

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Technical Thermodynamics		Code 1010615211010630911
Field of study Mechanical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty Motor Vehicles	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 9 Classes: 9 Laboratory: - Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
Responsible for subject / lecturer: Prof. dr hab. inż Ewa Tuliszką-Sznitko email: ewa.tuliszka-sznitko@put.poznan.pl tel. 61 6652111 Inżynierii Transportu http://www.fwmt.put.poznan.pl/		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the field of: technical thermodynamics, heat exchange and fluid mechanics.
2	Skills	The student is able to apply the principles of thermodynamics to solve simple engineering problems.
3	Social competencies	The student is able to improve professional competencies and is ready to collaborate in team
Assumptions and objectives of the course: The aim is to extend the student's knowledge in the field of thermodynamics. To acquaint with energy balances of thermodynamic systems and explanation of the importance of lecture topics in industrial practice. To acquaint the student with thermodynamic cycles which can be found in industry. To acquaint the student with the issues of heat transport and ecology problems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. The student has knowledge on the properties of steam power plants, internal combustion engines, cooling systems and heat pumps. The student knows the main mechanisms and laws regarding heat transfer. He / she knows the methods of solving the problems of conductivity and convection as well as radiation transfer of thermal energy occurring in industrial devices. - [M2_W04]		
Skills: 1. The student knows how to apply knowledge in the field of thermodynamic phenomena to solve technical problems. - [M2_U13] 2. The student knows how to determine the efficiency of thermal-fluid-flow devices in industrial installations. - [M2_U13] 3. The student can explain the need for effective use of primary energy resources. - [M2_U13]		
Social competencies: 1. The student is able to think and act in an effective way in the field of power plants to minimize primary energy consumption and environmental protection. - [M2_K05]		
Assessment methods of study outcomes		

Rewarding activity in class. Written final test		
Course description		
The first and second law of thermodynamics. The perfect, real gases and their polytropic transformations. Phase transitions in thermodynamic terms. Evaporation curve. Thermodynamic cycles and their optimization (recuperation). Gas power cycles, vapor and combined power cycles. Gas condensation (LNG). Thermodynamics of moist air. Methods of solving engineering problems with the conduction, convection and radiation heat transfer. Methods of intensification of heat exchange. Combustion processes.		
Basic bibliography:		
1. Szargut J. i inni: Zadania z termodynamiki technicznej, P. Śl. 2013		
2. Szargut J.: Termodynamika techniczna, Wyd. P. Śl. 2011		
3. Incropera F., DeWitt P., Bergman P., Lavine A.: Fundamentals of heat and mass transfer, Wiley & Sons, 2006		
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. Furmański P., Domański R.: Wymiana ciepła. Przykłady obliczeń i zadania, Oficyna Wydawnicza Politechniki Warszawskiej, 2002		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	9	
2. Consolidation of lecture material	3	
3. Consultation	2	
4. Preparation for classes	3	
5. Participation in classes	9	
6. Preparation to test	4	
7. Participation in test	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	32	2
Contact hours	22	0
Practical activities	0	0