

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Computerized methods of the power network calculations and		Code 1010314391010311893
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 5 / 9
Elective path/specialty Power Networks and Electric Power System	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: 9 Classes: - Laboratory: - Project/seminars: 9		No. of credits 2
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 %) 2 100%
Responsible for subject / lecturer: Andrzej Trzeciak email: andrzej.trzeciak@put.poznan.pl tel. 61 665 2581 Elektryczny Poznań, ul. Piotrowo 3A		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in field of power network, power flow and short-circuit calculations. Basic theory of protections, electric machines and electrical equipment.
2	Skills	Effective self-education in study field. Skills in basic network calculations of power flow, short-circuits and voltage regulaton.
3	Social competencies	Student should have consciousness of necessity of improving his competences in innovation technologies for power engineering, readiness to work individual and cooperate within groups.
Assumptions and objectives of the course: Studies of calculation technology for power network analisys in normal and fault conditions. Individual calculations for the real electric objects (substations and networks)		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Systematic knowledge in normal and failure state analysis of power and distribution networks - [K_W02++] 2. Use knowledge of the votage regulation methods and power flow, short-circuits calculations also in networks with distributed generation. - [KW_24+++] 3. Use knowledge of the calculation methodology for short-cicuit and overload protecion in lines and trasformers - [KW_22++]		
Skills:		
1. Ability to conception design and determine parameters for network secure exploitation. - [K_U10+++ , K_U22++] 2. Ability to implementation expert and design tools for determination of parameters for network secure exploitation - [K_U10+++]		
Social competencies:		
1. One has an awareness of usage of modern methods for designing and high-class solutions. - [K_K02++] 2. One has an awareness of economic and social acceptance for the choosen technical solution. - [K_K02++]		
Assessment methods of study outcomes		

- assessment of knowledge and skills on the basis of test consisting on solving of design problem.
- permanent assessment on lectures and projects.

Obtaining additional points activity during lectures and projects, in particular way for:

- activity on classes in any attempt to solving of the problem to solve,
- skill of co-operation in workgroups.

Course description

Computer systems of network calculations. Modelling of the selected HV/MV substation and MV distribution network. Power flow, voltage levels and power losses calculations. Short-circuit calculations for the overload and fault protection. Distributed generation and power line protection settings. Calculations of the network adaptation range for the normal and fault conditions.

Update 2017: Impact of hybrid power plants on the selection of the security settings of distribution line

Applied training methods

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

Project: case study of the real MV distribution network, working in a team

Basic bibliography:

1. Kulczycki J., Optymalizacja struktur sieci elektroenergetycznych, WNT, Warszawa, 1990 r.
2. Zajczyk R.: Zwarcia w układach elektroenergetycznych, Gdańsk, 2005 r.
3. Kahl T.: Sieci elektroenergetyczne, WNT, Warszawa, 1984 r.
4. Praca zbiorowa pod. red. J. Kulczyckiego: Ograniczanie strat energii elektrycznej w elektroenergetycznych sieciach rozdzielczych, Wyd. Polskie Towarzystwo Przesyłu i Rozdziału Energii Elektrycznej, Poznań, 2002 r..
5. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe, Wyd. PP, Poznań, 2007 r.

Additional bibliography:

1. Marszałkiewicz K., Grzędzielski I., Trzeciak A.: Ocena wielokryterialna możliwości przyłączenia jednostek wytwórczych do sieci elektroenergetycznej średniego napięcia. Wiadomości Elektrotechniczne, Warszawa, 2012, 1 - ISSN 0043-5112 ss. 3-8.
2. Thekla N., Boutsika A., Papathanassiou S.A.: Short-circuit calculations in networks with distributed generation. Electric Power Systems Research 2008 No 78.
3. Marszałkiewicz K., Grzędzielski I., Trzeciak A.: Impact of Voltage Conditions on Distributed Generation Connctivity 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	9	
2. Participation in project classes	9	
3. Project implementation	30	
4. Consultations	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	53	2
Contact hours	23	1
Practical activities	44	2