STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Transfer and distribution of electric energy		**1010321351010313675**
Field of study: **Electrical Engineering**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **3 / 5**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **30** Classes: **15** Laboratory: **15** Project/seminars: **-**		No. of credits: **5**
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		ECTS distribution (number and %)

Responsible for subject / lecturer:

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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. Operating characteristics of the distribution network. Voltage regulation and reactive power, short-circuit risks, work distribution network reliability.

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

Knowledge:

1. Has an ordered and theory-underpinned knowledge about electric circuits theory, knows basic electrical engineering rules, knows basic features of the electric network elements, has knowledge of steady and transient states, knows the infinite line theory fundamentals, - [K_W04+++]

2. Has knowledge of the electric power devices? design, construction and operation principles. - [K_W08++]

Skills:

1. Can use the acquired mathematical techniques and models as well as computer simulations to analyze and estimate operation of the electrical elements and networks - [K_U10++]

2. Can see non-technical aspects, including environmental economic and legal ones, when formulating and solving tasks referring to the electrical elements and systems - [K_U20++]

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

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Lectures:

1.Assesment of the knowledge and skills shown at the written and oral examinations ,

2.Continuous assessment during courses (bonus for activity and perception quality).

Classes:

1.Continuous assessment in the classroom - rewarding gain the skills they met to use the principles and methods,

2.Periodic assessment of knowledge and skills in the form of written tests.

Laboratory:

1.Test of the knowledge necessary to deal with problems posed in the lab tasks.

2. Assessment of the knowledge and skills related to the lab task completion, assessment of the task report.

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.

Characteristics of the distribution network, work network neutral. Calculation of load flow of currents, voltage losses and power losses in simple networks. Basic rules for the calculation of closed networks and nodes. Voltage regulation and reactive power compensation. Calculation of short-circuit based on the recommendations of normative. Earth faults in medium voltage networks. Selection criteria for conductor cross-section. Power quality and reliability of the network and its components.

Update 2017: Problems lied to the steady and transient conditions in the electric power systems, solutionbs applied to the electric machines systems; FACTS

Lecture with multimedia-based presentation and student-oriented questions/inquiries harking back to the content of other courses

Exercises include auditorium perform calculations on examples illustrating the material presented in lectures.Multimedia- and ? blackboard-aided solving of questions

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 and digital models. Work in groups, preparation of report and its evaluation.

Basic bibliography:

1. Sz. Kujszczyk (pod red.): Elektroenergetyczne układy przesyłowe, WNT, Warszawa 1997.

2. Sz. Kujszczyk (pod red.): Elektroenergetyczne sieci rozdzielcze, tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004 r.

3. A. Kordus (pod red.): Sieci elektroenergetyczne - przykłady wybranych zagadnień, WPP, Poznań 1990 r.

4. Poradnik Inżyniera Elektryka . t.3. WNT, Warszawa 2011

Additional bibliography:

1. T. Kahl: Sieci elektroenergetyczne. WNT, Warszawa 1984

2. J. Popczyk: Elektroenergetyczne układy przesyłowe, WPŚ, Gliwice 1984

3. S. Kończykowski: Obliczanie sieci elektroenergetycznych, t.II, PWN, Warszawa 1958

4. Żmuda K.: Elektroenergetyczne układy przesyłowe i rozdzielcze ? Wybrane zagadnienia z przykładami. Wydawnictwo Politechniki Śląskiej, Gliwice 2016

Result of average student's workload

Activity	Time (working hours)
1. participation in lecture courses	30
2. participation in exercises auditorium	15
3. participation in labs	15
4. participation in discussions related to lectures	4
5. participation in discussions related to labs	4
6. preparation for the exercise auditorium	8
7. preparation to labs	8
8. lab reports? elaboration	10
9. preparation to examination	15
10. taking an examination	3

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Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	112	5
Contact hours	82	3
Practical activities	30	1

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