STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Energy management		**1010611271010630234**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	**Subject offered in:**	**Course (compulsory, elective)**
Food Industry Machines and Refrigeration	**Polish**	**obligatory**

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

No. of hours	No. of credits
Lecture: **1** Classes: **1** Laboratory: **-** Project/seminars: **-**	**2**

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	**2 100%**
Technical sciences	**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student has a basic knowledge of thermodynamics, fluid mechanics and economics.
2	**Skills**	The student knows how to prepare energy balances of basic thermal devices.
3	**Social competencies**	The student is able to work in a group and know how to prioritize tasks.

Assumptions and objectives of the course:

To acquaint the student with the principles of rational acquisition, processing, transportation, distribution and use of energy. Gaining knowledge of the balancing of energy systems, and deepening the knowledge of the impact of technological processes on environment. To acquaint the student with the energy audit and to show the benefits of energy saving.

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

Knowledge:

1. The student has knowledge of thermal energy management in a factory. The student knows the processing systems, the methods of energy accumulation and storage. - [M1_W08]
2. Student has the knowledge and understands the associated processes in industry and knows the systems of energy conversion from renewable resources. - [M1_W21]
3. Student has the basic knowledge necessary to analyse the energy costs and to conduct an energy audit at the factory. - [M1_W08]

Skills:

1. The student knows how to optimize the use of energy. - [M1_U12]
2. The student knows how to calculate the ratios of energy consumption in a food industry. - [M1_U12]
3. The student is able to assess potential risks to the environment resulting from the use of industrial technology. - [M1_U12]

Social competencies:

1. The student understands the need for further education and knows how to broaden his knowledge in the field. - [M1_K02]
2. The student understands the social aspects of energy saving and the use of energy from renewable sources. - [M1_K02]

Assessment methods of study outcomes

Written test

Course description

Trends of the energy management in industrial sectors. Energy consumption of various branches of the food industry. Methods of saving energy. Steam boilers and fired systems. The industrial dryers an industrial refrigerators. The energy management in a drying industry. Power plants. West-heat recovery. The energy savings. The use of renewable energy. The basic components of energy audit. Economic analysis. Analysis of investment costs.

Basic bibliography:

1. Górzyński J., Audyting energetyczny, Biblioteka Fundacji Poszanowania Energii, 2000
2. Szargut J.: Termodynamika techniczna, Wyd. P. Śl. 2011
3. Laudyn D., Pawlik M., Strzelczyk F., Elektrownie, WNT Warszawa, 200
4. Wiśniewski St.: Termodynamika techniczna, WNT 1995
5. Tuliszka E. Red.: Termodynamika techniczna. Zbiór zadań, Nr 889, Wyd. P.P.
6. Gutkowski A., Kapusta T. (red) - Zbiór zadań z termodynamiki technicznej, Skrypt PŁ, 2014

Additional bibliography:

1. Szymański W., Wolańczyk F., Termodynamika powietrza wilgotnego, Oficyna Wydawnicza Politechniki Rzeszowskiej, 2008

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Preparation to pass the lecture test	6
3. Presence at the lecture test	2
4. Participation in classes	15
5. Preparation for classes	8
6. Consolidation of the knowledge acquired in classes	5
7. Consultations	3
8. Preparation to pass the classes test	2
9. Presence at the classes test	1

Student's workload

Source of workload	hours	ECTS
Total workload	57	2
Contact hours	36	1
Practical activities	0	0