COURSE DESCRIPTION CARD

<table>
<tr><td colspan="11">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="7">Environmental Engineering</td><td>Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="7">Facilities and instalation sanitary</td><td>Study profile</td><td>generally academic</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="7" rowspan="2">Air Protection</td><td>Course code</td><td>IS-FCEE-00025</td></tr>
<tr><td>Course type</td><td>Erasmus</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td>15</td><td></td><td></td><td>15</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>3</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Physics, General Chemistry, Mathematics</td></tr>
<tr><td>Course objectives</td><td colspan="9">Mastering the skills and competences of understanding phenomena and processes occurring in the atmosphere; principles of operation, design and use of devices and technologies protecting air quality.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Basic information about atmospheric air and its pollution. Classification of types and sources of air pollution, emission, sling, immission. Criteria used to determine air quality hazards. Ambient air quality standards. Primary and secondary pollution, natural and anthropogenic. The importance of VOC in the threat of ground-level ozone. POPs impact on ambient air quality; Long-range pollution transfer. The use of the Pasquilla model to determine the extent of immission from point sources. Meteorological conditions of pollution spread. The role of freons in depleting the ozone layer. Ecological characteristics of freons. Greenhouse effect mechanism. Gases aggravating the greenhouse effect. Behavior of dusts and aerosols in the air, basic concepts. Dedusting devices. Technology of neutralizing pollutants in waste gases - absorbers, adsorbers, heat burners, bioscrubbers, cryogenic methods, wet oxidation. Communication air pollution and methods of their minimization. International conventions and protocols limiting emissions. Ecologically clean and highly efficient technologies for burning solid fuels. Principles of measuring pollutant emissions in air and waste gases, basic devices and methods of analysis.
Project: identification of pollution emission sources, characteristics of individual pollution groups, assessment of the impact of emissions on quality air, selection of primary and secondary methods to reduce gaseous and dust pollutant emissions, calculation of gaseous and dust pollutant emissions, selection and design of dedusting devices.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">informative lecture, project</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture - two written tests, specialist workshop - project implementation and oral answer</td></tr>
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Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study
LO1	The student knows the advanced topics in mathematics, physics, chemistry, biology, which are the basis of processes occurring in atmospheric air.	IS1_W02
LO2	The student knows the basic methods of physical and chemical analyzes, processes and phenomena occurring in the air at an advanced level.	IS1_W02 IS1_W04
LO3	The student is able to use scientific, popular-scientific and industry literature, subject standards, legal acts, online databases in a foreign language; properly use the information obtained.	IS1_U14
LO4	The student is able to design, in accordance with the initial assumptions, noise protection systems adequate to the needs and possibilities, using appropriately selected technologies, methods, tools and materials.	IS1_U10
LO5	The student has the skills to consciously apply non-technical aspects of engineering activities and to take into account its impact on the environment, and the associated responsibility for decisions.	IS1_K06

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	written tests, project defense	L, P
LO2	written tests, project defense	L, P
LO3	project implementation	P
LO4	project implementation	P
LO5	project implementation and defense	P

Student workload (in hours)		No. of hours
Calculation	participation in lectures	10
	participation in a specialist workshop	10
	preparation for a specialist workshop and implementation of project tasks	25
	preparation for the lecture test	25
	participation in consultations	5

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	25	1
Student workload – practical activities	65	2,5

Basic references	-

Supplementary references	Belgiorno V., Naddeo V., Zarra T.: Odour impact assessment handbook. Chichester: John Wiley a. Sons, 2013.	
Organisational unit conducting the course	Department of Technology in Environmental Engineering	**Date of issuing the programme**
Author of the programme	Msc Eng Ewa Szatyłowicz	01.12.2019

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar