STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Technical Thermodynamics		**1010612211010630911**
Field of study **Mechanika i budowa maszyn**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**
Elective path/specialty **Product engineering (Inżynieria produktu)**	Subject offered in: **English**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **1** Classes: **1** Laboratory: **-** Project/seminars: **-**		No. of credits **2**
Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **university-wide**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **2 100%** **2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	In-depth knowledge of the basics of thermodynamics and energy conversion processes in thermal power.
2	**Skills**	Ability to describe and calculate selected thermodynamic processes and systems conversion of thermal energy. The ability to effectively self-study in a field related to the chosen field of study.
3	**Social competencies**	Awareness of the need to broaden competence, willingness to cooperate within the team.

Assumptions and objectives of the course:

1.Knowledge of selected, advanced thermodynamic processes, thermodynamic transformations and equations of conservation of energy.

2.Learning the methods of thermodynamic description of the various factors and thermodynamic cycles in energy conversion processes for efficient operation, modernization or reconstruction of technological systems in the field of machinery and equipment for heat flow.

3.Practical skills in description of thermal processes.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. 1. Characterize the principles of thermal systems and processes in power plants, power plants and thermal conversion systems and supply of thermal and mechanical energy - [K2A_W04]

Skills:

1. Use knowledge of thermodynamic phenomena occurring in the processes of energy needed to efficiently convert thermal energy - [K2A_U11]

2. Determine the correctness and effectiveness of the basic machinery and equipment for heat flow and their environmental impact - [K2A_U13]

Social competencies:

1. Ability to think and act in an effective manner in the area of thermodynamic processes in the energy sector in order to minimize the consumption of primary energy and to reduce environmental impacts - [K2A_K02]

Assessment methods of study outcomes

Lecture:
- Assessment of knowledge and skills, rewarding activity and quality of perception

Laboratory exercises:
- Test and rewarding knowledge necessary for the accomplishment of the problems in the area of laboratory tasks
- Continuous assessment - favoring growth of skills in principles and methods
- Assess the knowledge and skills associated with the practical tasks

Extra points for the activity in the classroom, especially for :
- Proposing to discuss additional aspects of the subject
- Effectiveness of applying knowledge when solving a given problem
- Ability to work within a team practically performing the task in the laboratory
- Comments related to the improvement of teaching materials
- Care for aesthetically developed reports and tasks in the framework of self-study

Course description

Equations of real gases and the phenomenon of Joule-Thomson. Phase transitions. Thermodynamics of the compression process. Isothermal Compression. Thermodynamics of flow. Temperature and static and dynamic factor. Elements of thermodynamics - enthalpy of formation. Fundamentals of thermodynamics of nonequilibrium processes. Fundamentals of mass flow. Circuits of gas turbine engines. Circuits in steam and gas power stations.

Basic bibliography:

1. Kestin J.: Course in Thermodynamics, New York, Hemisphere 1979
2. M.J. Morano, H.N.Shapiro: Fundamentals of Engineering Thermodynamics, John Wiley & Sons, New York, 1998

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Lecture participation	30
2. Consultation	10
3. Preparation for assessment	10
4. Assessment participation	2

Student's workload

Source of workload	hours	ECTS
Total workload	70	2
Contact hours	40	0
Practical activities	20	0