

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Braking Systems</b>		Code <b>1010612211010620554</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 1</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>2</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>major</b>		(university-wide, from another field) <b>university-wide</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>  Jerzy Nowicki DEng. email: office_ice@put.poznan.pl tel. +48 61 665 2012 Faculty of Working Machines and Transportation 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 the basic knowledge in the field of railway brake systems. In addition, knows, construction and safety of work of the basic units of brake systems and the principle of the automatic brake station.
2	<b>Skills</b>	The student can use the acquired knowledge for the calculation of the brake pads, and then to develop wagonowej installation disk.
3	<b>Social competencies</b>	Students can work in groups, to organize the process of repair and production in its main features. The student determines the priorities is important in solving the set tasks.
<b>Assumptions and objectives of the course:</b> It is designed to familiarize students with the practical principles braking trains and devices that implement the process of the recommendations of consumables. In addition, knowledge of the rules of conducting research stanowiskowych and poligonowych brakes of the train.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. has ordered podbudowaną theoretically knowledge brakes knows, technical drawing, is the main message on the development of brake systems, knows the rules of the design of brake systems - [K2A_W13]		
2. has ordered theoretically knowledge of the basic parameters of the technical-operational, knows the mechanisms and brake system, knows the overall design scheme of the brakes. - [K2A_W14]		
<b>Skills:</b>		
1. can get access to information from the literature, Internet, databases and other sources in Russian and foreign. - [K2A_U01]		
2. knows how to communicate using different methods in the environment, able to work with a formal record of design, technical drawing, knows concepts and definitions in the field of brake systems. - [K2A_U02]		
3. can analyze brakes, can search in catalogues and on sites of manufacturers of ready-made components, parts, to assess their suitability for use in technical projects. - [K2A_U10]		
4. may develop technology for the manufacture of simple brake systems and technologies of mounting and dismantling of this system. - [K2A_U14]		
<b>Social competencies:</b>		

1. understands the need and knows opportunities for continuous professional development in the field, knows the need to acquire new knowledge for professional development. - [K2A\_K01]
2. have a sense of responsibility for their work and the willingness to obey the principles of cooperation in a team and be responsible for jointly fulfilled the task. - [K2A\_K04]
3. in the mind transfer of the received knowledge society, making efforts that this information is understood. - [K2A\_K08]

<b>Assessment methods of study outcomes</b>		
A written exam, a Colloquium loans		
<b>Course description</b>		
requirements to a modern hamulcom train, definitions, concepts, brake system brake vehicles, their field of application, advantages and disadvantages, recommendations for use, experimental methods of determination of mass hamującej cars, characteristics of the pneumatic devices and materials on the brake pads and linings disc brakes, naval and research programs, rules and regulations of the establishment of trains.		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Piechowiak T.: Hamulce pojazdów szynowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2012.</li> <li>2. Ścieszka S.F.: Hamulce cierne. Zagadnienia materiałowe, konstrukcyjne i tribologiczne, Wydawnictwo Gliwice-Radom 1998.</li> <li>3. Grzeskiewicz W.: Hamulce pojazdów szynowych. Wydawnictwo Politechniki Warszawskiej (skrypt), Warszawa 1982.</li> <li>4. Kalinowski A., Orlik A.: Wagony towarowe i hamulce. WKŁ, Warszawa 1981.</li> <li>5. Przepisy UIC i normy.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Miatluk M., Kamiński Z.: Układy hamulcowe pojazdów obliczenia. Wydawnictwo Politechniki Białostockiej, Białystok 2005.</li> <li>2. Osiński Z.: Sprzęgła i hamulce. Wydawnictwo Naukowe PWN, Warszawa 2000.</li> <li>3. Janiak M., Kalinowski A.: Konstrukcja i eksploatacja wagonów kolejowych. WŁK, Warszawa, 1980.</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Preparation for the performance	5	
2. Participation in lectures	30	
3. Fixing the contents of the lectures	5	
4. Consultations in lectures	2	
5. Exam preparation	8	
6. Participation in the exam	2	
7. Preparing for exercises	5	
8. Part in the exercises	15	
9. Fixing the contents of physical exercises	5	
10. Consultations for physical exercises	2	
11. Preparation of set-off	4	
12. Participation in success	2	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	85	3
Contact hours	53	2
Practical activities	0	0