

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Diagnostic Methods of Rail Vehicles		Code 1010621261010620551
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Railway Transport	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: 2 Project/seminars: -		No. of credits 4
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		ECTS distribution (number and %) 4 100%
Responsible for subject / lecturer: Bartosz Czechyra, DEng. email: bartosz.czechyra@put.poznan.pl tel. +48 61 665 20 23 Faculty of Machines and Transportation Piotrowo 3 street, 60-965 Poznan		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student knows advanced issues of the construction and mine operation principles of rolling stock and physics phenomena occurring during normal operation of rail vehicle. Student knows basics of metrology and the measuring technics of mechanical values. Basic information from the field of linear algebra and statistics.
2	Skills	Student can gather information from the literature, the Internet, databases, and other sources. Student can integrate and properly interpret the received information and to make conclusions from them, and work out and justify reviews.
3	Social competencies	Student is aware and understands technical and out of technical aspects of engineering and consequences of decisions and activities of transport engineer. Student understand of impact on the environment and responsibility for his decisions, the consequences of his actions in respect of short and long-term perspective.
Assumptions and objectives of the course: Knowledge of the theoretical and practical problems associated with the diagnosis of rail transport means and methods of diagnostics of rail vehicles. The creation of a diagnostic systems and the ability to use diagnostics in the management system of raiiling stock.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Understands the need for continuous training in. - [K1A_K01]		
2. Has basic knowledge in the field of Metrology and measurement of mechanical values. - [K1A_K16]		
3. Has basic knowledge in the field of technical diagnostics of vehicles. - [K1A_K25]		
Skills:		
1. Can get access to information from the literature, the Internet, databases, and other sources. - [K1A_U01]		
2. Know how to plan and carry out experiments. - [K1A_U07]		
3. Can analyze technical objects from the point of view of their diagnostic. - [K1A_U10]		
Social competencies:		
1. Has the awareness and understands another aspects and consequences. - [K1A_K02]		
2. Knows how to think and work entrepreneur, make decisions. - [K1A_K07]		
Assessment methods of study outcomes		
A written exam and an exam on the basis of a written test and evaluation order of lessons and exercises.		

Course description		
<p>Antropotechnical system - a place and roles of an operator in the system of human-vehicle-environment. The introduction to technical diagnostics of railway rolling stock. Processes and diagnostic signals, as a sources of information about the technical state of the rail vehicles. The methodology of building the diagnostic systems from functional assumptions, measurement and data management. Technical state assessment and Troubleshooting in rail vehicles operation with special consideration for gearbox, internal combustion engine, electrical machinery and auxiliary equipment. The conditions of diagnostic system application in the technical-organizational systems of rail rolling stock. A method of constructing the base system diagnostics in the LabView? environment.</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. Marciniak: Diagnostyka techniczna kolejowych pojazdów szynowych. WKiŁ, Warszawa 1982. 2. M. Hebda, S. Niziński, H. Pelc: Podstawy diagnostyki pojazdów mechanicznych. WKiŁ, Warszawa 1980. 3. C. Cempel, F. Tomaszewski: Diagnostyka Maszyn. Zasady ogólne, przykłady zastosowań. M.C.N.E.M.T, Radom 1992. 4. B. Żółtowski: Podstawy diagnostyki maszyn. Wydawnictwo. Uczelniane Akademii Techniczno-Rolniczej w Bydgoszczy, Bydgoszcz 1996. 5. R. A. Collacot: Mechanical Fault Diagnosis and Condition Monitoring. Chapman and Hall, London 1977. 6. B.R. Randall.: Vibration-based Condition Monitoring: Industrial, Aerospace and Automotive Applications, Wiley 2013. 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. W Tłaczała: Środowisko LabVIEWTM w eksperymencie wspomaganym komputerowo, WNT 2002. 2. www.ni.com. 3. www.wobit.com.pl. 4. www.kistler.com. 5. www.bksv.com. 6. www.endevco.com. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for the performance	2	
2. Participation in lectures	30	
3. Consultations	1	
4. Preparation for the exam/ credit	4	
5. The participation in the examination	1	
6. Part in the exercises	30	
7. Fixing the contents of the report exercises	8	
8. Consultations	8	
9. Preparation for the exam	5	
10. Participation in success	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	71	3
Practical activities	62	2