

DISCIPLINE: THERMODYNAMICS

Specialization ENVIRONMENT ENGINEERING, 3rd Year of study, 1th Semester

Credit value (ECTS): 4

Course category: optional

Course holder:

PhD Ilie BODALE, Assistant professor

Discipline objectives (course and practical works)

The aim of the course is to acquiring the theoretical and practical notions of thermodynamics to understand the mechanisms of energy conversion from production processes and transport, and their impact on the environment.

- developing an independent and efficient study method by using appropriate bibliographic resources;
- enhancing the practical abilities to work in laboratory.

Contents (syllabus)

Course (chapters/subchapters)
1. Thermodynamics systems and parameters.
2. Ideal gas. Equation of state for ideal gases. Kinetic theory of the ideal gas.
3. Principles of thermodynamics Mechanical work. The heat. Internal energy. Thermodynamic functions.
4. Applications of first principle of thermodynamics. Ideal gas transformations.
5. Applications of the second principle of thermodynamics Carnot cycle, Otto cycle, Diesel cycle. Heat engine, refrigerator, heat pumps.
6. Irreversible processes and entropy production.
7. Irreversible processes in biological structures.
8. Heat transfer Thermal conductivity. Thermal convection. Thermodiffusion. Thermal radiation. Stefan-Boltzmann's law.
9. Thermodynamics of processes far from thermodynamic equilibrium.
10. Statistical thermodynamics.

Practical works
1. Conversion of different forms of energy into thermal energy.
2. Calibration of the thermocouple.
3. Calibration of the thermometer with semiconductor.
4. Study of isothermal transformation by using gas laws module.
5. Study of isobaric transformation by using gas laws module.
6. Study of isochoric transformation by using gas laws module.
7. Study of the energy distribution of air molecules.
8. Determination of specific heat capacity of solids by using the calorimeter.
9. Determination of specific heat capacity of water by electrical method.
10. Determination of the latent heat of melting and crystallization of the substance.
11. Verification of the Stefan-Boltzmann's law.
12. Determination of heat capacity ratio of air by using Clément-Desormes method
13. Applications of statistical thermodynamics.

Bibliography

- Georgescu Violeta, Leonte Liviu, Sorohan Mardarie, "Molecular and Thermodynamic Physics", University of Alexandru Ioan Cuza Publishing House, Iasi, 2006.
- Feynman R., "Modern Physics - Mechanics, Radiation, Heat", vol. I, Technical Publishing House, Bucharest, 1970.
- Plavitiu C.N., "Thermodynamics", Victor Publishing House, Bucharest, 2000
- Oancea S., Foca N., Condurache D., Baleanu A., "Atoms. Molecules. Aggregation states", Dan Publishing House, Iasi, 1999
- Oancea S., Cazacu A., "Problems solved by physics", PIM Publishing House, Iasi, 2015
- Luca E., et al., "General Physics", Didactic and Pedagogical Publ., Bucharest, 1981.
- Oancea Servilia, "Elementary Physics", PIM Publishing House, Iasi, 2005.
- Bodale Ilie, "Practical works of thermodynamics", 2019.
- Oancea Servilia, "Practical works of physics and biophysics", PIM Ed., Iasi, 2009.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Course activity	10%
	Written exam	70%
Practical works	Laboratory activity evaluation	10%
	Projects	10%

Contact

PhD. Ilie BODALE, Assistant professor

Faculty of Horticulture - USAMV Iasi

3 Mihail Sadoveanu Alley, Iasi, 700490, Romania

Telephon: (+4) 0232 407 527

E-mail: ilie.bodale@uaiasi.ro