

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Special Purpose Heating Systems</b>		Code <b>1010101271010135185</b>
Field of study <b>Environmental Engineering First-cycle Studies</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>elective</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  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		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Knowledge of heat transfer, fluid mechanics and thermal systems operation.
2	<b>Skills</b>	Engineering calculations and equipment sizing in basic thermal systems.
3	<b>Social competencies</b>	Awareness of the need to constantly update and supplement one's knowledge and skills.
<b>Assumptions and objectives of the course:</b> Students will acquire basic knowledge in the design of special thermal systems, particularly industrial installations.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
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]		
<b>Skills:</b>		
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]		
<b>Social competencies:</b>		
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]		
<b>Assessment methods of study outcomes</b>		

Written test at the end of the lectures, evaluation of design prepared during laboratory lessons.		
<b>Course description</b>		
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.		
<b>Basic bibliography:</b>		
<b>Additional bibliography:</b>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in lectures	30	
2. Participation in exercise classes	15	
3. Preparation for final tests	10	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	55	2
Contact hours	45	2
Practical activities	15	0