STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Electric power protection automatics	**1010311271010311551**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**general academic**	**4 / 7**

Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Networks and Electric Power Systems	**polish**	**obligatory**

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

No. of hours				No. of credits
Lecture: **1** Classes: **-** Laboratory: **2** Project/seminars: **1**				**7**

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

Education areas and fields of science and art	ECTS distribution (number and %**)**
technical sciences	**7 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	They have knowledge of the basics of electrical engineering, electric power industry and automatic protection
2	**Skills**	They can autonomously calculations for electricity networks
3	**Social competencies**	They are aware of the need to supplement the expertise and to cooperate in a group

Assumptions and objectives of the course:

-The grove of specific knowledge for the work of power electric grid and the activities of the automatic protection. The gain of the skill of laboratory verification of correctness working of automatic protection arrangements.

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

Knowledge:

1. They have knowledge of the selection of equipment and setting of eliminative automatic protection for basic power system elements. They know principles of restitutive and preventive automatic protections. - [K_W22+++]

2. They have knowledge of modeling the power system, of the normal work of system requirements - the possible load of current for elements, quality of energy, of the short circuit work of system requirements - thermal and dynamic results of the fusion current, selection of automatic protection - [K_W11++ K_W22++]

3. They have knowledge of automatic protection equipment requirements ? start up characteristic, measure mistake and relay mistake, compactness of start up values. - [K_W05+ K_W22+++]

Skills:

1. They can broaden their knowledge using a complementary literature. They can evaluate the project requirements based on regulation and recommendations. To the selection of devices they can find directories, where are given these parameters. - [K_U09+]

2. They can set the normal as soon as the short-circuit working conditions of network devices. They can choose the these devices and choose to them the protections - [K_U13++, K_U22++]

Social competencies:

1. They are aware of the social effects of the failure of electricity, the impact on reliability by automatic protections and responsibility in working the power control protection equipment services - [K_K02 ++]

Assessment methods of study outcomes

- Test and reward the necessary knowledge to complete the lab exercises

- Evaluation accuracy of measurements and the ability to interpret their results

- Identify the skills of cooperation within the framework of the implementation of a specific project to award

- Bonuses, supported by sources necessary knowledge to solve problems in the area of tasks

- Evaluation reports of project assessment

- Evaluation of knowledge and skills shown out on the written exam

Course description

-Widening of information automatic protection ? selected eliminative protection systems (lines, transformers and motors). Getting to know the features and algorithms of automatic restitution and prevention systems. Laboratory testing and checking the operating conditions of the protection equipment. The designation of the normal and short-circuit work states of small fragment of the power system. The selection of its components and project equipment to protect it.

Basic bibliography:

1. Żydanowicz J. Elektroenergetyczna automatyka zabezpieczeniowa.   WNT -Warszawa, tom I (1979), tom II (1985), tom III (1989)

2. Winkler W., Wiszniewski A. Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT ? Warszawa 1999

Additional bibliography:

1. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe. Wydawnictwo Politechniki Poznańskiej 2007 .

2. Wiszniewski A.: Algorytmy pomiarów cyfrowych w automatyce elektroenergtycznej.,   Warszawa, WNT 1990.

3. Zilouchian A., Jamshidi M.: Intelligent Control Systems Using Soft Computing Metho-dologies. CRC Press, 2001

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in laboratories	30
3. Participation in project exercise	15
4. Participation in consultations	13
5. Preparation for laboratory activities and development results	40
6. Realization of the project task	40
7. Prepare for the exam	22
8. Participation in the exam	3

Student's workload

Source of workload	hours	ECTS
Total workload	178	7
Contact hours	63	4
Practical activities	85	4