COURSE DESCRIPTION CARD - SYLLABUS

Course name
Systems of Air Protection [S2IŚrod2-ZwCKiOP>SOP]

Course

Field of study
Environmental Engineering

Year/Semester
1/1

Area of study (specialization)
Heating, Air Conditioning and Air Protection

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
15

Number of credit points

3,00

Coordinators

dr inż. Wojciech Rzeźnik
wojciech.rzeznik@put.poznan.pl

Lecturers

Prerequisites

1. Knowledge: Engineering air protection; meteorology and climatology; fluid mechanics; environmental management? at the level required for the degree Environmental Engineering 2. Skills: The use of differential calculus to describe physical phenomena. Ability to conduct measurements of physical quantities and the analysis of experimental results 3. Social competencies: Ability to work in a team. Awareness of the need for continuous replenishment of knowledge and skills.

Course objective

-Broaden and deepen the knowledge and skills of a systemic approach to the prevention of air pollution and the active development of air quality, especially in urban structure

Course-related learning outcomes

Knowledge:
1. The student knows and understands the processes associated with the dispersion of pollutants emitted from sources of high and low
2. The student knows and understands the processes that affect air quality in the urban agglomeration
3. The student has knowledge of atmospheric monitoring, standards and indicators of air quality and

odorymetrii
4. The student knows the principles and mechanisms of basic techniques reduce nuisance emissions of dust, gas and odor

Skills:
1. Student is able to develop Study of air protection for the plant
2. The student is able to determine the effect of building structures and technical conditions for emission dispersion of pollutants from point sources and low mobile
3. The student is able to determine the impact of natural and anthropogenic factors (including the structure of energy supply, urban structure, emissions) on air quality in the city
4. The student is able to design the optimal technology to reduce nuisance air emissions

Social competences:
1. The student understands the complexity of the technical environment? the natural and the need for cooperation of specialists from different fields to solve theoretical and practical problems
2. The student is aware of the responsibility of environmental protection specialist for the quality of life especially in the urban agglomeration
3. Student recognizes the need for systematic and deepen and broaden their knowledge and skills

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

-lecture:
written exam - duration 70 minutes. ; Individual possible discussion after the results of the written work; Evaluation of written work - based on points earned from individual tasks; Bonus activity during lectures; taking into account assessments of the exercises in the final assessment
-ćwiczenia design:
Ongoing control of the project during exercise and consultation; completion of the project on the basis of an oral defense of the work.

Programme content

The spread of pollutants from point emitters, mathematical model of Euler; boundary conditions and simplifying assumptions;formula calculation Pasquile' a andSutton. Determination of instantaneous concentrations, medium and frequency exceeding the established concentrations of gases according to the formula Pasquile'a and Sutton; the notion of roughness of the terrain, diffusion coefficients, the apparent height of the emission determination influx of dust.
Chemical processes in the plume, precipitation and leaching of contaminants from streaking phenomenon of flow around buildings, shade and trace aerodynamic. Emitters low dispersion of pollutants from low emitters and in the canyon street model boxed; load emission (Emission).
Environmental aspects of internal and external affecting the air quality in the urban area.
Energy analysis and ecological accordance with the procedure LCA, supply structure in the energy of the city.
Energy balance of the city; natural and anthropogenic components of the balance sheet, their characteristics. Urban heat island, source, structure, consequences analysis. City island pollution sources, variability.
Photochemical reactions in the atmosphere; photochemical smog and acid.
Air quality standards expressed immission values of permissible concentrations of selected pollutants; upper and lower assessment threshold. Air Quality Index (AQI) Energy and Air Quality Indicator (EAQI).
Monitoring atmospheric; principle of location of measuring stations. Remote measurement of concentrations: the principle of absorption spectroscopy - DOAS and Differential Absorption - DIAL.
Physiological characteristics of the odor, the basic concepts related to the assessment of odor; Source odorów.Metody measurements of odor - odorymetria; electronic nose.
The principles and mechanisms underlying technologies pollution reduction odor.

Course topics

none

Teaching methods

Topics design exercises:
study of air protection for the agglomeration of several sources of emissions.

Bibliography

Basic:
1. Markiewicz M., Podstawy modelowania rozprzestrzeniania się zanieczyszczeń w powietrzu atmosferycznym, Wyd. Politechniki Warszawskiej, 2004
2. Zwoździak .J.; Zwoździak A., Szczurek A., Meteorologia w ochronie atmosfery, Wyd. Politechniki Wrocławskiej, 1998
3. Bagieński Z: Wpływ struktury zużycia energii na jakość powietrza w aglomeracji miejskiej; Wyd. Politechniki Poznańskiej, seria Rozprawy nr 440, 2010
4. Warych Jerzy.: Oczyszczanie przemysłowych gazów odlotowych, odlotowych, WNT, 2000
5. Kośmider J., Mazur-Chrzanowska B., Odory, PWN, Warszawa 2002

Additional:
1. Bagieński Z.: System ochrony powietrza , cz.1. PFP , Poznań 2003
2. Tomeczek J., Gradoń B., Rozpondek M., Redukcja emisji zanieczyszczeń z procesów konwersji paliw i odpadów, Wyd. Politechniki Śląskiej,2009
3. Zieliński S. : Skażenie chemiczne w środowisku ; Wyd. Politechniki Wrocławskiej; 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00