Zał. nr 4

DESCRIPTION OF THE COURSES

- Course code: ESN1500
- Course title: Advanced technology in electrical power generation
- Language of the lecturer: English

Course form	***Lecture***	***Classes***	***Laboratory***	***Project***	***Seminar***
*Number of hours/week**	*2*	*1*		*1*	
*Number of hours/semester**	*30*	*15*		*15*	
Form of the course completion	*exam*	*colloquium*		*report*	
ECTS credits	*3*	*1*		*1*	
Total Student's Workload					

- Level of the course (basic/advanced): advanced
- Prerequisites: thermodynamics
- Name, first name and degree of the lecturer/supervisor: Halina Kruczek DSc
- Names, first names and degrees of the team's members:
- Year:...II level 1..... Semester:.....I.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course): achievement knowledge, skills and design bases in the field of –the energy conversion and advanced power production system from fossil fuels with new zero emission concept, nuclear resources .
-
- Form of the teaching (traditional/e-learning): traditional
- Course description:

This course covers fundamentals of thermodynamics, chemistry, flow and transport processes as applied to energy systems. Topics include analysis of energy conversion in thermomechanical, thermochemical, processes in existing and future power systems, with emphasis on efficiency, environmental impact and performance. Systems utilizing fossil fuels, nuclear resources, over a range of sizes and scales are discussed. Applications include combustion, hybrids, supercritical and combined cycles IGCC.. A exercises supplements the course

-
- Lecture:

Particular lectures contents	*Number of hours*
1. The fundamentals of thermodynamics – thermal equilibrium, the properties of the substances , the first and second laws of thermodynamics, power cycle, efficiency ,	2h
2. Heat transfer and chemistry applied in energy system	2
3. Energy production today and in the future – energy resources, review of energy production system	2h
4.. Thermal power technology – system based on fossil fuels with conventional boiler and– condensate turbine	2h
5. Thermal power technology – system based on fossil fuels with supercritical fluidized and PC boilers.	2h
6. Advanced technology of energy production with high efficiency- GGCC with gas turbine and steam turbine	2h

7. Power advanced system IGCC based on solid fossil fuel	2h
8.Cogeneration system in production energy	2h
9.Clean energy production system from fossil fuels – oxyfuel	2h
10. Zero emission power technology- capture of carbon dioxide-precombustion, post combustion	2h
11. Nuclear power Plants – base system types of reactors	2h
12. Power system with HTR – new generation breeder reactor	2h
13. Nuclear fuel cycle, nuclear fission principles,	2h
,14. Management of wastes storage of toxic wastes	2h
15. Environmental impact of energy production system	2h

- Classes – the contents: The exercises involves 15 x1 hours of tasks for balance calculation of different energy production system and base equipment of power unit i.e. boiler, turbine, exchangers, funs, and fossil and products and byproducts
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents: The project 15x1 hours of design typical power unit with conventional or supercritical boilers or cogeneration system for HGP (Heat generation Plants
- Basic literature:

[1] Fundamentals of Heat and Mass Transfer, Frank P. Incropera, David P. DeWitt, John Wiley & Sons, 1996
[2] Thermodynamics and heat power, Granet, Irving., Pearson Prentice Hall, cop. 2004.
[3] Energy Hndbook, Robert Loftness, 1983
4. Steam its generation and use, The Bacock &Wilcox Company a McDermott company ed. By J.B. Kitto and S.C. Stultz ed. 41, 2005.

- Additional literature: J.H. Harker, J.R. Backhurst, Fuel and Energy , Academic Press, 1981
- Conditions of the course acceptance/credition: exam

* - depending on a system of studies