



Subject card

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|---|---|---|----------|-------------------------------------|--|------------|-----|
| Subject name and code | Electrical engineering in transport, PG_00058350 | | | | | | |
| Field of study | Hydrogen Technologies and Electromobility | | | | | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | | | 2025/2026 | | |
| Education level | first-cycle studies | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 2 | Language of instruction | | | Polish | | |
| Semester of study | 4 | ECTS credits | | | 3.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Leszek Jarzębowicz | | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 0.0 | 45 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 45 | | 6.0 | | 24.0 | 75 |
| Subject objectives | Gaining knowledge about the issues of electric traction and electrified transportation systems. Acquiring the ability to solve basic tasks and problems related to electric traction infrastructure and vehicles. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_W10] knows the principles of the processing, use and rational use of electricity, including the principles of electric traction in various transport systems | The student knows structure and features of traction power supply for various railway and urban systems. | | | [SW1] Assessment of factual knowledge | | |
| | [K6_U04] can apply the learned methods to the analysis and design of electrical elements, devices and systems | Student is able to calculate the principal operational parameters of electric vehicles and power supply infrastructure. | | | [SU1] Assessment of task fulfilment | | |
| Subject contents | Definitions. History of electric traction. Vehicle classification and specific parameters. Equation of motion. Vehicle movement resistance. Vehicles' electric drives. Tractive force characteristics. Electric vehicles. Electrified transportation systems. Motion phases. Shaping the speed profile. Motion dynamics. 3 kV-DC railway traction power supply system. Other railway traction power supply systems. Urban traction supply systems. Catenary. Traction substations. Section cabins. Traction supply control systems. Current collectors (pantographs). Diagnostics of current collectors. Electric vehicles' braking systems. Energy consumption. Energy storages. | | | | | | |
| Prerequisites and co-requisites | Basic knowledge of physics and electrical machines, and the ability to solve simple electrical circuits. | | | | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | | | Percentage of the final grade | | |
| | Reports and preparation for laboratory | 60.0% | | | 30.0% | | |
| | Lecture part tests | 60.0% | | | 70.0% | | |

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| Recommended reading | Basic literature | <p>Karwowski K. (red.): Energetyka transportu zelektryfikowanego. Poradnik inżyniera. Wyd. PG, 2020.</p> <p>Karwowski K. (red.): Energetyka transportu zelektryfikowanego. Zbiór zadań problemowych. Wyd. PG, 2023.</p> <p>Szeląg A.: Trakcja elektryczna - podstawy. Oficyna Wydawnicza Politechniki Warszawskiej, 2019.</p> <p>Szeląg A., Drażek Z., Maciołek T.: Elektroenergetyka miejskiej trakcji elektrycznej. Radom: INW Spatium, 2017.</p> <p>Skibicki J.: Pojazdy elektryczne. Część 1. Wydawnictwo PG, 2010.</p> <p>Skibicki J.: Pojazdy elektryczne. Część 2. Wydawnictwo PG, 2012.</p> <p>Chrabąszcz I., Prusak J., Drapik S.: Trakcja elektryczna prądu stałego. Układy zasilania. Podręcznik INPE dla elektryków praca zb. pod red. J. Strojnego. Zeszyt 27. Warszawa: SEP-COSiW, 2009. Głowacki K., Onderka E.: Sieci trakcyjne. Bibice: EMTRAK 2002.</p> |
| | Supplementary literature | <p>Steimel A.: Electric Traction Motive Power and Energy Supply. Basic and Practical Experience. Munich: Oldenbourg Industrieverlag, 2008.</p> <p>Ehsani M., Gao Y., Longo S., Ebrahimi K.: Modern Electric, Hybrid Electric, and Fuel Cell Vehicles. 3rd Edition. CRC Press, 2018.</p> <p>Hayes J.G., Goodarzi G.A.: Electric Powertrain. Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles. Wiley 2018.</p> <p>Giętkowski Z., Karwowski K., Mizan M.: Diagnostyka sieci trakcyjnej. Wydawnictwo PG, 2009.</p> |
| | eResources addresses | Adresy na platformie eNauczenie: |
| Example issues/ example questions/ tasks being completed | Present the main parameters and features of various railway power supply systems used in Europe. Discuss what determines the dynamics of vehicle motion. | |
| Work placement | Not applicable | |

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