COURSE DESCRIPTION CARD - SYLLABUS

Course name
Operation and diagnostics of electric drive systems

Course

Field of study
Electromobility

Year/Semester
4/7

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Piotrowo 3A Street, 60965 Poznań

Responsible for the course/lecturer:
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Faculty of Control, Robotics and Electrical Engineering

Piotrowo 3A Street, 60965 Poznań

Prerequisites

Knowledge - Basic knowledge of electronics, power electronics and microprocessor technology.

Skills - The ability to effectively self-educate in a field related to the chosen field of study; the ability to make the right decisions when solving simple tasks and formulating problems in the field of power electronic drive systems.

Competences - The student is aware of expanding his competences, demonstrates readiness to work in a team, the ability to comply with the rules applicable during lectures and laboratories.

Course objective

Getting to know the structure and principles of operation of selected drive structures of converter systems. Acquiring knowledge related to their proper operation and diagnostic methods.

Course-related learning outcomes

Knowledge

1. The student should have knowledge of the construction and operation of basic drive converter systems.

2. The student should have knowledge of the proper operation and maintenance of drive converter systems.

3. The student should have basic knowledge in the field of diagnostics of drive converter systems.

Skills

1. The student will be able to use the knowledge in the field of construction and the principles of operation of basic power electronic converters used in drive systems.

2. The student will be able to diagnose the faults of the high-current part and the control part of power electronic transformers used in drive systems.

3. The student will be able to determine the conditions for the correct operation of drive converter systems.

Social competences

1. The student understands the importance of knowledge in solving problems and improving professional, personal and social competences.

2. The student is aware that the knowledge and skills in the technique quickly become obsolete.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated in the solved written test of a problem nature,

- continuous assessment, rewarding activity and substantive content of statements.

Laboratory:

- verification based on the reports made,

- continuous assessment, rewarding activity and substantive content of statements.

Programme content

Diagnostics of DC / DC power systems used in electric vehicles and their operation, diagnostics of AC / DC systems used in electric vehicles and their operation, diagnostics of DC / AC systems used in electric

vehicles and their operation, fault detection in digital control and measurement systems, operation and maintenance of power electronic systems in traction substations, operation and maintenance of electronic and power electronic systems used in electric vehicle charging stations, diagnostic systems for on-board power electronic devices in electric vehicles.

Teaching methods

Lecture: presentation of issues with the use of multimedia, illustrated with examples given on the board, discussion of the issues.

Laboratory: performing laboratory exercises in teams (preparation of the stand, building measuring systems, carrying out experiments) with the help and supervision of the teacher, testing simulation and experimental models - comparing the obtained results.

Bibliography

Basic

1. Frąckowiak L., Power electronics. Th. 2, Publishing House of the Poznań University of Technology, Poznań 2002.

2. Frąckowiak L., Januszewski S., Power electronics. Th. 1, Semiconductor devices and power electronics modules, Publishing House of the Poznań University of Technology, Poznań 2001.

3. Mikołajuk K., Fundamentals of power electronics analysis, Państwowe Wydawnictwo Naukowe, Warsaw 1998.

4. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley; Sons Inc., New York 1999.

5. Tunia H., Smirnow A., Nowak M., Barlik R., Power electronic systems. Calculation, modeling, design, Scientific and Technical Publishing House, Warsaw 1982.

6. Strzelecki R., Supronowicz H., Power factor in AC power systems and methods of its improvement, Oficyna Wydawnicza Politechniki Warszawskiej, Warsaw 2000.

7. Kaźmierkowski M., Krishnan R., Blaabjerg H., Control in Power Electronics, Academic Press, Amsterdam 2002.

8. Szeląg A., Electric traction - the basics, Publishing House of the Warsaw University of Technology, Warsaw 2019.

Additional

1. Technical documentation of drive power electronics systems

2. Technical documentation of processor systems dedicated to the control of power electronic systems.

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	35	1,5
Student's own work (literature studies, preparation for laboratory classes, preparation of a report on the laboratory exercise, preparation for exam) [1]	35	1,5

[1] delete or add other activities as appropriate