(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: MEASUREMENTS OF EMISSION AND CONCENTRATION LEVEL OF AIR POLLUTANTS	**2. Course code**
3. Validity of course description: 2016/2017	
4. Level of studies: 1st cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: ENVIRONMENTAL ENGINEERING	(FACULTY SYMBOL) RIE
7. Profile of studies: academic	
8. Programme: Heating, Ventilation, Air Conditioning and Air Protection	
9. Semester: 6	
10. Faculty teaching the course: Department of Air Protection	
11. Course instructor: dr hab. Józef S. Pastuszka prof. nzw. w Pol. Śl., dr inż. Anna Mainka	
12. Course classification: specialty subjects	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: Physics (equations of the laminar flow of fluid, Stokes law), chemistry (characteristics and basic knowledge on the properties of sulfur dioxide, nitrogen dioxides, and carbon dioxide)	
16. Course objectives: Transfer of the detailed knowledge related to determination of the emission and concentration of the selected air pollutants, and general rules of the measurement processes applied to air quality assessment.	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Formulates requirements for measurements of organized emissions of air pollutants.	written test	lecture	K_W23
2.	Indicates methods for assessing gaseous, particulate and biological air pollutants in terms of assessing the impact of these pollutants on population health.	written test	lecture	K_W18
3.	Ability to schedule measurements of emissions of organized dust and gases into the atmosphere.	written test	lecture	K_U14
4.	Ability to carry out of measurements of concentration of primary gaseous and particulate pollutants.	written test at lecture and laboratory classes	Lecture and laboratory	K_U14
5.	By cooperating in a team, performs laboratory exercises in various roles.	observation of teacher	laboratory	K_K03

18. Teaching modes and hours

Lecture : 15h / Exercise: 15h / Laboratory: 15h

19. Syllabus description:

Lecture

Basic concepts of emission and immission of pollutants. Aerosol characteristics. Application of aerosol mechanics to describe the measurement process. Measurements of deposition and concentration of dust (total suspenden particles, PM10, and respirable particles). Determination of immission of fibrous aerosols, including asbestos. Measurements of bioaerosols concentrations. Measurement of concentrations of gaseous pollutants using active and passive samplers. Methods for determining personal exposure to air pollution. Measurement network of atmospheric pollution. Schedule of measurements. Methods for automatically measuring air pollution. Measurements of atmospheric pollution monitoring. Measurement of gaseous and particulate emissions. Planning the implementation of measurements. Location of emission measurement points. Basic parameters of dusty gas. Dust probes and their constructions. Automatic dust gauge. Gas probes Automatic analyzers for industrial gases measurement.

Exercise

Discussing the importance of respirable particles exposure time in the inhaled dose calculation (case study analysis).
Calculating the lifetime cancer risk resulting from exposure to benzo (a) pyrene (case study).
Discussion on the hypothesis of asbestos fiber carcinogenesis and analysis of the resulting conclusions on the possible carcinogenic properties of other fibrous materials.
Exercises in the preparation of air quality information for decision makers based on the "risk communications" principles.

Laboratory

Measurements of sulphur dioxide emission by nephelometry
Determination of nitrogen oxides concentration in the air by Saltzman method
Measuring the concentration of carbon dioxide (NDIR sensor)
Determination of the chloride concentration in the air by potentiometer.
Determination of conductivity of sulphate ions.
Analysis of the chemical composition of exhaust gases ORSAT apparatus
Measuring the concentrations of suspended (PM10) or respirable (PM2.5) fractions of particulate matter.

20. Examination: yes

21. Primary sources:

1. Praca zbiorowa pod red. Trzepierczyńskiej I.: Fizykochemiczna analiza zanieczyszczeń powietrza. Politechnika Wrocławska. Wrocław 1997
2. Juda J., Chróściel S.: Ochrona powietrza atmosferycznego, WNT, Warszawa 1974
3. Namieśnik J., Łukasiak J. Jamrógiewicz Z.: Pobieranie próbek środowiskowych do analizy. PWN Warszawa. 1995
4. Praca zbiorowa pod redakcją Namieśnika J., Jamrógiewicza Z.: Fizykochemiczne metody kontroli zanieczyszczeń środowiska. WNT. Warszawa 1998
5. Górka P., Kowalski St. i in.: Badania zanieczyszczeń powietrza Cz. I. Gazowe substancje zanieczyszczające. Wyd. Politechniki Śląskiej. Gliwice 2000.

22. Secondary sources:

1. Praca zbiorowa pod redakcją Willeke K., Baron P.: „Aerosol Measurements: Principles, Techniques and Applications" , Van Nostrand Reinhold, New York, USA, 1992.
2. Praca zbiorowa pod redakcją Spurny K.: „Advances in Aerosol Filtration", Lewis Publisher, Boca Raton, Florida, USA, 1998.

Przygotowywany jest podręcznik JS. Pastuszki, nt. pomiarów imisji.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	15/15
3	Laboratory	15/15
4	Project	/
5	Seminar	/
6	Other	/
	Total number of hours	45/45

24. Total hours: 90

25. Number of ECTS credits: 4

26. Number of ECTS credits allocated for contact hours: 4

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)*