Study program: Mechanical engineering

Type and level of studies: Bachelor studies

Course unit: Engineering Thermodynamics

Teacher in charge: Prof. Dr Rade Karamarković

Assistant: Đorđe Novčić

Language of instruction: English

ECTS: 4

Prerequisites: no

Semester: Winter semester

Course unit objective:

To teach students about the basics of engineering thermodynamics: (i) thermodynamic laws and their application to the analysis of thermodynamic systems, (ii) the fundamentals of energy transformation (power and refrigeration), and (iii) the fundamentals of heat transfer (conduction, convection, radiation)

Learning outcomes of the course unit:

Students are enabled to use thermodynamic laws to analyze closed and open thermodynamic systems. Informed about the concepts of ideal gas, gas mixtures, and trained to calculate basic thermal devices, plants and cycles (vapor and gas power and refrigeration cycles).

Course unit contents

Theoretical classes

Definitions, balance equations, state and conservation principles. The first law with applications to closed and opened systems. Ideal gas. Equation of state. Polytropic processes. The second law with applications to closed and open systems. Mixtures of gases. Real gases. Vapor and gas power cycles. Vapor and gas refrigeration cycles. Basics of heat transfer: conduction, convection, radiation. Heat Transmission, Overall Heat Resistances, and Overall Heat Transfer Coefficients.

Practical classes

Practical classes consist of solving numerical problems covered in theoretical classes and laboratory exercises. Laboratory exercises determination of: specific heat capacity, polytropic exponent, evaporation heat, heat conductance for a wall, and energy balance of a heat exchanger.

Literature

1. Robert T. Balmer. Modern Engineering Thermodynamics. Academic Press, 2011.
2. Karamarković V. Practicum for laboratory exercises in Thermodynamics. Faculty of Mechanical Engineering, Kraljevo 2003.
3. Cool pack (freely downloadable software)
4. R. Karamarković, ppt presentations for Thermodynamics.

Number of active teaching hours				**Other classes**
Lectures: 45	Practice: 30	Other forms of classes:	Independent work:	Laboratory exercises 8.

Teaching methods

Theoretical classes are followed by auditory exercises with computational examples. Laboratory exercises. Reviews of homework.

Examination methods (maximum 100 points)

Exam prerequisites	**No. of points:**	**Final exam**	**No. of points:**
Student's activity during lectures	5	oral examination	20
practical classes/tests	15	written examination	30
Seminars/Homework	10	Laboratory exercises	20
Project			
Other			

Grading system

Grade	No. of points	Description
10	**91-100**	Excellent
9	**81-90**	Exceptionally good
8	**71-80**	Very good
7	**61-70**	Good
6	**51-60**	Passing
5	**Less than 51**	Failing