(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: Gas cleaning and wastewater treatment	**2. Course code**
3. Validity of course description: 2015/2016	
4. Level of studies: 1st cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: Industrial and Engineering Chemistry	RCH
7. Profile of studies: -	
8. Programme: general	
9. Semester: 5	
10. Faculty unit teaching the course: Department of Chemical Engineering and Process Design	
11. Course instructor: prof. Andrzej Gierczycki, PhD, DSc	
12. Course classification: field	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: basic knowledge of Unit operations and Industrial equipment	
16. Course objectives: An objective of the course is to acquaint students with main processes and apparatus applied in gas cleaning and wastewater treatment industry.	
17. Description of learning outcomes: underneath	

No.	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	student knows main processes and apparatus used in air and flue gases cleaning	examination	lecture	K_W07++ K_W12++
2.	student knows main processes and apparatus used in wastewater treatment	examination	lecture	K_W07++ K_W12++
3.	student knows main processes and apparatus used in sludge treatment	examination	lecture	K_W07++ K_W12++
4.	student is able to carry out basic calculations concerning processes and devices for air and flue gases cleaning	credit test	class	K_U07+ K_U08++
5.	student is able to carry out basic calculations concerning processes and devices for wastewater treatment	credit test	class	K_U07+ K_U08++
6.	student understands the necessity of further professional training and the development of his/her engineering and personal competence	observation and discussion	lecture, class, consultation	K_K01 +

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Lecture sem. 5 - 30 hr / class – sem. 5 - 15 hr

19. Syllabus description:

The course is divided into two parts: cleaning of gases from particulate solid and gaseous contaminants and wastewater treatment. In the first part removal of particulate solid from air and flue gases (dry and wet dust removal processes, filtration and electrostatic methods) and air and flue gases cleaning from various gaseous contaminants (absorption, adsorption, combustion, biofiltration and membrane methods) are discussed. The second one considers main processes and methods used in wastewater treatment such as sedimentation, filtration, adsorption, chemical methods, flotation, coagulation and flocculation, sorption and biological methods. The lectures are matched by practical classes

devoted to solving simple problems in water and gas cleaning.

20. Examination: yes

21. Primary sources:

Benefield L.D., Randall C.W., Biological Process Design for Wastewater Treatment, Prentice-Hall Engelwood Cliffs, 1980.
Crittenden J., Water Treatment: Principles and Design, John Wiley & Sons, Inc., New York 2005.
Droste R.L., Theory and Practice of Water and Wastewater Treatment, John Wiley & Sons, Inc., New York 1996.
Gierczycki A.T., Kurowski Ł., Thullie J., Gas Cleaning and Wastewater Treatment for Industrial and Engineering Chemistry Students, Wyd. Pol. Śl., Gliwice 2011.
Gordon G., Peisakhov I., Dust Collection and Gas Cleaning, MIR, Moscow 1972.
Grady C.P.L., Daigger G.T., Lim H.C., Biological Wastewater Treatment, Marcel Dekker, New York 1994.

22. Secondary sources:

Benitez J., Process Engineering and Design for Air Pollution Control, Prentice Hall, Engelwood Cliffs 1993.
Böhm J., Electrostatic Precipitators, Elsevier Scientific Publishing Co., Amsterdam 1982.
Cheremisionoff N.P., Biotechnology for Waste and Wastewater Treatment, Noyes Publications, Westwood 1996.
Crawford M., Air Pollution Control Theory, Mc–Graw Hill Book Company, Inc., New York 1976.
Dawson G.W. and Merces B.S., Hazardous Waste Management, John Wiley & Sons, Inc., New York 1986.
Fersenius W., Quentin K.E., Scheider W. (eds.), Water Analysis, Springer-Verlag, Berlin 1988.
Gerardi M.H., Microscopic Examination of the Activated Sludge Process, John Wiley & Sons, Inc., New York 2008.
Gil M., Szymczak I., Gierczycki A., Jarzębski A., Thullie J., Chemical Engineering English-Polish Glossary, Wyd. Pol. Śl., Gliwice 2005.
Gray N.F., Biology and Wastewater Treatment, Oxford University Press, Oxford 1989.
Hamer P., Jackson J., Thurston E.F., Industrial Water Treatment Practice, Butterworths, London 1963.
Reynolds J.P., Jeris J.S., Theodore L., Handbook of Chemical and Engineering Calculations, Wiley-Interscience, New York 2002.
1979.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/30
2	Classes	15/15
3	Laboratory	-/-
4	Project	-/-
5	BA/ MA Seminar	-/-
6	Other	15/15
	Total number of hours	60/60

24. Total hours: 120

25. Number of ECTS credits: 4

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):-

26. Comments:-

Approved:

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