STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Energy management		**1010634161010630234**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**3 / 6**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Thermal Engineering	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**part-time**

No. of hours				No. of credits
Lecture: **18**	Classes: **8**	Laboratory: **10**	Project/seminars: **-**	**5**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student has basic knowledge of thermodynamics, fluid mechanics and economics.
2	**Skills**	The student knows how to carry out basic thermodynamic calculations, knows how to create engineering algorithms and knows how to analyze technological schemes.
3	**Social competencies**	The student is able to work in a group. The student knows how to prioritize tasks and knows how to work independently.

Assumptions and objectives of the course:

The aim of the course is to understand the principles of rational acquisition, processing, transportation, distribution and the use of energy and to gain knowledge of the balancing of energy systems, and to deepen the knowledge of the impact of technological processes on environment.

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

Knowledge:

1. The student has knowledge of fluid mechanics and the theory of thermal machines needed to perform thermodynamic/fluid flow calculations occurring in the energy equipment. - [K1A_W06]

2. The student has knowledge of thermodynamics, efficient power generation, thermodynamic cycles of power plants, energy devices occurring in the power plants. - [K1A_W07 K1A_W24]

3. The student has knowledge of the impact of technology on the environment and global energy balance. He has knowledge of the use of renewable energy sources. - [K1A_W20]

Skills:

1. The student is able to obtain information on the energy management from literature, the Internet, from a database, and from other sources. - [K1A_U03]

2. The student knows how to integrate information, interpret it and draw conclusions. The student knows how to optimize the use of energy in a factory and knows energy producing processes in power plants. The student is able to balance the thermal power plants cycles. - [K1A_U19]

3. The student is able to assess potential risks to the environment resulting from the use of industrial technology. - [K1A_U27]

Social competencies:

1. The student understands the need for further education and knows how to broaden his knowledge in the field. - [K1A_K01]
2. The student understands the non-technical aspects of mechanical engineers activities. He is aware of the impact of their activities on the environment. - [K1A_K02]
3. The student is aware of the responsibility for his own work. - [K1A_K04]
4. The student can think and act in an entrepreneurial manner. - [K1A_K05]

Assessment methods of study outcomes

Written exam, tests

Course description

Basic problems of energy. World and national primary energy deposits. The national energy system. Energy conversion systems. Thermal cycles condensing steam power plants and heating plants. Methods of increasing thermal cycle efficiency. Stationary gas turbine installations. Gas/ steam systems. Cogeneration of heat and electricity. Nuclear power plants. The use of renewable energy. Hydropower plants. Wind power plants. Solar power plants. Geothermal power plants. The use of waste energy. The cost of building of power plants. Energy audit - basic definitions and rules. The benefits from energy saving. Monitoring energy systems.

Basic bibliography:

1. T. Chmielniak, Technologie energetyczne, WNT, 2008
2. D Laudyn, M. Pawlik, F. Strzelczyk, Elektrownie, WNT Warszawa, 2000
3. J. Szargut, A. Ziębik, Energetyka cieplna, PWN, 1998

Additional bibliography:

1. K. Lawrence, A, McRae, S. Alley, Energy conservation, Aspen Systems Corporation, 1980
2. K. Lawrence, A, McRae, S. Alley, Energy conservation, Aspen Systems Corporation, 1980

Result of average student's workload

Activity	Time (working hours)
1. Lecture	45
2. The consolidation of the lecture	5
3. Consultation	1
4. Exam preparation	16
5. Participation in the exam	1
6. Participation in laboratory classes	30
7. Preparation for laboratory classes	4
8. Consultation	1
9. Preparation for laboratory classes test	5
10. Preparation for laboratory classes test	1

Student's workload

Source of workload	hours	ECTS
Total workload	109	4
Contact hours	79	1
Practical activities	41	0