

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Transportation Systems		Code 1010601331010620454
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: - Project/seminars: 1		No. of credits 5
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 %) 5 100% 5 100%
Responsible for subject / lecturer: dr inż. Grzegorz Gramza email: grzegorz.gramza@put.poznan.pl tel. (61) 665 20 17 Wydział Inżynierii Transportu ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The student has a basic knowledge about transportation in the economy and social life, in the system of sciences and the relationship with other areas of knowledge. The student knows the main tasks in the operation of the systems and economic development of enterprises and the state.
2	Skills	Student is able to use the acquired knowledge to the analysis of specific phenomena and processes in traffic objects. The student is able to solve specific problems in technical systems.
3	Social competencies	The student is able to work in a group. Student is able to prioritize the tasks. Student is self-reliant in solving problems, acquire and improve their knowledge and skills.
Assumptions and objectives of the course: The aim of the course is to provide students with information relating to transport systems, definitions and concepts. Students gain knowledge and skills in the operation of transport systems in the different modes of transport, intermodal transport and learn the elements of the systems modeling and transport processes.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. has a structured, theoretically founded general knowledge in the field of technology, transport systems and various means of transport - [T1A_W03] 2. has a structured and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected guesses of this discipline in transport engineering - [T1A_W04]		
Skills: 1. can make a critical analysis of the functioning of transport systems and other technical solutions and evaluate these solutions, including: can effectively participate in technical inspection and assess the transport task from the point of view of non-functional requirements, has the ability to systematically perform functional tests - [T1A_U09]		
Social competencies: 1. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the reasons for malfunctioning transport systems that led to serious financial and social losses or to serious health and even life - [T1A_K02]		
Assessment methods of study outcomes		

The written examination, the project		
Course description		
sources and characteristics of transport needs, the division of vertical and horizontal transport functions in the management of transport systems and their classification system and transport process, ownership of the systems, the mapping of the characteristics of the transport system in the models, modeling transport systems, network configuration relational mapping a chosen transport network, the traffic routed and free, traffic congestion and random traffic stream mapping models of transport systems, the intensity and density of the traffic stream, the linear model and nonlinear distribution of the stream of traffic in the transport network, the distribution of minimally - cost stream of traffic and distribution of equilibrium, criteria and limit the implementation of the modal total cost of the tasks of traffic, the average unit costs, marginal costs, the cost of transport referred to the elements of the road transport system, the distribution of minimally - cost stream of traffic and distribution of equilibrium, criteria and limitations of implementing modal transport system development models, systems transport: car, rail, air, transmission, inland waterway, maritime and intermodal transport operations impact on the environment and human external costs of transport		
Basic bibliography:		
1. Bąk Cz.: Systemy transportowe. Wprowadzenie do transportu. Wydawnictwo Politechniki Krakowskiej, 1989.		
2. Jacyna M.: Modelowanie i ocena systemów transportowych. Oficyna Wydawnicza Politechniki Warszawskiej, 2009.		
3. Jacyna M.: Wybrane zagadnienia modelowania systemów transportowych. Oficyna Wydawnicza Politechniki Warszawskiej, 2009.		
4. Leszczyński J.: Modelowanie systemów i procesów transportowych. Oficyna Wydawnicza Politechniki Warszawskiej, 1999.		
Additional bibliography:		
1. Skocznyński L., Szczepaniak I.: Modelowanie procesów transportowych. Ćwiczenia projektowe i laboratoryjne. Wydawnictwa Politechniki Warszawskiej, Warszawa, 1991.		
2. Stajniak M. i in.: Transport i spedycja. I LiM, seria Biblioteka Logistyka, Poznań 2008.		
3. Rydzkowski W., Wojewódzka-Król K. (red.): Transport. PWN, Warszawa 2009.		
4. Zeigler B.P., Teoria modelowania i symulacji. PWN, Warszawa, 1984.		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for the performance	5	
2. Participation in lectures	30	
3. Fixing the contents of the lectures	10	
4. Consultations	6	
5. Exam preparation	20	
6. Participation in the exam	1	
7. Preparation of the project	10	
8. Participation in the exercises of the project	15	
9. Development of project report	15	
10. Consultations	10	
11. Preparation of set-off	10	
12. Participation in success	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	133	5
Contact hours	63	3
Practical activities	61	2