STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Transfer and distribution of electric energy**		Code **1010324371010313675**
Field of study **Electrical Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 7**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **12** Classes: **8** Laboratory: **8** Project/seminars: **-**		No. of credits **3**
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 %) **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Possesses basic knowledge of the theory of electrical circuits, electromagnetic field, electrical machines, High voltage techniques, electric power engineering and electrical power generation
2	**Skills**	Has effective self-study ability in the domain of the chosen field of studies, is able to integrate the knowledge acquired at the credited courses
3	**Social competencies**	Is aware of the need to develop his knowledge and competencies, is ready to undertake the cooperation and team work

Assumptions and objectives of the course:

Getting knowledge of the parameters and tasks of the modern electric power systems, electric power transmission and distribution systems, AC transmission systems construction, impact of the AC lines on the natural environment, long and short distance transmission of the AC electric power, role of the DC transmission systems.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has elementary knowledge of fundamentals of the electric power engineering and electric power systems and grid - [K_W11 ++]
2. Has ordered knowledge of the electric, electronic and power electronic circuits theory as well as of the signal theory and signal processing techniques - [K_W17++]

Skills:

1. Can use acquired mathematical methods and models as well as the computer simulation to discuss and assess the operation of the electric power elements and systems - [K_U07 ++]
2. Can use properly chosen techniques and devices for measuring basic magnitudes describing power elements and systems - [K_U10++]

Social competencies:

1. Understands the need and knows opportunities of the continuous studies (second and third cycle studies, post-diploma, courses) - improving professional skills, personal and social - [K_K01 ++]

Assessment methods of study outcomes

Lectures:
?assessment of knowledge and skills demonstrated in written and oral exams,
?assessment in class.
Auditorium:
?continuous assessment in class - to increase the ability to use the knowledge learned,
?periodic assessment of knowledge and skills on the basis of a written quiz (recent activities).
Laboratory exercises:
?assessing the knowledge and skills of each task in each class;
exercise, credit the exercise report.
Obtaining extra points for activity during classes, especially for:
?propose discussing additional aspects of the issue;
?the effectiveness of the use of acquired knowledge when solving a given problem;
?ability to cooperate within the team practically fulfilling the task detailed in the lab;
?attention to the improvement of didactic materials;
?the diligence and aesthetics of the reports and tasks developed - within the framework of self-study.

Course description

Lectures: Power system tasks and parameters. Electric power transmission and distribution subsystems. Hierarchic structure of electric power grid. HV and LV AC transmission system construction, contemporary development trends. AC transmission theory fundamentals - wave phenomena, natural power. Means to upgrade the LV line transmission capacity. Power flow control in the HV and LV transmission network. DC electric power transmission. AC transmission systems,design fundamentals.

Characteristics of distribution networks, operation of the neutral point of the network.Calculation of currents, voltage drops and power losses in simple network circuits. Basic rules for calculating closed and nodal networks. Voltage regulation and reactive power compensation. Calculation of short-circuits based on normative recommendations. Ground faults in medium voltage networks. Criteria for selection of conductor cross-section. Quality of electricity and reliability of the network and its components.

Update 2017:Modern power grid solutions and current directions of their development.

-lecture with multimedia presentation,

-student activity is taken into account during the course of the assessment,

-theory presented in connection with the current knowledge of students.

Auditorium exercises include performing selected calculations on examples illustrating material presented at lectures.

-solving sample tasks on the board,

-discussion on solutions.

Laboratory involves experiments concerning analysis of the phenomena which occur in the transmission and distribution networks under the normal and disturbed operating conditions using physical models.

-detailed review of the reports by the leading labs and commentary discussions,

-work in teams.

Basic bibliography:

1. Sz. Kujszczyk (pod red.): Elektroenergetyczne układy przesyłowe. WNT, Warszawa 1997
2. Sz. Kujszczyk (pod red.): Elektroenergetyczne sieci rozdzielcze. t.1 i 2, OWPW, Warszawa 2004
3. Poradnik Inżyniera Elektryka, t.3. WNT, Warszawa 2011
4. A. Kordus (pod red.): Sieci elektroenergetyczne - przykłady wybranych zagadnień. WPP, Poznań 1990
5. J. Strojny(pod. red.): Vademecum Elektryka. COSiW, Warszawa 2009

Additional bibliography:

1. K. Żmuda: Elektroenergetyczne układy przesyłowe i rozdzielcze. Wybrane zagadnienia z przykładami. Wydawnictwo Politechniki Śląskiej, Gliwice 2016
2. Z. Kowalski: Jakość energii elektrycznej. Monografie Politechniki Łódzkiej, Łódź 2007
3. J. Popczyk: Elektroenergetyczne układy przesyłowe. WPŚ, Gliwice 1984
4. T. Kahl: Sieci elektroenergetyczne. WNT, Warszawa 1984
5. S. Kończykowski: Obliczanie sieci elektroenergetycznych. t.II, PWN, Warszawa 1958

Result of average student's workload

Activity	Time (working hours)
1. participation in lecture courses	12
2. participation in labs	8
3. participation in discussions related to lectures	10
4. participation in discussions related to labs	8
5. preparation to labs	12
6. lab reports? elaboration	10
7. preparation to examination	20
8. taking an examination	3

Student's workload

Source of workload	hours	ECTS
Total workload	83	3
Contact hours	31	1
Practical activities	28	1