

(pieczęć jednostki organizacyjnej)

SUBJECT CARD

1) Name of the subject: Air pollution engineering and monitoring		2) Course code:		
3) Valid in academic year: 2019/2020				
4) Course: 1 st cycle of higher education				
5) Type of studies: intramural studies				
6) Field of study: Power Engineering				
7) Profile of studies: General Academic				
8) Programme: SUSTAINABLE ENERGY ENGINEERING				
9) Semester: 6				
10) Responsible unit: Department of Air Protection				
11) Lecturer: Jozef S. Pastuszka, Ph.D., D.Sc., Professor of Technical Sciences				
12) Group of subjects: selective				
13) Status: obligatory				
14) Language of instruction: English				
15) Learning outcomes: Students will be able to analyze the monitoring data and assess the impact of air pollution on environment and health.				
16) Objective of the course: To obtain professional, detailed knowledge about the determination of the concentration levels of selected air pollutants, as well as to learn the general measurement processes useful for the air quality assessment				
17) Learning outcomes:¹				
Nr	Description of learning outcome	Method of assessments	Type of classes	Reference to learning outcomes
1	Students will know how to define the priorities to assess the air quality	Test	Lecture	K_W15
2	Students will know how to use the data from the monitoring stations for the environmental management.	Assessment of the students` activity during the lecture	Lecture	K_U09
3	Student will know how the air quality guidelines and air quality standards are prepared	Test	Lecture	K_U09
4	Students will know, after the course, how to measure the concentration of gaseous pollutants and aerosols, including bioaerosols, and how to use these data to estimate the adverse effect levels of exposed population.	Test	Lecture	K_W14
5	Students are able to evaluate emission rates from various sources.	Activity during lectures, open results discussion	Lecture	K_W15 K_U27
6	Students are able to select appropriate devices for the measurement of the concentration of the selected air pollutants.	Test	Lecture	K_W15 K_U27
7	Students are able to assess the adverse health effects due to the exposure to air pollutants using dose-effect and dose-risk relationship.	Activity during lectures	Lecture	K_W15 K_U27
8	Students are familiar with procedures of EIA (Environmental Impact Assessment), especially with Air Quality part.	Discussion on Air Quality report	Lecture	K_W15 K_U27

¹ 5-8 learning outcomes should be given

18)

Type of classes and their duration

Lectures	Recitations	Lab	Project	Seminar
15 hours	-	-	-	-

Content of the course:**Lectures**

The principles of air pollution. Effect of airborne agents on human health. Characteristics of atmospheric and indoor aerosols, including asbestos and other fibers, as well as, bioaerosols. The application of aerosol mechanics for the description of the sampling process. Measurements of the concentration levels of the total suspended particles (TSP), PM10, and respirable particles (PM2.5). Measurements of the concentration of fibers and biological particles. The passive and active methods of determination of concentration levels of gaseous pollutants. Personal exposure measurements as the best method of finding the total dose of the air pollutants. Dose-effect and dose-risk relationship as the tool for the prognosis of the adverse health effect caused by the exposure to air pollutants. The principles of representative monitoring. The necessary components of the air quality management.

19) Examination: NOT (only test)**20) Basic literature:**

- 1) WHO. *Air Quality Guidelines for Europe*, Second edition, Copenhagen, Denmark, 2000.
- 2) Querol X. et al., *Technical Guide to Reduce Biomass Burning Emissions*, Report 27, Project of EU: AIRUSE-Testing and development of air quality mitigation measures in Southern Europe, 2016 (available in the Internet).
- 3) Martin J., Heindrichs T., Pirc-Velkavrh A., Volkery A., Jarosińska D., Csagoly P., Hoogeveen Y. *The European Environment: State and Outlook*, European Environmental Agency, Copenhagen, Denmark, 2010.

21) Other reading:

Pastuszka J.S. (Editor) *Synergic Influence of Gaseous, Particulate, and Biological Pollutants on Human Health*. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA, 2016.

22) Work load of the student necessary to achieve the learning outcomes

Lp.	Type of classes	Number of contact hours / student work
1	Lectures	15/20
2	Recitations	/
3	Lab	/
4	Project	/
5	Seminar	/
6	Other (participation in consultations associated with project execution)	/
Number of hours (subtotal)		15/20

23. Total number of hours:	35
24. Number of ECTS credits:	2
25. Number of ECTS credit points gained during classes (contact hours):	1
26. Number of ECTS credits gained during practice oriented classes (labs, projects):	1
27. Remarks:	

.....
(data i podpis prowadzącego)

.....
(data i podpis Dyrektora/Kierownika podstawowej
lub międzywydziałowej jednostki organizacyjnej)

¹ 1 ECTS point – 30 hours workload