

| STUDY MODULE DESCRIPTION FORM | | |
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| Name of the module/subject The Construction of Rail-Vehicles | | Code 1010621151010620548 |
| Field of study Mechanical Engineering | Profile of study (general academic, practical) (brak) | Year /Semester 3 / 5 |
| Elective path/specialty Mass Transport Vehicles | 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: 3 Classes: 1 Laboratory: - 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: Tadeusz Piechowiak email: tadeusz.piechowiak@put.poznan.pl tel. +48 61 665 2011 Faculty of Working Machines and Transportation ul. Piotrowo 3 60-965 Poznań | | |
| Prerequisites in terms of knowledge, skills and social competencies: | | |
| 1 | Knowledge | Student has basic knowledge of transport means. |
| 2 | Skills | Student can utilize collected knowledge for analyse of processes proceed in moving technical systems. Student can solve specific problems in technical systems. |
| 3 | Social competencies | Student is able to define priority of the hypotheses for the solved problems. He show independence and creativity 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 of the rail cars. Students obtain general knowledge of the types of the rail cars its construction 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. - [-] 2. Has knowledge of rail transport means exploitation. and of the other modern means of transport. It is especially connected with rail cars. - [-] | | |
| Skills: 1. Student is able to gain information about transport from literature, internet, knowledge bases, and interpret it. - [-] 2. He is able to communicate in technical environment about specific problems. - [-] | | |
| Social competencies: 1. He understand necessity of continuous learning in his profession and transfer of knowledge on the platform technique-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, suburban 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 zespół 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. Internet
12. 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 | 60 | |
| 3. Reports | 10 | |
| 4. Consulting | 4 | |
| 5. Preparation od exam | 38 | |
| 6. Exams | 4 | |
| Student's workload | | |
| Source of workload | hours | ECTS |
| Total workload | 128 | 4 |
| Contact hours | 68 | 2 |
| Practical activities | 0 | 0 |