Study: Physics

Type and level of studies: Bachelor studies

Course name: Molecular Physics and Thermodynamics

Lecturer**: Marina Stojanović Krasić**

Status: Compulsory

ECTS: 10

Attendance prerequisites: Physical Mechanics

Course aims

Introduction to the thermal properties of matter, the concepts of temperature and heat as well as basic laws of thermodynamics and statistical physics.

Course outcome

Introduction to the basic laws of thermodynamics, kinetic theory of gases, heat and aggregate states. Solving specific experimental and computational problems in these areas of physics and obtaining the skills for usage of simple measuring instruments. Linking knowledge from different areas of classical physics and their application. Preparation for understanding the laws of physics which will be studied in the senior years.

Course content

Theoretical part

The subject of thermodynamics. Thermodynamic body and system. Thermodynamic state. Thermodynamic processes. Temperature and heat. Temperature measurement. First law of thermodynamics. Iso-processes. Absolute temperature and absolute zero. The ideal-gas equation of state. Specific heat of gases. Cyclic processes in thermodynamics. Efficiency of a heat engine. Second law of thermodynamics. The Carnot cycle. Adiabatic process. Work done in basic thermodynamic processes. The Clausius' inequality. Entropy. Fundamentals of kinetic molecular theory of gases. Cp/Cv ratio. Mean free path of gas molecules. Gaseous diffusion. Viscosity in gases. Thermal conductivity. Equation of state of real gases. The molecular structure of liquids. Physics of solid-liquid interfaces. Surface tension of liquids. Capillary phenomena. General characteristics of solid state. Types of crystals. Physical properties of crystal lattices. Change of aggregate states. Triple point. State diagram.

Practical Part:

Selected experimental exercises in thermodynamics; gas laws - Boyle-Marriotte gas law and Gay-Lussac's law; Determination of Cp/Cv ratio; Measuring the specific heat of a solid body using a calorimeter; Determining the dependence of the boiling point on atmospheric pressure. Computational exercises in all areas of thermodynamics.

Literature

1. Ф.В.Сеарс: Увод у термодинамику, кинетичку теорију гасова и статистичку механику, Београд 1953.
2. Божидар Жижић: Курс опште физике, молекуларна физика, термодинамика, механички таласи, ИРО Грађевинска књига, Београд 1988.
3. В. Вучић, Д. Ивановић: Физика I, Научна књига, Београд, 1989.
4. В.Вучић: Основна мерења у физици, Научна књига, Београд 1970.
5. Б.Јакупи, Р.Тутунџију, Збирка решених задатака из Механике и термодинамике, Завод за издавање уџбеника, Приштина,1998.

Number of active classes				Other classes
Lectures: 4	Practical classes: 2	Laboratory exercises: 2		

Teaching methods

Lectures (4 classes per week during the semester), computational exercises (2 classes per week during the semester), laboratory exercises (2 classes per week during the semester).

Assessment (maximum 100 points)

Course assignments	**points**	Final exam	**points**
Lectures	10	Written exam	30
Practical classes	10	oral exam	30
Laboratory exercises	20	.....	
Total	40		60

Two term tests which include theoretical questions and computational problems: 2x30=60 points.