

(faculty stamp)

**COURSE DESCRIPTION**

<b>1. Course title: ENVIRONMENTAL PROTECTION IN POWER ENGINEERING</b>		<b>2. Course code</b>		
<b>3. Validity of course description:</b> from 2012/2013				
<b>4. Level of studies:</b> BA, BSc programme / MA, MSc programme or 1 <sup>st</sup> cycle / 2 <sup>nd</sup> cycle of higher education				
<b>5. Mode of studies:</b> <u>intramural studies</u> / extramural studies				
<b>6. Field of study:</b> POWER ENGINEERING		(FACULTY SYMBOL)		
<b>7. Profile of studies:</b> general academic				
<b>8. Programme:</b> Sustainable energy engineering				
<b>9. Semester:</b> 6				
<b>10. Faculty teaching the course:</b> Institute of Thermal Technology				
<b>11. Course instructor:</b> Andrzej Ksiadz PhD				
<b>12. Course classification:</b> common directional subject				
<b>13. Course status:</b> <u>compulsory</u> /elective				
<b>14. Language of instruction:</b> English				
<b>15. Pre-requisite qualifications:</b> Fundamentals of Mechanical Engineering, Chemistry, Physics, Power engineering machines				
<b>16. Course objectives:</b> To provide students with basic knowledge on environmental impact of energy sector, legislation of environmental protection, methods of flue gas cleaning.				
<b>17. Description of learning outcomes:</b>				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student knows fundamental issues of environment protection in power systems.	Written test	lecture	K_W03 K_W12 K_W22
2.	Student is able to determine the environmental impact of power plants.	Written test	lecture	K_W11 K_W15 K_W17
3.	Student knows the principles of flue gas control systems applied in power sector	Written test	lecture	K_W17 K_W18
4.	Student is capable of formulating simple problems involving pollutants emission from power systems	Written test and laboratory tests	lecture, laboratory	K_W15 K_W22 K_U11
5.	Student is able to carry out simple thermal measurements and validate obtained results.	Laboratory tests and written report	laboratory	K_W03 K_W12 K_U09 K_U11
<b>18. Teaching modes and hours</b>				
<b>30 Lecture / BA /MA Seminar / Class / Project / 15 Laboratory</b>				
<b>19. Syllabus description:</b>				
<b>Lecture:</b>				
Basics of the impact of power systems on environment. Pollutants types description and emission structure. Fundamental legislation in environmental protection. Air protection in power systems – fuel cleaning/upgrading, primary and secondary measures of NO <sub>x</sub> emission reduction, flue gas desulphurisation methods and processes, gas dedusting. Solid waste management and water protection in power systems.				
<b>Laboratory:</b>				
Fuels, CO and NO <sub>x</sub> emission during combustion, fluidisation, spraying, properties of boiler water and wastewater.				
<b>20. Examination: no</b>				

**21. Primary sources:**

1. Zevenhoven R., Kilpinen P.: Control of pollutants in flue gases and fuel gases. On-line e-book - <http://users.abo.fi/rzevenho/gasbook.html>
2. Koniecznyński J.: Ochrona powietrza przed szkodliwymi gazami. Wydawnictwo Politechniki Śląskiej, Gliwice 2004
3. Warych J.: Oczyszczanie gazów. Procesy i aparatura. WNT, Warszawa 1998
4. Kucowski J., Laudyn D, Przekwas M.: Energetyka a ochrona środowiska. WNT, Warszawa 1997

**22. Secondary sources:**

1. Warych J.: Oczyszczanie przemysłowych gazów odlotowych. WNT, Warszawa 1994
2. Wilk R.K.: Podstawy niskoemisyjnego spalania. Wydawnictwo Gnome, Katowice 2000
3. Koniecznyński J.: Oczyszczanie gazów odlotowych. Wydawnictwo Politechniki Śląskiej, Gliwice 1993

**23. Total workload required to achieve learning outcomes**

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/20
2	Classes	/
3	Laboratory	15/15
4	Project	/
5	BA/ MA Seminar	/
6	Other	5/5
	Total number of hours	50/40

**24. Total hours: 90****25. Number of ECTS credits: 3****26. Number of ECTS credits allocated for contact hours: 2****27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1****26. Comments:**

Approved:

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(date, Instructor's signature).....  
(date, the Director of the Faculty Unit signature)