COURSE DESCRIPTION CARD - SYLLABUS

Course name
Automation of energy processes

Course

Field of study
Power Engineering

Year/Semester
3/6

Area of study (specialization)
- common courses

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
10	10	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

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. 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. A consciousness of the need to expand its competence, he is ready to pick the cooperation up in frames of team unit.

Course objective

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.

Course-related learning outcomes

Knowledge

1. Student knows the construction and principle of operation of steam power plant power units and has knowledge about the process of electricity production in conventional sources.

2. Student knows methods for simulating phenomena in energy systems.

3. Student has elementary knowledge in the field of automatic control systems of technological processes in power plants and combined heat and power plants, including regulation of: temperature, pressure, water and steam flow rate, liquid level in tanks.

4. Student knows and understands the connections between theoretical issues and real objects.

5. Student knows and understands the methods of measuring controlled and control quantities characteristic of control algorithms in power plant technological systems.

Skills

1.Student is able to apply knowledge in the field of automation of energy processes necessary to determine the essential parameters of the system controlling the temperature, pressure, water and steam flow control.

2. Student is able to determine the correct operation of basic elements of process control systems in power plants and combined heat and power plants.

3. Student is able to apply knowledge of the theory of process control related to energy conversion to design simple automatic control systems used in power plants.

4. Student is able to use catalog cards and application notes to select the appropriate components of the designed energy system.

5. Student is able to implement the device / energy object control algorithm

Social competences

1. Student understands the non-technical (including ecological) effects of their actions and its impact on the environment, especially in terms of.

2. Student is able to demonstrate an incentive initiative to solve the problem effectively.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- evaluation of the knowledge and skills listed on the written test,

Laboratory classes

Modeling of dynamic properties of selected steam power plant objects.

Programme content

Lecture

Automatic steam pressure and temperature control system. Generated power control system. Ways to regulate the work of the steam turbine. Automatic drum water level adjustment system. Automatic pressure regulation system in the boiler's combustion chamber. Automatic combustion control system.

Laboratory classes

Classes on computer stations in the matlab/simulink environment.

Teaching methods

Lecture

Lecture with multimedia presentation supplemented with examples given on the board.

Laboratory classes

Activating method, independent development of the algorithm and implementation of the program to control the given energy process..

Bibliography

Basic

1. J. Rakowski, Automatyka cieplnych urządzeń siłowni, WNT W-wa 1983

2. J. Kostro, Elementy, urządzenia i układy automatyki, WSiP W-wa 1983

3. R. Janiczek, Eksploatacja elektrowni parowych, WNT W-wa 1980

4. Z. Domachowski, Regulacja automatyczna turbozespołów cieplnych, Wydawnictwo PG 2011

Additional

1. S. Brock i inni, Sterowniki programowalne, Wyd. Politechniki Poznańskiej, 2000

2. A. Urbaniak, Podstawy automatyki, Wyd. Politechniki Poznańskiej, 2001

3. B. Ceran, Modelowanie własności dynamicznych średnio-bieżnego młyna węglowego, Energetyka w kierunku nowej polityki energetycznej, cykl Rynki surowców i energii TOM 2 – Prawo – Bezpieczeństwo – Technika, Poznań-Zielona Góra 2020, 393 - 401.

4. Sokólski, P.; Rutkowski, T.A.; Ceran, B.; Horla, D.; Złotecka, D. Power System Stabilizer as a Part of a Generator MPC Adaptive Predictive Control System. Energies 2021, 14, 6631.

5. Sokólski, P.; Rutkowski, T.A.; Ceran, B.; Złotecka, D.; Horla, D. Numbers, Please: Power- and Voltage-Related Indices in Control of a Turbine-Generator Set. Energies 2022, 15, 2453.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1

[1] delete or add other activities as appropriate