diffusion. The course covers an introduction of thermal physics, including the study of temperature, heat, and how they affect matter. Within normal temperature ranges, a gas acts like a large collection of non-interacting point particles, called an ideal gas. Such gases will be studied on either a macroscopic or microscopic scale. Concepts of internal heat, specific heat and latent heat will be introduced. Some of the processes of energy transfer between a system and its surroundings will be discussed.

**(2) Course Objectives**

**This course is designed to provide students with:**

- An introduction of states of matter
- The concept of Hooke's law and solid deformation
- Archimedes's Principle and floating condition
- An introduction to fluid dynamics
- Introducing some concepts such as surface tension, viscosity and transport phenomena.
- The fundamental of thermometers and the effect of heat on solid and liquid.
- Macroscopic and microscopic description of ideal gas.

**(3) Course Contents**

**Theoretical Part:**

- **Solids and Fluids:** States of Matter , and The Deformation of Solids, Density and Pressure, Variation of Pressure with Depth, Pressure Measurements, Buoyant Forces and Archimedes's Principle, Fluids in Motion, Surface Tension, Capillary Action, and Viscous Fluid Flow, and Transport Phenomena
- **Thermal Physics:** Temperature and the Zeroth Law of Thermodynamics, Thermometers and Temperature Scales, Thermal Expansion of Solids and Liquids, Macroscopic Description of an Ideal Gas and The Kinetic Theory of Gases
- **Energy in Thermal Processes:** Heat and Internal Energy, Specific Heat, Calorimetry, Latent Heat and Phase Change, and Energy Transfer

**Experimental Part:**

- Moment of Inertia and Body Shape.
- Compound Pendulum.
- Young's Modulus.
- Speed of Sound in Liquids.
- Boyle's law.
- Thermal Conductivity of solids.
- Thermal Expansion in Solids.
- Specific Heat of Solids.
- Joule's law of Heat.

**(4) Assessment Criteria**

- Periodic Exams: 20%
- Oral, Student Activity and Essay: 10%
- Laboratory Work: 20%
- Final Exam: 50%

**(5) Course Teaching Strategies**

- Lectures, Reports and Essay Assignments, Homeworks, and Web-based Assignments.

**(6) Text Book**

- College Physics 7<sup>th</sup> edition, R. A. Serway, J. S. Faughn and C.Vuille, Brooks/Cole Publishing Co. 2005.

**(7) Reference Books**

- Physics for Scientists and Engineers with Modern Physics; 7<sup>th</sup> edition, Serway, Saunders Golden Sunburst Series, 2007.
- Fundamentals of Physics; Halliday, Resnik and Walker , John Wiley and Sons Inc., 2007.