

## DESCRIPTION OF THE COURSES

- Course code: ARR2509
- Course title: Control object In power plants
- Language of the lecturer: polish

<i>Course form</i>	<b>Lecture</b>	<b>Classes</b>	<b>Laboratory</b>	<b>Project</b>	<b>Seminar</b>
<i>Number of hours/week*</i>	<b>2</b>		<b>1</b>		
<i>Number of hours/semester*</i>	<b>30</b>		<b>15</b>		
<i>Form of the course completion</i>	<b>colloquium</b>		<b>colloquium</b>		
<b>ECTS credits</b>	<b>2</b>		<b>1</b>		
<b>Total Student's Workload</b>	<b>60</b>		<b>30</b>		

- Level of the course (basic/advanced): basic
- Prerequisites: Backgrounds of power processes, Power generation.
- Name, first name and degree of the lecturer/supervisor: Mieczysław Kozak Ph dr
- Name, first names and degrees of the team's members: Henryk Wojciechowski Ph dr
- Year: 1 Semester: 2/II
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course):  
Technological processes in thermal, hydro and nuclear power stations
- Form of the teaching (traditional/e-learning):  
traditional
- Course description:

Technological processes in thermal, hydro and nuclear power stations. Essential equipment of different kind power stations as control objects: steam and water boilers, thermal and gas turbine generator sets, auxiliary equipment of thermal cycle – degassing tanks, regenerative heaters and preheaters, feed pumps, network and cooling pipe pumps, mills, fans. Until auxiliaries systems. Nuclear reactors and their environment. Hydro generator sets of different kind.

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Construction of stem and water boilers, evaporators, air and water heaters, Superheaters – parameters and control processes.	2
2. 2. Auxiliary equipment of boiler building (feed pump, carrier air and blower fans) – running characteristics.	2
3. Steam turbine generator sets (condense and backpressure) – control values and characteristics.	2
4. Steam turbine generator sets (pass-out condensing and pass-out backpressure)	2
5. Network and cooling pipe pumps.	2
6. Colling equipment; cooling and fan assisted cooling towers.	2
7. High and low pressure regenerative heaters, network (pipe) heat exchangers.	2
8. Degassing tanks and degassing tank systems.	2

9. Evaporators and release-cooling stations.	2
10. Coal systems – mills and belt conveyors.	2
11. Mechanical and electrostatic flue gas dedusting.	2
12. Gas turbine as a control object.	2
13. Nuclear reactors – dynamic and static properties.	2
14. Hydro turbine sets – control quantities.	2
15. Colloquium	2

#### Classes, seminars – the contents

##### Laboratory – the contents:

Calculation of burning process: coal heating value, air requirement, volume of combustion flue gases, combustion flue gas system, excess air.

Loss balance of steam boiler. Characteristic calculations.

Turbine stage calculations. Calculations of turbine nozzle parameters in changing conditions.

Heat calculations of heaters, degassing tanks, stem injectors.

Calculations of condensers.

Cooling and fan assisted cooling towers characteristics.

Analysis of generator operation with stiff power grid.

##### Material for self preparation

- • Basic literature:

1. Szafran R., Podstawy procesów energetycznych, WPWr, Wrocław 1989.
2. Laudyn Klaudyn., Pawlik M., Strzelczyń Strzelczyń., Elektrownie. WNT, Warszawa 1997.
3. Jamniczek R., Eksploatacja elektrowni. WNT, Warszawa 1980.
4. Ormowski P. i In. Kotle parowe, WNT – W-wa 1979.
5. Tuliscka E., Turbiny cieplne, WNT – W-wa 1973

- • Additional literature:

1. Pawlik M., Skierki J., Układy i urządzenia potrzeb własnych elektrowni, WNT, W-wa 1986.
2. Nehrebecki L., Elektrownie cieplne, WNT – W-wa 1974

- • Conditions of the course acceptance/creditation:

Lecture – credit colloquium. Project – credit based on project realization.