



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Noxious Technology, Industrial Wastes and Recycling

		Course
Field of study		Year/Semester
Environmental Protection Technologies		IV/7
Area of study (specialization)		Profile of study
-		general academic
Level of study		Course offered in
First-cycle studies		Polish
Form of study		Requirements
full-time		compulsory

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
30	0	0
Tutorials	Projects/seminars	
30	0	
Number of credit points		
5		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
dr hab. inż. Katarzyna Staszak		

Prerequisites

The student knows the principles of environmental protection related to chemical production and waste management. He/she can also define, explain and characterize raw materials, products and processes used in the chemical industry and the directions of development of the chemical industry in the country and worldwide.

Course objective

Gaining knowledge of environmentally harmful technologies, sources and ways to minimize the waste generated.

Course-related learning outcomes

Knowledge

Student has knowledge of methods of characterising and identifying chemicals and typical environmental pollutants. Student has basic knowledge about the life cycle of products, equipment and installations in environmental technologies and is able to define the hazards associated with the implementation of chemical processes and risk assessment principles, knows international conventions and EU directives on technical safety, and knows the principles of chemical market organization



(REACH). Moreover, the student has general knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activities (K_W09, K_W13, K_W14, K_W16).

Skills

Students could prepare and present oral presentation on environmental technology issues in Polish and foreign languages. Student analyses, verifies existing technical solutions in the field of environmental protection technologies. Moreover, student is able to estimate usefulness and to select tools and methods for solving a problem in the field of environmental protection technology (K_U5, K_U16, K_U18).

Social competences

The student is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including their environmental impact and related responsibility for decisions. He or she understands the need to communicate to the public - among others through the mass media - information about favourable and unfavourable aspects of activities connected with the production and use of chemical compounds, he or she is able to communicate such information in a commonly understood way (K_K02, K_K07).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The lecture: Final exam, Exercises: Semester evaluation of completed projects, which consists of a preliminary pre-project analysis, the quality of the completed project and preparation of the final report and presented presentations.

Programme content

The classes discuss the technological processes that have the greatest impact on the environment. The whole production cycle (preparation of raw materials, chemical synthesis, separation of products, transport and storage of products) is analyzed along with the requirements of monitoring at individual stages. Methods enabling the reduction of technology nuisance based on, among others, the best available techniques (BAT) are discussed. The economic and legal aspects of the discussed processes are analysed. Moreover, the classification of waste and its sources in technological processes is discussed along with the methods of its neutralization or recycling. Moreover, during the classes, the students get acquainted with the available algorithms evaluating the processes in terms of their potential impact on the environment, including the emission of pollutants and waste production. During the classes, students will have the opportunity to apply in practice the WASTE Reduction (WAR) algorithm, developed by The Environmental Protection Agency (EPA).

Teaching methods

Presentation at the lecture of the discussed issues together with a discussion conducted with students. During the exercises, presentation of the application of the WASTE Reduction algorithm (WAR), with the use of a design support tool - Chemcad. Based on the presented examples, the students perform preliminary, test projects of single unit operations during the classes. At this stage, the teacher supports students in the area of using the CAD tool without solving any design problems. During the course of the



final course projects, students are assisted in the functioning of the Chemcad program, but they make their own design decisions for which they are responsible. As part of their classes, students also prepare presentations on the issues discussed during the lectures.

Bibliography

Basic

1. Best Available Technology, reports.
2. Legal regulations, including the Environmental Protection Law, EU regulations, including the assessment of durability, bioaccumulation capacity and toxicity (PBT) and very high durability and very high bioaccumulation capacity (vPvB), REACH.
3. Current article in the field of chemical technology.

Additional

1. K. Schmidt, J. Sentek, J. Raabe, E. Bobryk, Podstawy technologii chemicznej. Procesy w przemyśle nieorganicznym. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004.
2. T. Grzywa, J. Molenda, Technologia podstawowych syntez chemicznych, tom 1 i tom 2, WNT, Warszawa 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	5,0
Classes requiring direct contact with the teacher	80	3,0
Student's own work (literature studies, preparation for tutorials, preparation and presentation of the presentation, preparation for exam, project preparation) ¹	70	2,0

¹ delete or add other activities as appropriate