

CLEANING TECHNOLOGIES OF SOLID PARTICLES AND GASEOUS EMISSION

Title of Study Programme and Code		Type (compulsory/optional)	Cycle	Year of study when the component is delivered (if applicable)
Environment Protection Engineering, 6531EX042		Compulsory	1 st	2 nd
Semester/trimester when the component is delivered		Number of ECTS credits allocated	Language of instruction	Mode of delivery (face-to-face/e-learning/...)
3 rd		8	Lithuanian	Face-to-face
Learning outcomes			Study methods	Assessment methods
After completion of the study subject, a student should be able:			Interactive lecture; Individual work preparing for control work; Consultations; Situation analysis; Legislative analysis, analysis of the literature in preparation for test.	Test; Examination.
LO 1	To acquire chemical properties of dust and aerosol and methods of their determination.			
LO 2	To apply dust and aerosol concentration determination methods, devices, and equipment for cleaning of contaminated air from gaseous and mechanical pollutants.			
LO 3	To find and apply relevant legal, technical, and scientific information sources for atmospheric protection in public and in specialized databases.			
LO 4	To apply the atmospheric pollutant dispersion models for planned / administered economic activities.			
LO 5	To evaluate air pollution aspect relevancy in economic activity.			
LO 6	To know air cleaning methods and work principles of equipment.			
LO 7	To solve the environmental problems in the selection of technologies to reduce air pollution.			
LO 8	To carry out air pollution research, provide the conclusions modeling environmental attitude to the public.			
Prerequisites (these courses must be sucessfully completed prior to taking this particular course)				
Chemistry, Mathematics, Physics, Information Technologies and Engineering Computer Graphics				
Course content				
1. 1. Provided economic environmental problems, and their possible solutions. Review of technological processes. 2. Assessment of planned /carried out economical environmental impact. Practical work: - The analysis of planned economic activity alternatives - The analysis of community participation in environmental impact assessment.				

4. The methods and the devices of air clearing from the gaseous pollutants:

- The criteria for detergent absorbent selection; physical absorption; chemisorption; absorption air cleaning filters.
- The absorption gas cleaning devices; the types of absorbers; the technologies for decontaminating the absorption atmosphere pollutants.

Practical works:

- Calculations of absorber efficiency
- The analysis of adsorber emission cleaning consistent patterns

5. Technologies of smoke cleaning from sulfur oxide.

Practical works:

- Classification analysis of gas desulphurisation methods

6. Technology of smoke cleaning from nitrogen oxides

Practical works:

- The analysis of primary nitrogen oxide reduction measure

7. Biotechnologies:

- Biofilters
- Bioscrubbers
- Biocatalyst emission cleaning

8. Measurement techniques of gaseous emissions. Photometric methods. Emission measurement by flame ionization method. Olfactometry.

Gaseous pollutants sampling for laboratory analysis.

9. Characteristics of the solid particles. The ways of setting the dispersion and abrasion of the solid particles

10. The methods for the control of the solid particles concentration.

Practical works:

- Calculations of solid particles mass concentration in ambient air.
- Calculations of gas flow rate and volume flow in the duct measurement

11 Practical works:

Determination of solid particles concentration in ambient air.

Determination of CO, CO₂ concentration in the ambient air.

12. Methods and devices of air purifying from particulate matter.

Practical works:

- Calculations of centrifugal settlers
- Efficiency calculations of particulate matter inhibition by scrubbers
- efficiency calculations of particulate matter by fiber filters
- payback calculation of air purification equipment

13. Atmospheric pollution dispersion modeling using the ADMS 4 program.

Practical works

- Particulate matter dispersion modeling in ambient air using ADMS 4 program

Recommended or required reading and other learning resources/tools

1. Marquita K. Hill (2010) Understanding Environmental Pollution Cambridge University Press

2. Control of gaseous emissions. Capter:

<https://www.google.lt/#hl=lt&biw=1366&bih=641&sclient=psy->

3. Schiffner, K.C. (2002) Air pollution control equipment selection guide. Boca Raton: Lewis Publishers;

http://eco.com.ua/sites/eco.com.ua/files/lib1/english_book/air_pollution_kenneth_2002.pdf

4. Michael L. McKinney,,Robert M. Schoch, Jones & Bartlett (2003) Environmental science–systems and solutions. Learning<http://books.google.lt/books?>

id=NJUanyPkh0AC&printsec=frontcover&hl=lt&source=gbg_ge_summary_r&cad=0#v=onepage&q&f=false

5. Daniel A. Vallero (2008) Fundamentals of Air Pollution. Fourth edition. Daniel A. Vallero. Civil and Environmental Engineering Department, Pratt School of engineering Duke University, Durham, North Carolinahttp://search.babylon.com/?q=Air+Pollution.+Daniel+.+pdf&s=web&as=0&rlz=0&babsrc=NT_ss

6. Aaron Daly and Paolo Zannetti.(2007) An Introduction to Air Pollution – Definitions, Classifications, and History. The EnviroComp Institute, Fremont, CA (USA).http://search.babylon.com/?q=Books+about+air+pollution+pdf&s=web&as=0&rlz=0&babsrc=NT_ss

7. Rachel H. Plattenberg (2006) Environmental Pollutionhttp://books.google.lt/books?id=5oUp75PJwgoC&printsec=frontcover&hl=lt&source=gbg_ge_summary_r&cad=0#v=onepage&q&f=false