STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Decision algorithms in the Electric Power Engineering	**1010322321010314877**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Electrical Systems in Mechatronics	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **15** Classes: **-** Laboratory: **15** Project/seminars: **-**	**2**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	One has knowledge of the basics of electrical engineering, power engineering and numerical methods.
2	**Skills**	One can create own decision-making algorithms and computer programs
3	**Social competencies**	One is aware of the team work contribution.

Assumptions and objectives of the course:

Recognition of theoretical and practical applications of the procedures and algorithms to ensure proper functioning of the electrical power systems.

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

Knowledge:

1. One has knowledge in developing algorithms for optimization and decision-making in the electrical power sector - [K_W17 +++]
2. One has knowledge of the optimization issues and decision-making by the network restrictions - [K_W19++]
3. One has knowledge in the identification of power system operating conditions while maintaining hierarchy of choices - [K_W16+++, K_W19++]

Skills:

1. . One can create decision-making algorithms in the field of power engineering on the basis of verbal discussion of the principles of programs operation - [K_U07+++]
2. One is able to estimate the processes of the tasks performance and on the basis of an algorithm write a computer program in the field of power engineering using high level programming language - [K_U17+++]
3. One is able to work individually and in a team and on the basis of given algorithms make decisions in the power engineering sector supporting various computer programs - [K_U02+++]

Social competencies:

1. One is aware of the proper coordination of own activities within small task groups - [K_K01 +]

Assessment methods of study outcomes

-Determination of cooperation abilities within a team performing practical specific task

-Assessment of knowledge and skills related to the accomplishment of a practical task, assessment of the report of the task performed

-Test and awarding the knowledge necessary to carry out the given problems in the given task area

-Assessment of the knowledge and skills demonstrated in the written test.

Course description

-Optimization and decision-making problems. Decision-making algorithms ? decision making under risk conditions, identification of the power system operational state. Power flow and voltage levels calculation algorithms in the network and generation nodes. Network nodes control algorithms in the transmission and distribution system within regulation range of voltage, considering the flows of active and reactive power. Decision algoritms in power system restitution process.

Applied training methods

Lecture: the theory of the closely related to practice, Multimedia lecture

Laboratory: Computational experiments, working in a team

Laboratory activities:

Algorithms sequence of switching operations in power stations. Creating algorithms and computer programs implementing specific network tasks.

Basic bibliography:

1. Kremens Z., Sobierajski M., Analiza systemów elektroenergetycznych, WNT, Warszawa 1996

2. Dołęga W.: Stacje elektroenergetyczne, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2007

3. Kożuchowski J., Sterowanie systemami elektroenergetycznymi, PWN, Warszawa 1994

Additional bibliography:

1. J.Machowski, Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Polit. Warszawskiej, Warszawa 2007

2. Bąchorek W., Gancarz A., Algorytmy genetyczne w projektowaniu układów zasilania rezerwowego elektroenergetycznych sieci rozdzielczych średniego napięcia, Zeszyty Naukowe Wydziału Elektrotechniki i Automatyki Politechniki Gdańskiej, XVII Seminarium ?Zastosowanie komputerów w nauce i technice? 2007, Oddział Gdański PTETiS, ss.11-14

3. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Impact of Voltage Conditions on Distributed Generation Connctiivity in Medium Voltage Grids. Acta Energetica, 4/25 2015 ISSN 2300-3022

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	15
2. participation in laboratory classes	15
3. participation in the consultations	8
4. preparation to the laboratory classes and accomplishment of the report	18
5. preparation for the exam	5
6. exam	2

Student's workload

Source of workload	hours	ECTS
Total workload	63	2
Contact hours	38	1
Practical activities	33	1