COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power generation and transmission [S2Elmob1-PAiME>WiPEE]

Course

Field of study
Electromobility

Year/Semester
2/3

Area of study (specialization)
Alternative Fuels and Energy Storage

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge of physical and electrical engineering laws and phenomena. Relating physical phenomena to the principles of operation of technical devices and their technical parameters. Basic knowledge of the fundamentals of electrical power engineering, the impact of power engineering on the environment, the transmission and distribution of electricity, the operation of electrical power equipment and systems. Knowledge of the calculation of alternating current systems and the structure of the electric power distribution system. The ability to assess the impact of the implementation of analyzed processes in the field of electric power industry on society. The ability to obtain information from the subject literature and other sources and critically analyze it. Understanding of the need to expand one's competence, the consequences of the responsibility of the engineer's activity for decision-making, and the readiness to cooperate in a team.

Course objective

Learning about power supply, transmission and distribution systems. To learn about the construction and components that make up the electric power system. To acquire a structured knowledge of the construction and operation of electric power networks and equipment. To acquire a structured knowledge of the tasks, role and operation of generation sources in the electric power system. To learn about the legal and organizational regulation of the operation of entities producing and distributing energy and related services in this field of electromobility development.

Course-related learning outcomes

Knowledge:
He knows the operation of electric power systems and networks and the criteria for the selection of installed equipment. Has a structured knowledge of the operation of various generation sources in the electric power system. Has knowledge of energy security issues. Knows the basic principles of operation and operation of generating sources operating in the electric power system.

Skills:
The student can characterize the Polish power system from the point of view of generating sources. He/she can assess the role and suitability of generation sources for operation in the electric power system.

Social competences:
Understands the role of generation sources in the power system and is aware of the importance of the role of the power engineer in planning the operation of the sources and the power system

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
- The knowledge acquired in the lecture is verified by a written final exam, consisting of open-ended or test questions variously scored. Passing threshold: 50% of the points.
- Continuous assessment in each class of skills and competencies through discussion of current issues related to energy security (premio ning activity and attendance in class).
Project:
- the preparation of materials for the project is evaluated,
- evaluation of substantive preparation for the execution of the assigned project,
- execution of the project and its defense

Programme content

The current state of the electricity system in Poland, taking into account the role of distributed energy, including renewable energy sources. Poland's energy policy and its determinants in the context of electromobility development. System sources in the electric power system (conventional and distributed). Transmission and distribution networks - construction, components, structural solutions and principles of distribution network design. Legal regulations on the development of generation sources and electricity transmission. Strategies for the development of electromobility.

Course topics

Lecture:
The current state of the power system in Poland, taking into account the role of distributed energy including renewable energy sources. Tasks of energy generation subsectors, network sectors of electricity transmission and distribution and the proper operation of the energy market to ensure the safe operation of the power system. Poland's energy policy and its conditions in the context of the development of electromobility. System sources in the electric power system (conventional and distributed). Operating conditions of different types of generating sources in the power system. Environmental aspects of the operation of generation sources. Transmission and distribution networks - construction, components, structural solutions and principles of design of distribution networks. Operating systems of transmission networks. Power substations - construction, equipment, layouts. Overhead lines, cable lines - construction, operating parameters. Determinants of development of the electricity generation and transmission sector in

the context of the development of electromobility. Requirements for power supply reliability of various groups and consumers. Legal regulations on the development of electricity generation and transmission sources. Municipal strategies for the development of electromobility.
Project:
Project-type activities: Development of a project on selected aspects and problems of energy infrastructure development to provide electricity for charging electric vehicles.

Teaching methods

Lecture: multimedia presentation - informative and problem lectures supplemented with examples on the blackboard, elements of brainstorming and discussion.
Project: multimedia presentation, expert table method, solving project tasks individually and in groups

Bibliography

Basic:
1. Dołęga W., Stacje elektroenergetyczne. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2007.
2. Kujszczyk Sz., Elektroenergetyczne sieci rozdzielcze, tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2004.
3. Kujszczyk Sz., Elektroenergetyczne układy przesyłowe, WNT, Warszawa, 1997.
4. Markiewicz H., Urządzenia elektroenergetyczne, WNT, Warszawa, 2006.
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6. Energy Law Act
7. Kowalska A., Wilczyński A., Źródła rozproszone w systemie elektroenergetycznym. Kaprint. 2007
8. Paska J., Wytwarzanie rozproszone energii elektrycznej i ciepła. Oficyna Wydawnicza Politechniki Warszawskiej. 2010
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10. Chmielniak T., Technologie energetyczne, WNT W-wa 2014
11. Kwiatkiewicz P., Szczerbowski R., Śledzik W., Elektromobilność środowisko infrastrukturalne i techniczne wyzwania polityki intraregionalnej, FNCE, 2020

Additional:
1. Dołęga W., Planowanie rozwoju sieciowej infrastruktury elektroenergetycznej w aspekcie bezpieczeństwa dostaw energii i bezpieczeństwa ekologicznego, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2013
2. Paska J., Rozproszone źródła energii, Oficyna Wydawnicza Politechniki Warszawskiej, 2017
3. Lubośny Z., Farmy wiatrowe w systemie elektroenergetycznym, Wydawnictwa Naukowo-Techniczne, 2013
4. Marecki J., Podstawy przemian energetycznych, WNT W-wa 2014
5. Wiatr J., Orzechowski M., Poradnik projektanta elektryka: podstawy zasilania budynków mieszkalnych, użyteczności publicznej i innych obiektów nieprzemysłowych w energię elektryczną z przykładowymi projektami oraz przepisami prawnymi na płycie CD, Dom Wydawniczy Medium, Warszawa 2012
6. Szczerbowski R., Wybrane aspekty rozwoju elektromobilności w aglomeracjach, Wiadomości Elektrotechniczne, nr. 4. 2021
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8. Szczerbowski R., Rozwój elektromobilności w aglomeracjach miejskich a system elektroenergetyczny cz.2., elektroinfo, nr. 3. 2021
9. Janusz P., Szczerbowski R., Zaleski P., Istotne aspekty bezpieczeństwa energetycznego Polski, Texter, Warszawa 2017
10. Polityka energetyczna Polski do 2040 r., Ministerstwo Klimatu i Środowiska, Warszawa 2021
11. Szczerbowski R. Energetyka węglowa i jądrowa Wybrane aspekty. Wydawnictwo Fundacja na rzecz Czystej Energii. Rok wydania 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	112	4,00
Classes requiring direct contact with the teacher	62	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00