STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Decision algorithms in the Electric Power Engineering	**1010315331010314877**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**2 / 3**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Electric Power Systems	**Polish**	**obligatory**

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

No. of hours	No. of credits
Lecture: **10** Classes: **-** Laboratory: **10** Project/seminars: **-**	**3**

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 %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Has knowledge of the basics of electrical engineering, power engineering and numerical methods
2	**Skills**	Can create their own decision-making algorithms and computer programs
3	**Social competencies**	Is aware of the group work

Assumptions and objectives of the course:

Knowledge of theoretical and practical applications of the procedures and algorithms to ensure proper functioning of the electrical power system

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

Knowledge:

1. Has knowledge of the problems of optimization and decision-making processes - [K_W17 +++]
2. He has knowledge in developing an optimization and decision-making algorithms in the electrical power sector - [K_W16 +++]
3. Has knowledge in the identification of power system operating conditions - [K_W19 ++]

Skills:

1. Know how to use the available resources in order to develop decision algorithms - [K_U02 +++]
2. Is able on the basis of an algorithm to create a computer program in the field of electricity - [K_U07 +++]
3. s able on the basis of these algorithms and tools to make decisions on power sector - [KU_17 +++]

Social competencies:

1. Is aware of the proper coordination of their activities in the small task group - [K_K01 +]

Assessment methods of study outcomes

Lecture
evaluation of the knowledge and skills based on exam

Laboratory:
tests and written tests,
evaluation of knowledge and skills related to the accomplishment practice task,
evaluation of report from performed exercise.

Obtainment of extra points for the activity in the classroom, in particular for:
effectiveness of the application of acquired knowledge during studies,
ability to work within a team performing the detailed practice task in the laboratory,
contribution to the achievement of the tasks.

Course description

Lecture in the form of multimedia presentations, interactively with the group to identify cognitive difficulties and explain them on the examples of the panel.The theoretical basis for decision-making processes, decision trees, the implementation of decision algorithms such as ID3, C4.5. Fuzzy logic, genetic and evolutionary algorithms. Optimization problems, decision-making under conditions of risk, identification of power system while maintaining the hierarchy of choice. Decision-making algorithms for power protection systems (EAZ). Power flow calculation algorithm and voltage levels in the generative and network nodes. Control algorithms for network nodes in the transmission system and the control of voltage including active and passive power flows. In laboratory classes, work in two-person groups: development of algorithms and computer programs for specific network tasks. Decision-making skills, acting in accordance with given algorithms, using available software.

Basic bibliography:

1. Dołęga W., Stacje elektroenergetyczne, Oficyna PWr, 2007
2. Kożuchowski J., Sterowanie systemami elektroenergetycznymi, PWN, 1994
3. Kremens Z., Sobierajski M., Analiza systemów elektroenergetycznych, WNT, 1996
4. Lewandowski J., Procesy decyzyjne : w niezawodności i eksploatacji obiektów technicznych o ciągłym procesie technologicznym, Wydawnictwo PŁ, 2008
5. Nowicki L.K., Rozmyte systemy decyzyjne w zadaniach z ograniczoną wiedzą, EXIT, 2009
6. Szafran J., Wiszniewski A., Algorytmy pomiarowe i decyzyjne cyfrowej automatyki elektroenergetycznej, WNT, 2001

Additional bibliography:

1. 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
2. Gwiazda T.D., Algorytmy genetyczne : kompendium, Tom 1 i 2, PWN, 2007
3. Parol M., Optymalizacja konfiguracji sieci elektroenergetycznych wielokrotnie zamkniętych 110 kV za pomocą adaptacyjnych technik ewolucyjnych, Oficyna PW, 2003
4. Bewszko T.: Planowanie i eksploatacja sieci elektroenergetycznych jako wielokryterialne problemy decyzyjne. Przegląd Elektrotechniczny 8/2011

Result of average student's workload

Activity	Time (working hours)
1. participation in class lectures	10
2. participation in laboratory classes	10
3. participate in the consultations on the lecture	4
4. participate in the consultations on the laboratory	4
5. preparartion to the laboratory classes	6
6. preparation laboratory reports	5
7. preparation of home work	4
8. prepare for the completion of laboratory	3
9. completion of laboratory classes	2
10. preparation for the exam	10
11. the exam	2
12. student`s selfmanaged work	15

Student’s workload

Source of workload	hours	ECTS
Total workload	69	3
Contact hours	32	1
Practical activities	47	1