

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Special thermal systems		Code 1010101271010135185
Field of study Environmental Engineering First-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 4 / 7
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: 15 Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr inż. Fabian Cybichowski email: fabian.cybichowski@put.poznan.pl tel. 665 24 14 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5 60-965 Poznań		
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 other 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	45	2
Contact hours	45	1
Practical activities	15	1