

(faculty stamp)

COURSE DESCRIPTION

Z1-PU7

WYDANIE N1

Strona 1 z 1

1. Course title: DESIGN OF UTILITY BOILERS		2. Course code		
3. Validity of course description: from 2015/2016				
4. Level of studies: 1 st cycle of higher education				
5. Mode of studies: intramural studies				
6. Field of study: MECHANICS AND MACHINE DESIGN		(FACULTY SYMBOL) RIE		
7. Profile of studies: academic				
8. Programme: Turbomachinery and power devices				
9. Semester: 7				
10. Faculty teaching the course: Faculty of Energy and Environmental Engineering, Institute of Power Engineering and Turbomachinery				
11. Course instructor: Prof. Marek Pronobis				
12. Course classification: specialized subjects				
13. Course status: compulsory				
14. Language of instruction: English				
15. Pre-requisite qualifications: basics of chemistry, physics, thermodynamics, material science, strength of materials, steam generators				
16. Course objectives: An introduction to various aspects of modernization of power boilers				
17. Description of learning outcomes:				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Describes thoroughly the design of power boilers and defines the fundamental challenges facing the boiler technology in the future	Test	Lecture	K_W15 K_W16 K_W22
2.	Identifies and describes the aims of modernization of power boilers	Test	Lecture	K_W22 K_U26
3.	Describes the ways of improving the boiler efficiency	Test	Lecture	K_U27
4.	Describes the ways of improving the environmental impact of power boilers	Test	Lecture	K_U27
5.	Is able to perform calculations of simple modernizations of boiler furnaces and heating surfaces	Defence of project	Lecture/Project	K_U26 K_U27
18. Teaching modes and hours				
Lecture 15 / BA /MA Seminar / Class / Project 15/ Laboratory				
19. Syllabus description:				
Basic problems of modernizations improving boiler efficiency. An introduction to the improvement the milling and combustion systems. Introduction to modernization of power boiler furnaces enabling combustion of biomass and wastes and abatement of NOx emissions. Thermal and flow calculation of convection surfaces. Thermal calculation of furnaces. Determination of tube wall loss resulting from fly ash erosion.				
Project: Thermal and flow calculation of convection and radiant surfaces in the boiler.				
20. Examination: No				

21. Primary sources:

- [1] Prabir Basu, C. Kefa, L. Jestin, Boilers and Burners: Design and Theory. SPRINGER VERLAG GMBH, 1999.
[2] Pronobis M.: Unpublished appendix to lectures.

22. Secondary sources:

- [1] Pronobis M.: Modernizacja kotłów energetycznych. WNT. Warszawa 2002 (In Polish).

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/10
2	Classes	15/10
3	Laboratory	/
4	Project	/
5	BA/ MA Seminar	/
6	Other	5/5
	Total number of hours	35/25

24. Total hours: 60**25. Number of ECTS credits:** 2**26. Number of ECTS credits allocated for contact hours:** 1**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)

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(date, the Director of the Faculty Unit signature)