FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Obliczenia zwarciowe**
Name in English:	**Fault Calculations**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	**Renewable Energy Systems**
Level and form of studies:	**2nd level, full-time**
Kind of subject:	**obligatory**
Subject code:	**ELR052139**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):				30	
Number of hours of total student workload (CNPS):				60	
Form of crediting:				crediting with grade	
For group of courses mark (X) final course:					
Number of ECTS points:				2	
including number of ECTS points for practical (P) classes :				2	
including number of ECTS points for direct teacher-student contact (BK) classes:				1.40	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has basic knowledge on power system operation.
2. Has basic knowledge on programming in Matlab.
3. Is able to state and verify simple calculation algorithms.
4. Is able to think and act in a creative way.
5. Is able to work in a team.

SUBJECT OBJECTIVES

C1. Gaining knowledge on power system faults.
C2. Familiarization with methods for analysis of fault signals and fault identification.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

relating to skills:

PEU_U01 Is able to analyse fault signals obtained from computer simulation.

PEU_U02 Is able to conduct fault identification and to determine its characteristic features.

relating to social competences:

PEU_K01 Is able to act independently and cooperate within a group working on a complex engineering project.

PROGRAMME CONTENT		
Form of classes - project		**Number of hours:**
Proj 1	Presentation of health and safety rules and general regulations of the laboratory. Establishing conditions for passing and marking the project course. Introduction - aim and contents of the projects to be performed.	2
Proj 2	Familiarization with loading the simulation data from ATP-EMTP simulation into the Matlab programme and visualisation of the signals.	2
Proj 3	Digital filtering of fault signals from ATP-EMTP simulation.	2
Proj 4	Digital algorithms for fault detection.	2
Proj 5	Digital algorithm for fault direction discrimination.	2
Proj 6	Digital algorithm for fault classification - part 1.	2
Proj 7	Digital algorithm for fault classification - part 2.	2
Proj 8	Distance protection - digital measurement of fault-loop impedance and reflection of MHO decision characteristic - part 1.	2
Proj 9	Distance protection - digital measurement of fault-loop impedance and reflection of MHO decision characteristic - part 2.	2
Proj 10	One-end fault location - the sample solution applied in modern protection terminal for power line - part 1.	2
Proj 11	One-end fault location - the sample solution applied in modern protection terminal for power line - part 2.	2
Proj 12	Fault location on power line with use of measurements of voltage and current from both line ends - part 1.	2
Proj 13	Fault location on power line with use of measurements of voltage and current from both line ends - part 2.	2
Proj 14	Calculation of fault currents in a given faulted network.	2
Proj 15	Summary and description of the performer projects.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Matlab software.
N2. Report on performed project.
N3. Student's own work.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(P)	PEU_U01 PEU_U02 PEU_K01	Activity at the project classes
F2(P)	PEU_U01 PEU_U02 PEU_K01	Marks of the reports on the performer reports
P(P)	P=0,3F1+0,7F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Iżykowski J., Power system faults. PRINTPAP, 2011, p. 190.

SECONDARY LITERATURE:

[1] Glover J. D., Sarma M., Power system analysis and design. PWS Publishing Company Boston, second edition, 1994.
[2] Michalik M., Rosołowski E., Simulation and analysis of power system transients. PRINTPAP, 2011.
[3] Saha M.M., Iżykowski J., Rosołowski E., Fault location on power networks. Springer-Verlag London, Series: Power Systems, 2010, 425 p.

SUBJECT SUPERVISOR

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