

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Modelling of heat and mass-transfer		Code 1010635221010636552
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Thermal Engineering and Renewable Energy	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) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: Robert Kłosowiak email: robert.klosowiak@put.poznan.pl tel. 6652331 WIT Piotrowo 3		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the field of thermodynamics, fluid mechanics and flow and energy conversion processes in thermal and flow machines and devices
2	Skills	Ability to describe and calculate basic thermodynamic processes and simple thermal energy conversion systems. The ability of effective self-education in the field related to the chosen field of study
3	Social competencies	Is aware of the need to expand their competence, readiness to cooperate within the team
Assumptions and objectives of the course: The aim of the course is to acquire new knowledge in the field of numerical modeling of thermal-flow processes. Familiarization with problems and barriers of numerical modeling. Acquiring the ability to use computer software to conduct numerical analyzes.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probabilistic, analytical geometry necessary for: description of the operation of discrete mechanical systems, understanding of computer graphics methods, description of the operation of electrical and mechatronic systems - [M1_W01] 2. Has knowledge in physics, including the basics of classical mechanics, optics, electricity and magnetism, solid state physics, quantum and nuclear physics, necessary to understand specialized lectures in the theory of construction materials and materials, theory of machines and mechanisms, the theory of electric drives and mechatronic systems - [M1_W02]		
Skills:		
1. Can acquire information from literature, the internet, databases and other sources. Can integrate the information obtained and interpret conclusions and create and justify opinions - [M1_U01] 2. Is able to search in catalogs and on manufacturers' websites ready machine components for use in own projects - [M1_U02]		
Social competencies:		
1. Is ready to critically evaluate your knowledge and content you receive - [M1_K01] 2. . Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem - [M1_K02]		

Assessment methods of study outcomes		
Performing your own numerical analysis. Model preparation, calculation grid modeling, boundary conditions task, solver setting, results presentation, results analysis and creation of conclusions.		
Course description		
The use of knowledge in subjects previously conducted at the university. First of all, thermodynamics, fluid mechanics and exchange of heat, momentum and mass. Performing computer simulations for models and boundary conditions presented by the lecturer. Creating your own numerical simulation.		
Basic bibliography:		
1. Gryboś M. Mechanika Płynów 2. Wiśniewski S. Wymiana ciepła 3. Szargut J. Termodynamika 4. Piotr Krzyżanowski, Obliczenia inżynierskie i naukowe		
Additional bibliography:		
1. Zenon Fortuna, Bohdan Macukow, Janusz Wąsowski, Metody numeryczne		
Result of average student's workload		
Activity	Time (working hours)	
1. Udział w zajęciach	15	
2. Utrwalenie wiedzy	15	
3. przygotowanie do zaliczenia	30	
4. egzamin	5	
5. Konsultacje	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	30	2
Contact hours	15	1
Practical activities	15	1