



Subject card

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|---|--|--|---|-------------------------------------|--|------------|-----|
| Subject name and code | Electric Machines, PG_00038436 | | | | | | |
| 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 | 3 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Michał Michna | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 30.0 | 0.0 | 0.0 | 60 |
| | 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 | 60 | | 8.0 | | 57.0 | 125 |
| Subject objectives | Get acquainted with constraction, theory and application of electric machines and transformers. | | | | | | |
| | Getting to know the structures and elements of electric drive systems. | | | | | | |
| | Verification of the theory in the laboratory | | | | | | |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---------------------------------|---|--|---|
| | [K6_K04] can react in abnormal and emergency situations, threats to health and life when using automation and robotics components and systems in hydrogen devices and installations | Student explains the principles of health and safety. Student applies the principles of health and safety. Student is able to react in emergency situations | [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work |
| | [K6_W06] knows the construction and operation of transformers, electrical machines, low and high temperature electrolyzers, electrical drive systems, their modeling and industrial applications | Student explains the general principles of construction and physical basics of electric machines, Student explains the construction, operation and modeling of transformers, student draws and explains the characteristics of transformers, student explains the construction, operation and modeling of DC machines, student draws and explains the characteristics of DC machines, student explains the construction, operation and modeling of synchronous machines, student draws and explains the characteristics of synchronous machines, student explains the construction, operation and modeling of induction machines, student draws and explains the characteristics of induction machines, student explains the general principles of designing electrical machines | [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge |
| | [K6_K01] is aware of the need for continuous education and self-improvement in the field of the profession of an electrician and knows the possibilities of further education | Student understands the importance of constantly expanding their knowledge and skills regarding electrical machines and their applications. Student can use up-to-date technical documentation and publications for this purpose | [SK5] Assessment of ability to solve problems that arise in practice |
| | [K6_K02] can work in a group taking on different roles in it | Student organizes work in a team. Student chooses the appropriate methods of solving problem. Student exchanges information with the team members. Student uses technical language. Student knows how to estimate the time needed to complete task. Student is able to implement the work schedule. | [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills |
| Subject contents | <p>LECTURE: Types and ways of producing magnetic fields.. Generation of electromagnetic torque and induced voltages. Electrical machines and material technology. Classification of electrical machines. Design, principle of operation and properties of single and three-phase transformers. Design, principle of operation and properties of dc and ac machines. General principles of regulating the speed of electric motors. Control properties of rotating generators. LABORATORY Transformer properties. Characteristics of asynchronous motor fed from converter and power system. Characteristics of shunt direct current motor and generator. Characteristics of synchronous generator and parallel works at power system.</p> | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Writing, practical and oral exam | 50.0% | 60.0% |
| | Practical exercise reports | 60.0% | 40.0% |

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| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas: zastosowanie, budowa, modelowanie, charakterystyki, projektowanie. (e-skrypt) Wyd. PG, Gdańsk, 2009/2011. 2. Matulewicz W.: Podstawy teorii maszyn elektrycznych, Wyd. PG, Gdańsk 2014 3. Matulewicz W., Chomiakow M: Badania podstawowe maszyn elektrycznych. Wyd. PG, Gdańsk 2014 4. Roszczyk S.: Teoria maszyn elektrycznych. WNT, W-wa 1979 5. J. F. Gieras, Electrical Machines: Fundamentals of Electromechanical Energy Conversion, 1st Edition. Boca Raton: CRC Press, 2016 |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Fitzgerald A.E, Kingsley Ch. (Jr.), Umans S. D.: Electric Machinery. New York: McGraw-Hill Book Comp. 2003. Gieras J. F.: Advancements In Electric Machines, Springer, 2008. 2. Rafalski W., Ronkowski M.: Zadania z Maszyn Elektrycznych, cz. I, II. Wyd. 4/3 (skrypty) Wyd. PG, Gdańsk 1994. 3. Plamitzer A.: Maszyny elektryczne. WNT, W-wa 1976. 4. Manitus Z.: Transformatory. Maszyny prądu stałego. Maszyny Synchroniczne. Maszyny asynchroniczne. (seria skryptów). Wyd. PG, Gdańsk 1973 - 1978. 5. Latek W.: Teoria Maszyn Elektrycznych. WNT, W-wa, 1982. 6. Staszewski P., Urbański W.: Zagadnienia obliczeniowe w eksploatacji maszyn elektrycznych, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej 2009 |
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| Example issues/ example questions/ tasks being completed | | |
| Work placement | Not applicable | |

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