STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Special thermal systems**		Code **1010134291010135185**
Field of study **Environmental Engineering Extramural First-**	Profile of study (general academic, practical) **general academic**	Year /Semester **5 / 9**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **elective**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **20** Classes: **10** Laboratory: **-** Project/seminars: **-**		No. of credits **3**
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 %) **3 100%** **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of heat transfer, fluid mechanics and thermal systems operation.
2	**Skills**	Engineering calculations and equipment sizing in basic thermal systems.
3	**Social competencies**	Awareness of the need to constantly update and supplement knowledge and skills.

Assumptions and objectives of the course:

Students will acquire basic knowledge in the design of special thermal systems, particularly industrial installations.

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

Knowledge:

1. Student has basic knowledge of thermal systems used in industrial plants - [K_W05]
2. Student knows common thermal fluids and their properties - [K_W05]
3. Student knows calculation methods, design techniques and tools used during design process - [K_W04]
4. Student has the knowledge associated with balancing energy, heat transfer, flow of heating media - [K_W04]

Skills:

1. Student can choose the type of heating system appropriate for specific application - [K_U11, K_U14]
2. Student can perform the calculation and sizing for piping and ather equipment for a particular system - [K_U13, K_U15, K_U16]
3. Student is able to devise control algorithm for simple thermal system - [K_U13]

Social competencies:

1. The student sees the need for extending their competence systematically - [K_K01]
2. The student is aware of the importance and understand the non-technical consequences of engineering activities, including the impact on the environment. - [K_K02]

Assessment methods of study outcomes

Written test at the end of the lectures, evaluation of design prepared during laboratory lessons.
Course description
Industrial thermal systems: the specifics of various industrial processes, most common solutions, different thermal fluids, different heat exchangers. Balancing of the installation: instantaneous demand, energy consumption, operating cost. Regulation and control of industrial thermal systems. Calculating and sizing of pipelines and other equipment. Different materials. Installation layout. Examples of specific thermal systems.
Basic bibliography:
Additional bibliography:

Result of average student's workload	
Activity	**Time (working hours)**

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	30	3
Contact hours	20	2
Practical activities	10	1