

FACULTY OF MECHANICAL AND POWER ENGINEERING

**SUBJECT CARD**

**Name of subject in Polish:** Technologie energetyczne nowej generacji  
**Name of subject in English:** New generation energy technologies  
**Main field of study (if applicable):** Power Engineering  
**Specialization (if applicable):**  
**Profile:**  
**Level and form of studies:** 2nd level, full-time  
**Kind of subject:** obligatory  
**Subject code:** W09ENG-SM0039W  
**Group of courses:** No

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				15
Number of hours of total student workload (CNPS)	60				30
Form of crediting	crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade*
For group of courses mark final course with (X)					
Number of ECTS points	2				1
including number of ECTS points for practical (P) classes					1
including number of ECTS points for direct teacher-student contact (BU) classes	1				0,75

\*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

Competence in the field of thermodynamics, combustion process and fuels confirmed at the degree courses of study

**SUBJECT OBJECTIVES**

C1 – Detailed familiarize students with the development trends of the latest technologies used in the power plant industry, and with some problems with their implementations

**SUBJECT LEARNING OUTCOMES**

Relating to knowledge:

PEU\_W01 knows the problems of the development trends and the most important developments related to the latest technologies used in the power industry, the development trends and problems in their implementation

Relating to skills:

PEK\_U01 - can obtain information from literature, databases and other sources and make their critical assessment

PEK\_U02 - can prepare and present a presentation devoted to a selected technical issue

<b>PROGRAM CONTENT</b>		
<b>Lectures</b>		<b>Number of hours</b>
Lec 1	Power plant cycles	2
Lec 2	Combined cycle plants	2
Lec 3	Supercritical power technology	2
Lec 4	High-efficiency power generation (HELE) Fluidized bed technology (FBT)	2
Lec 5	High-efficiency power generation (HELE) Integrated Gasification Combined Cycle (IGCC) power generation	2
Lec 6	Future plants designs - Oxyfuel combustion	2
Lec 7	Future plants designs - Chemical looping combustion	2
Lec 8	Hybrid power plant - Solar Energy Systems	2
Lec 9	Power generation from fuel using supercritical CO2 cycle (sCO2)	2
Lec 10	CO2 capture and use in power industry	2
Lec 11	Energy storage technologies	2
Lec 12	Hydrogen energy systems	2
Lec 13	Bio-energy	2
Lec 14	Integration of Renewable Energy Sources (RES) in Future Power Systems	2
Lec 15	Crediting with grade	2
	Total hours	<b>30</b>

<b>Seminar</b>		<b>Number of hours</b>
Sem 1- Sem8	Presentations of students on the subject of the specialization being studied	15
	Total hours	<b>15</b>

<b>TEACHING TOOLS USED</b>	
N1. Information and problem lecture in the form of a multimedia presentation N2. Consultations N3. Thematic presentation, problem discussion. N4. Own work - preparation for passing.	

#### **EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT – lecture**

<b>Evaluation</b> (F – forming (during semester), P – concluding (at semester end))	<b>Learning outcomes number</b>	<b>Way of evaluating learning outcomes achievement</b>
P	PEK_W01	Crediting with grade

**EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT – seminar**

<b>Evaluation</b> (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEK_U01 PEK_U02	Thematic presentation
F2	PEK_U01 PEK_U02	Discussion of the thematic problem under consideration
P = (F1+F2)/2		

**PRIMARY AND SECONDARY LITERATURE****PRIMARY LITERATURE:**

- [1] Tadeusz J. Chmielniak, Technologie energetyczne, Wydawnictwo Politechniki Śląskiej 2004
- [2] Krzysztof Chmielowiec, Zbigniew Hanzelka, Andrzej Firlit Red., Elektrownie ze źródłami odnawialnymi : zagadnienia wybrane, Kraków : Wydawnictwa AGH 2015
- [3] Alexander V. Dimitrov, Introduction to Energy Technologies for Efficient Power Generation, 1<sup>st</sup> Edition, CRC Press 2017
- [4] Paul Breeze, Power Generation Technologies, 3<sup>rd</sup> Edition, Newnes 2019
- [5] Jean-Claude Sabonnadière (Ed.), Renewable Energy Technologies, Wiley-ISTE 2010

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

Wiesław Rybak, wieslaw.rybak@pwr.edu.pl