

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Energy Management in Transportation</b>		Code <b>1010612221010620385</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Railway Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>1</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  Bartosz Czechyra DEng. email: bartosz.czechyra@put.poznan.pl tel. +48 61 665 2023 Faculty of Working Machines and Transport ul. Piotrowo 3 street, 60-965 Poznan		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	The student has academic level knowledge in area of mechanics, thermodynamics and economics. Student has ordered knowledge of the means of transport and their functionality and basic operational parameters
2	<b>Skills</b>	Student can obtain information from the literature, the Internet, databases and other sources, in Polish and English/German. Student is able to integrate the information, interpret, draw conclusions from them and create and justify opinions
3	<b>Social competencies</b>	Understands the need and knows the possibilities of lifelong learning. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions.
<b>Assumptions and objectives of the course:</b> Acquire the skills to make a correct analysis and multi-criteria assessment of energy processes particularly in the field of transpo		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student has an extended knowledge in the field of chemical analysis for the understanding of science lectures for the protection of the environment, the science of fuels and lubricants, materials science - [K1A_W03]		
2. Student has a structured, theoretically founded knowledge in the field of transport infrastructure, he knows: transport networks types, general characteristics and classifications of transport infrastructure - [K1A_W12]		
3. Student has an ordered, theoretically founded knowledge in the field of transport, general characteristics and classification of vehicles - [K1A_W14]		
<b>Skills:</b>		
1. Student is able to obtain information from the literature, the Internet, databases and other sources, in Polish and foreign, can integrate the information obtained to interpret and draw conclusions from them - [K1A_U01]		
2. Student has the ability to self-education and is able to determine the directions of further learning using modern teaching tools - [K1A_U06]		
<b>Social competencies:</b>		
1. Student understands the needs and knows the possibilities of continuous training, knows the need to gathering of new knowledge in order to job developing; Student is able to organize the learning process of others - [K1A_K01]		
2. Student is aware of and understands the validity of the non-technical aspects and effects of transport engineering, its impact on the environment and responsibility for decisions - [K1A_K02]		
3. Student is able to identify and solve the dilemmas associated with the profession, e.g. the problems at the technique - environment level - [K1A_K06]		

<b>Assessment methods of study outcomes</b>		
Written test, based on multi-choice test and open questions		
<b>Course description</b>		
Basis problem of power production and distribution. Energy consumptions in life cycle of transportation system with particular emphasis on vehicles. Energy and exergy, calculation of cumulative energy consumption in transportation systems. Rationalization of the use of means of transport based on energy consumption and transport efficiency parameters. Environmental friendly methods of power generation. Renewable fuels as future power source ? new technology in classic transportation systems		
<b>Basic bibliography:</b>		
1. Baładynowicz H.W. i inni: Energochłonność skumulowana, Polska Akademia Nauk. Instytut Podstawowych Problemów Techniki, Warszawa : Państwowe Wydawnictwo Naukowe, 1983.		
2. Gronowicz J.: Energochłonność transportu kolejowego. Trakcja spalinowa, Warszawa, Wydawnictwo Komunikacji i Łączności, 1990.		
3. Gronowicz J.: Gospodarka energetyczna w transporcie lądowym, Wydawnictwo Politechniki Poznańskiej, Poznań 2006.		
4. Baładynowicz H.W. i inni: Energochłonność skumulowana, Polska Akademia Nauk. Instytut Podstawowych Problemów Techniki, Warszawa : Państwowe Wydawnictwo Naukowe, 1983		
5. Gronowicz J.: Energochłonność transportu kolejowego. Trakcja spalinowa, Warszawa, Wydawnictwo Komunikacji i Łączności, 1990		
6. Gronowicz J.: Gospodarka energetyczna w transporcie lądowym, Wydawnictwo Politechniki Poznańskiej, Poznań 2006		
<b>Additional bibliography:</b>		
1. J. Szargut, A. Ziębik - Podstawy energetyki cieplnej, PWN, Warszawa 1998.		
2. H. Recknagel; Poradnik, Ogrzewanie Klimatyzacja, EWFE, Gdańsk 1994.		
3. www.e.petroł.pl.		
4. J. Szargut, A. Ziębik - Podstawy energetyki cieplnej, PWN, Warszawa 1998		
5. H. Recknagel; Poradnik ?Ogrzewanie ? Klimatyzacja?, EWFE, Gdańsk 1994		
6. www.e.petroł.pl		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Consultations	5	
3. Preparation for written credits (based on lectures)	5	
4. Participation in written test solving	2	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	42	2
Contact hours	37	2
Practical activities	5	0