

<b>1. Course title:</b> Measurements of Air Pollution		<b>2. Course code</b>		
<b>3. Validity of course description:</b> 2019/2020				
<b>4. Level of studies:</b> 1 <sup>st</sup> cycle of higher education				
<b>5. Mode of studies:</b> intramural studies				
<b>6. Field of study:</b> ENVIRONMENTAL ENGINEERING		(FACULTY SYMBOL) RIE		
<b>7. Profile of studies:</b> academic				
<b>8. Programme:</b> Heating, Ventilation, Air Conditioning and Air Protection				
<b>9. Semester:</b> 6				
<b>10. Faculty teaching the course:</b> Department of Air Protection				
<b>11. Lecturer:</b> Jozef S. Pastuszka, Ph.D., D.Sc., Professor of Technical Sciences <b>Course instructor:</b> dr inż. Anna Mainka				
<b>12. Course classification:</b> specialty subjects				
<b>13. Course status:</b> compulsory				
<b>14. Language of instruction:</b> English				
<b>15. Pre-requisite qualifications:</b> Meteorology and climatology, Emission and dispersion of air pollutants				
<b>16. Course objectives:</b> Transfer of knowledge about the technique of measuring the concentration of selected air pollutants and the use of obtained data to assess air quality.				
<b>17. Description of learning outcomes:</b>				
N r	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Students will know the methods of sampling of gaseous pollutants and airborne particles.	written test	lecture	K_W18
2.	Ability to choose the method and appropriate samplers for measuring concentrations of air pollutants.	written test	lecture	K_W25
3.	Collects and analyzes of the samples of gaseous pollutants and particulate matter.	oral or written preparation, checked by teacher	laboratory	K_U14
4.	Ability to analyze measurement data, compare them with standards and comprehensive air quality assessment.	written report after laboratory classes	laboratory	K_U29
5.	Ability to cooperate in a team during measurements and laboratory exercises	observation of teacher	laboratory	K_K03
<b>18. Teaching modes and hours</b> <b>Lecture :</b> 15h / <b>Laboratory:</b> 15h				
<b>19. Syllabus description:</b> <b>Lecture</b> Methodology and devices for measuring the concentration and emission of particulate matter and gaseous pollutants. Measurement of concentrations of pollutants typical for indoor air. Planning of measurements, of the most abundant gaseous and dust air pollutants, measurement errors. Analysis of the measured results, as well as the monitoring data. Assessment of health risk associated with exposure to air pollutants.				

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

**20. Examination:** no

**21. Primary sources:**  
 1. WHO. *Air Quality Guidelines for Europe*, Second edition, Copenhagen, Denmark, 2000.  
 2. 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.  
 3. 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. Secondary sources:**  
 1. IARC Monographs  
 2. Current legislation on air quality standards.

**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	/
4	Project	/
5	Seminar	/
6	Other	8/0
	Total number of hours	38/30

**24. Total hours:** 68

**25. Number of ECTS credits:** 2

**26. Number of ECTS credits allocated for contact hours:**12.

**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)