



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Neutralization and Recovery of Organic Industry Wastes

Course

Field of study

Environmental Protection Technologies

Area of study (specialization)

Ecotechnology

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

I/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

45

Other (e.g. online)

Tutorials

Projects/seminars

15

Number of credit points

9

Lecturers

Responsible for the course/lecturer:

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Institute of Chemical Technology and

Engineering

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Responsible for the course/lecturer:

Prerequisites

Student has knowledge of chemical technology and environmental engineering. He/she knows basic methods, techniques and tools used in chemical technology.

Student is able to obtain information from literature, databases and other sources. He/she can interpret information obtained, draw conclusions and formulate opinions.

Student is able to cooperate and work in a group. He/she is able to adequately determine the priorities for a given task.



Course objective

Obtaining knowledge of chemical technology in the aspect of neutralization and recovery of organic industry waste.

Course-related learning outcomes

Knowledge

1. Student knows the basic rules of procedure for neutralization of the impact of harmful substances on the environment. [K_W07]
2. Student knows the basic rules of procedure in the neutralization and recovery of organic industry waste [K_W08]

Skills

1. Student has easy verbal communication with specialists in environmental technology [K_U01]
2. Student can plan, prepare and demonstrate a presentation on the implementation of a research task and conduct a substantive discussion on the subject. [K_U04]
3. Student can determine the methods of utilising the various waste from the organic industry [K_U09]
4. Student has the skills to indicate directions of action for neutralization and disposal of untypical waste from organic industry. [K_U12]
5. Student can work individually and in a team. [K_U16]

Social competences

1. Student can make use of the professional literature, integrate information obtained by interpreting and critically analysing it and, on that basis, formulate competent opinions and reports. [K_K01]
2. Student is able to critically assess and verify experimental results. [K_K02]
3. Student is aware of personal responsibility for teamwork. [K_K04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam; assessment criteria: 3 - 50,1-70,0%; 4 - 70,1-90,0%; 5 - from 90,1%

Laboratory and project: current control during the classes, oral/written response, evaluation of prepared reports from laboratory exercises, evaluation of prepared studies and participation in discussions during the project classes;

evaluation criteria: 3 - basic theoretical preparation for laboratory/project classes and moderate participation in the discussion; 4 - preparation for classes supported by theoretical knowledge, ability to formulate conclusions and active participation in the discussion during the classes; 5 - very good preparation for classes, ability to formulate own opinions and conclusions during the discussion, independent search for additional theoretical knowledge concerning the discussed issues.

Programme content



1. Neutralization technology (prevention of contamination, clean technology, methods, applications, examples of technological solutions).
2. Hierarchy of ways of dealing with waste. Special rules of managing certain types of waste.
3. Unit processes, including oxidation, halogenation, nitration and esterification (emissions and treatment).
4. Persistent Organic Pollutants (POPs).
5. Volatile organic compounds (sources, removal methods).
6. Odorants (sources, chemicals of fragrances, neutralization by direct oxidation with ozone, examples of solutions).
7. Examples of the management of selected waste organic industry.
8. Clean coal technologies.

Teaching methods

Lecture - multimedia presentation.

Laboratory - learning materials as pdf files, practical exercises.

Project - learning materials as pdf files, practical exercises - discussion of the problem of utilization and neutralization of selected waste on the basis of the method proposed by the students (realized project).

Bibliography

Basic

1. Cz. Rosik-Dulewska: Podstawy gospodarki odpadami, Wydawnictwo Naukowe PWN, Warszawa 2011.
2. K. Mędrzycka: Gospodarka odpadami niebezpiecznymi, Wydział Chemiczny Politechniki Gdańskiej, Gdańsk 1996.
3. J. Siwka, E. Sierka: Ochrona środowiska i gospodarka odpadami, Wydawnictwo Wydziału Inżynierii Produkcji i Technologii Materiałów Politechniki Częstochowskiej, Częstochowa 2016.
4. A. Tabor (red): Gospodarowanie odpadami i substancjami niebezpiecznymi : praca zbiorowa. T. 2, Klasyfikacja, oznakowanie, standardy emisji, recykling, karty charakterystyk, zarządzanie, Centrum Szkolenia i Organizacji Systemów Jakości Politechniki Krakowskiej im. Tadeusza Kościuszki, Kraków 2005.
5. E. Milchert, Technologie produkcji chloropochodnych organicznych: utylizacja odpadów, Politechnika Szczecińska, Wydaw. Uczelniane PS, Szczecin 1997.
6. B. Burczyk: Biomasa. Surowiec do syntez chemicznych i produkcji paliw, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2011.



7. M. Stasiewicz (red.): Technologia chemiczna organiczna, ćwiczenia laboratoryjne, Wydawnictwo Politechniki Poznańskiej, Poznań 2013

Additional

1. E. Kociołek-Balawejder (red.): Technologia chemiczna organiczna: wybrane zagadnienia, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2013.
2. B. Burczyk B.: Zielona chemia. Zarys, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2014.
3. C.A.M. Afonso , J.G. Crespo: Green separation processes: fundamentals and applications, Wiley-VCH, Weinheim 2005.
4. P.N. Cheremisinoff, L.F. Ferrante: Waste reduction for pollution prevention, Butterworth-Heinemann, Oxford 1989.
5. R. Zarzycki: Energia z odpadów, Polska Akademia Nauk. Oddział, Łódź 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	225	9,0
Classes requiring direct contact with the teacher	125	5,0
Student's own work (literature studies, preparation for laboratory and project classes, preparation of reports from laboratory classes, project execution, preparation for the exam) ¹	100	4,0

¹ delete or add other activities as appropriate