STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Railway Vehicles**		Code **1010624251010620376**
Field of study **Transport**	Profile of study (general academic, practical) **(brak)**	Year /Semester **3 / 5**
Elective path/specialty **Ecology of Transport**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **14** Classes: **10** Laboratory: **-** Project/seminars: **-**		No. of credits **3**
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 %) **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student hase basic nowleage of transport means
2	**Skills**	Student can utilize collected knowledge for analyse of proceses proceed in moving technical systems
3	**Social competencies**	Student is able to define priority of the hypotheses fo the solved problems. He show independence in the solving problems and perfection of acquired skills

Assumptions and objectives of the course:

The goal of subject is to get acquired with construction and partially operation of the rail cars. Students obtain general knowledge of the types of the rail cars and of particular assemblies of these cars.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student has systematic, theoretical based knowledge about means of transport, basic technical and operation parameters, , classification of rail cars, power sources and transmissions, characteristics of mechanisms and assemblies. - [-]

Skills:

1. student is able to gain information about transport form literature, internet, knowledge bases, and interpret it. He is able to communicate in technical environment about specyfic problems - [-]

Social competencies:

1. He understand necessity of continous learning in his profession and transfer of knowledge on the platform technic-environment - [-]

Assessment methods of study outcomes

Written examination

Course description

Historic evolution of cars, types of railway trains and rail cars. Railway organizations. Organizations standardize rail cars construction. Traction types, types of current in electrical traction. Wide and geometry of railways. .

Geometry and guide of wheels in track, stability of cars, independent wheels.

Security and running quality norms, gauging, comfort and noise.

Rail car body, framework, plating. Aluminum constructions, non-metal elements. Loads acting on body, strength of the car, passive security of the car.

Types of the railcar body. Types of the chassis. Boogies and its jobs. Untypical solutions of chassis. Overall information about boogies: wheels, wheelsets, bearings, suspension, wheel guidance, suspension springs, dumpers, pneumatic suspension, elements of longitudinal and lateral forces transfer. Rubber and plastic application in chassis elements.

Inter car force connection: automatic and non automatic. Types of standard couplings. Construction of inter car couplings. Longitudinal forces in long trains and gravity shunting.

Locomotive types, overall construction of diesel and electric locomotives. Locomotive body, Cabin of operator. Construction of the diesel engine. types and construction od power transmission types of transmission gears. Electric locomotive drive transmission. Diesel locomotive electric drive transmission.

Control systems of traction cars and traction characteristics. locomotive examples.

Computer nets in locomotive and train. Types of railway brakes. Functioning of the pneumatic brake. Steam locomotives. Construction of passenger wagons. Inclined body wagons.

Good wagons, self-dumping wagons. Fast collective trains, suburbian trains, rail busses.

Trams: types and the constructions.

Basic bibliography:

1. W. Gąsowski, M. Sobczak: Układy biegowe wagonów kolejowych. Wyd P.P. Poznań 1987
2. W. Gąsowski: Wagony kolejowe, konstrukcja i badania. WKŁ, Warszawa 1988
3. W. Gąsowski, Z. Durzyński, Z. Marciniak: Elektryczne pojazdy trakcyjne.. Wyd. Ucz. P.P., Poznań 1995
4. Gąsowski w., Sobaś M. Nowoczesna skrajnia pojazdów szynowych. IPS Poznan 2005
5. J. Gronowicz, B. Kasprzak: Lokomotywy spalinowe. WKŁ, Warszawa 1989
6. J. Madej (red): Technika taboru drogowo-szynowego (bimodalnego). Inst. Pojazdów Szynowych Poznań 2000
7. J. Madej: Teoria ruchu pojazdów szynowych. Of. Wyd. Pol. War. Warszawa 2004
8. Piec P. Badania eksploatacyjne elementów i zespoł pojazdów szynowych. Kraków 2004
9. Romaniszyn Z.: Podwozia wózkowe pojazdów szynowych. Wyd. Pol. krakowskiej, 2005
10. T. Piechowiak: Hamulce pojazdów szynowych. Wydawnictwo Politechniki Poznańskiej. Poznań 2012
11. Technical periodical: Technika Transportu Szynowego, Pojazdy Szynowe

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Preparation of lessons	12
2. Participation of lessons	45
3. Reports	10
4. Consulting	4
5. Preparation od exam	28
6. Exams	4

Student's workload

Source of workload	hours	ECTS
Total workload	88	3
Contact hours	51	2
Practical activities	37	1