

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Automation of energy processes</b>		Code <b>1010311451010314272</b>
Field of study <b>Power Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>100 2%</b>
<b>Responsible for subject / lecturer:</b> dr inż. Eugeniusz Sroczan email: eugeniusz.sroczan@put.poznan.pl tel. 061 6652276 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		<b>Responsible for subject / lecturer:</b> -mgr inż. Jakub Suerchula email: -jakub.sierchula@put.poznan.pl tel. -061 6652276 -Faculty of Electrical Engineering -ul. Piotrowo 3A 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	He has the knowledge in the scope of physics, essential to understand basic visions appearing in systems of the electric supply of technological processes connected with processing energy. He has the rudimentary knowledge from the scope of bases of automation and the computer science and the technology of processes in energetics.
2	<b>Skills</b>	He is able to use actually selected methods and devices enabling the measurement of parameters of typical processes appearing in energetics. He is able to use principles of programming on the general level. He poses an ability of the effective self-education in the field of energetics.
3	<b>Social competencies</b>	A consciousness of the need to expand its competence, he is ready to pick the cooperation up in frames of team unit.
<b>Assumptions and objectives of the course:</b> Acquainting the automation of processes with chosen systems in energetics as well as achieving abilities of working algorithms out and of programs of controlling with chosen processes programmed using the logical controllers. Achieving defining the ability and specifying assumptions to the project of energy automation.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. He has the elementary knowledge in the scope of the operation of systems of the automatic regulation of technological processes in power stations and combined heat and power stations, in it of regulation: of the temperature, the pressure, straining the flow of water and steam, the level of liquid in containers. - [K_W14] 2. . He knows and he understands methods of the measurement of controlled and controlling the technological parameters characteristic for algorithms of controlling in power stations systems. - [K_W19] 3. He knows principles of the assortment of devices and measuring sensors for systems of the automatic regulation in processes bound with the conversion of energy and with using the energy. - [K_W09]		
<b>Skills:</b> 1. He is able to apply the knowledge in the scope of the automation of energy processes essential to determine essential parameters of the system of controlling a process of regulation of the temperature, the pressure, the rate of flow of water and steam. - [K_U09] 2. He is able to determine the correctness of the operation of basic elements of systems of controlling with technological processes in power stations and combined heat and power stations. - [K_U10] 3. He is able to apply the knowledge in the scope of the theory of controlling with processes bound with the conversion of the energy for designing straight lines of systems of the automatic regulation applied in power stations working in microgrids. - [K_U12]		
<b>Social competencies:</b>		

1. He understands non technical (in it ecological) effects of owne - [K\_K02]  
 2. He is able to demonstrate the initiative motivating for effective solving the problem. - [K\_K05]

### Assessment methods of study outcomes

Lecture: Testing the wisdom in the quantic of the written test (opened and closed), in the last week of classes (6 questions).

Laboratory exercises: The test and awarding a bonus to the increase in the knowledge essential to solve put problems in the given area of laboratory tasks; constant giving oneself a grade, on every classes - awarding a bonus to the increase in the ability of using with found principles and methods; grade of the correctness of the operation of the algorithm worked out and the program.

### Course description

Typical systems of the adjustment of the temperature, the pressure and the flow. The structure and applying programmed logical drivers (PLC). Systems of the adjustment of integrated heating central units and systems of the air-conditioning. Automation of short hydroelectric power plants and the renewables. Integrated systems of controlling in energetics. Monitoring systems and the visualisation of the process. Programming PLC for the system of controlling with the power supply, the adjustment of the demand power. Using fuzzy logic to systems of controlling in energetics.

### Basic bibliography:

1. R. Janiczek - Eksploatacja elektrowni parowych, WNT W-wa 1980,
2. J. Kostro - Elementy, urządzenia i układy automatyki, WSiP W-wa 1983
3. J. Rakowski ? Automatyka cieplnych urządzeń siłowni, WNT W-wa 1983
4. R. Tadeusiewicz - Sieci neuronowe, Akad. Of. Wyd. RM 1993
5. A. Urbaniak - Podstawy automatyki, Wyd. Politechniki Poznańskiej, 2001

### Additional bibliography:

1. S. Brock i inni - Sterowniki programowalne, Wyd. Politechniki Poznańskiej, 2000
2. J. Mulawka ? Systemy ekspertowe, WNT W-wa 1997
3. A. Niderliński - Systemy cyfrowe automatyki przemysłowej, WNT 1985

### Result of average student's workload

Activity	Time (working hours)	
1. Preparation for the laboratory university class	10	
2. Working out the report on laboratory exercises	5	
3. Preparation for the test	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	60	2
Contact hours	35	1
Practical activities	25	1