

## FACULTY OF MECHANICAL AND POWER ENGINEERING

**SUBJECT CARD**

<b>Name of subject in Polish:</b>	Energetyka geotermalna
<b>Name of subject in English:</b>	Geothermal power engineering
<b>Mainfield of study (if applicable):</b>	Power engineering
<b>Specialization (if applicable):</b>	Renewable source of energy
<b>Profile:</b>	academic
<b>Level and form of studies:</b>	2nd level, full-time
<b>Kind of subject:</b>	obligatory
<b>Subject code:</b>	W09ENG-SM0043W
<b>Group of courses:</b>	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	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**

Knowledge and skills in the field of thermodynamics, power plants and CHP plants.

**SUBJECT OBJECTIVES**

- C1. Provides basic knowledge, taking into account aspects of its application, related to the:
- nature, classification and exploration of geothermal resources,
  - geothermal energy utilization.
- C2. Develops the ability to identify and solve practical problems related to the geothermal energy.

**SUBJECT LEARNING OUTCOMES**

Relating to knowledge:

PEU\_W01 To provide students with background knowledge on geothermal systems.

PEU\_W02 To provide students with a general knowledge related to the exploration, development and utilization of geothermal resources.

Relating to skills: PEU_U01 To develop students' ability to apply an integrated knowledge from various courses to solving practical task in geothermal energy exploration, development and utilization.		
<b>PROGRAM CONTENT</b>		
<b>Lectures</b>		<b>Number of hours</b>
Lec 1	The scope and course completion conditions. Introduction to geothermal energy.	2
Lec 2	History and development of geothermal energy.	2
Lec 3	Structure of the Earth. Mechanism for geothermal heat flow.	2
Lec 4	Model of geothermal system. Classification of geothermal resources.	2
Lec 5-6	Geothermal energy exploration strategies and techniques.	4
Lec 7	Geothermal well drilling.	2
Lec 8,9	Geothermal energy utilization. Direct and indirect use of geothermal energy.	4
Lec 10,11	Ground-source heat pump systems.	4
Lec 12-14	Geothermal power generating systems.	6
Lec 15	Colloquium.	2
	Total hours.	<b>30</b>
<b>Classes</b>		<b>Number of hours</b>
Cl 1,2	Solving practical task related to the exploration and development of geothermal resources.	4
Cl 3-7	Solving practical task related to the exploitation of selected geothermal power generating systems.	10
Cl 8	Colloquium.	1
	Total hours.	<b>15</b>
<b>TEACHING TOOLS USED</b>		
N1 Multimedia presentation.		
N2 Solving practical task and results discussion.		
N3 Consultations.		

#### EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation(F – forming (during semester), C – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
C	PEU_W01÷ PEU_W02	Colloquium
C	PEU_U01	Colloquium
<b>PRIMARY AND SECONDARY LITERATURE</b>		

**PRIMARY LITERATURE:**

- [1] Harsh G., Sukanta R., Geothermal energy: an alternative resource for the 21st century, 2007
- [2] DiPippo R., Geothermal power plants: principles, applications, case studies and environmental impact, 2008
- [3] Glassley W., Geothermal Energy: Renewable Energy and the Environment, 2010
- [4] Pierce V., Introduction to Geothermal Power, 2011
- [5] Wachtel A., Geothermal Energy, 2010

**SECONDARY LITERATURE:**

- [1] Quaschnig V., Renewable Energy and Climate Chang, 2010
- [2] Tabak J., Solar and Geothermal Energy, 2009

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

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