Nazwa w jęz. angielskim: ***Integrated air quality protection using sustainable methods – selected case studies***

Dane dotyczące zajęć:
Information on course:

Jednostka oferująca: *Faculty of Energy and Environmental Engineering // Prof. dr hab. inż. Marcin Sajdak*

Język wykładowy / Language:

English

Strona WWW:

Skrócony opis / Short description:

The course presents an integrated approach to air quality protection using sustainable technical and organisational measures. Selected examples of emission reduction solutions in the waste and energy sectors are discussed (including chemical recycling of plastics and multi-material textiles, process gas cleaning systems, BAT solutions), together with methods for assessing their actual impact on air quality. Chemical recycling is treated as one of the tools for air protection and is analysed against alternative scenarios such as incineration or landfilling.

Opis: / Description:

Course contents
Lecture:

1. Introduction to integrated air quality protection
2. Emissions from the waste sector and possible pathways for their reduction
3. Air pollution control techniques in waste treatment installations
4. Selected sustainable methods of air quality protection – case studies
5. Assessing the effectiveness of sustainable air quality protection methods

Laboratory:

1. Waste characterization and its emission reduction potential
2. Chemical recycling as a tool for air protection – mini-scale process
3. Model treatment of process products (gaseous and liquid streams)
4. Comparison of emission scenarios

Number of contact hours involving academic staff or other course leaders and students:
Lecture: 15 hours
Laboratory: 15 hours
Total number of hours: 30
Number of ECTS credits: 2

Literatura / Bibliography:

1. US EPA Air Pollution Training Institute, „Principles and Practices of Air Pollution Control – Student Manual”
2. Cheremisinoff N.P., „Handbook of Air Pollution Prevention and Control”
3. van Ewijk S., Stegemann J., „An Introduction to Waste Management and Circular Economy”, UCL Press (open access)
4. „Air pollution scenarios generated by solid waste management” (Boyacá, Kolumbia)
5. „Chemical recycling of plastic waste for sustainable material management: A prospective review on catalysts and processes” – Renewable and Sustainable Energy Reviews https://doi.org/10.1016/j.rser.2021.111866
6. Review of Reference Document on Best Available Techniques for Waste Incineration (BREF Waste Incineration) https://leap.epa.ie/docs/090151b2806fd74d.pdf

Efekty uczenia się / Learning outcomes:

Knowledge – a student knows and understands:

K1. The main sources of air pollutant emissions in the waste and energy sectors and the basic technical and organisational methods for their reduction, including in a system perspective. (links: K1A_W18 – pollutants and processes in the environment; K1A_W23 – emission sources and waste; K1A_W26 – air treatment

processes)
K2. The assumptions and application possibilities of selected sustainable methods for air quality protection (including chemical recycling of waste, biofiltration and BAT technologies) and their role within the circular economy. (links: K1A_W23, K1A_W24 – waste and technologies; K1A_W12 – legal and non-technical framework)

Skills: a student can
S1. Identify and analyse management scenarios for a selected waste stream in terms of air emissions and indicate technical measures that reduce these emissions (links: K1A_U20 – assessment of air pollution level; K1A_U21 – selection of emission abatement techniques; K1A_U27–U28 – analysis and design of waste management systems)

Social competences: a student is prepared to
SC1. Critically evaluate technological solutions declared as “sustainable” and take into account air quality criteria and potential health risks when selecting waste management technologies. (links: K1A_K02 – understanding the environmental impacts of engineering activities; K1A_K07 – awareness of the social role of an engineer and responsibility for informing the public)

Metody i kryteria oceniania / Methods and criteria of assessment:

Lecture:
Colloquium / test (open and multiple-choice questions) at the end of the lecture cycle.
Laboratory:
Assessment of laboratory reports (emission balance, description of the gas cleaning system).
Assessment of a short group presentation (installation case study).
Proposed grading structure:
Colloquium for the lecture part: 40%
Laboratory reports (at least 2 major reports): 40%
Group case-study presentation: 20%
Passing criteria (percentage scale as in the attached course card):
90–100% – grade 5.0
80–89% – grade 4.5
70–79% – grade 4.0
60–69% – grade 3.5
50–59% – grade 3.0
< 50% – failing grade
A necessary condition for passing the course is obtaining at least 50% of the total points and submitting all required laboratory reports.

Przynależność do grup przedmiotów w cyklach:
Element of course groups in various terms:

Opis grupy przedmiotów Course group description	Cykl pocz. First term	Cykl kon. Last term
przedmioty obieralne studia stacjonarne stopień studiów – dowolny kierunek studiów – dowolny, semestr dowolny elective courses full-time degree - any field of study - any semester - any	2024/25	