COURSE DESCRIPTION CARD - SYLLABUS

Course name

Waste reduction algorithms for industrial installations

Course

Field of study

Circular System Technologies

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

The student knows the rules of circular economy related to chemical production. He/she can also

define, explain and characterize raw materials, products and processes used in the chemical industry.

Course objective

Gaining knowledge in the field of computer simulations supporting activities in the field of reducing the number of impurities in industrial installations.

Course-related learning outcomes

Knowledge

1. Student is familiar with the principles of environmental protection related to chemical production and management of raw materials, materials and waste in a closed circuit [K_W06].

2. Student has knowledge of the negative impact of manufacturing and processing technologies on the environment [K_W08].

3. Student has basic knowledge of the life cycle of products, equipment and installations used in closed-loop technologies [K_W12].

Skills

1. Student uses computer programs that support the implementation of tasks typical for closed-loop technology [K_U02].

2. Student analyses, verifies existing technical solutions in the field of closed-loop technology [K_U11].

3. Student based on the knowledge gained, he is able to develop an individual or team project/report from the work done and make a multimedia presentation [K_U15].

4. Student using analytical, simulation and experimental methods, he is able to formulate assumptions and methods of their implementation for simple engineering tasks [K_U12].

Social competences

1. Student shows both self-reliance and inventiveness in individual work, as well as effective cooperation in the team, performing various roles in it; objectively evaluates the effects of own and team members' work [K_K02].

2. Student is aware of the negative impact of human activity on the environment and actively prevents its degradation [K_K10].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge test on the material discussed in the lecture. 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 projects presentations in the field of pollution reduction in industrial installations.

In the case of stationary classes, credit for projects is given in the computer lab, while in the case of online classes, credit is given using the university's network and computer infrastructure (VPN) through

the Remote Desktop Protocol (RDP) with the use of a remote desktop connection tool. In case of the exam, the credit is given online using the platform ekursy.put.poznan.pl in the form of a test.

Programme content

As part of the lectures, students will become familiar with existing algorithms for reducing pollutants in industrial installations. Issues related to the sources of emissions and ways of reducing them by modifying technological solutions will be discussed. During the project classes, students will learn about available algorithms that evaluate industrial processes in terms of their potential environmental impact, including emissions and waste production. Students in the class will have the opportunity to apply in practice the WAste Reduction (WAR) algorithm, developed by The Environmental Protection Agency (EPA) using Chemcad commercial software to assess the pollution on selected washing facilities together with an analysis of the impact of optimization and modernization of industrial processes on the possibility of reducing or eliminating the generation of waste and emissions of harmful substances within the entire process in accordance with GOZ assumptions.

Teaching methods

Lectures in the form of multimedia presentations and presentation of the application of the WAste Reduction (WAR) algorithm, with the use of a design support tool - Chemcad. Based on the presented examples, 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 completion of the final projects, the students are supported in the functioning of Chemcad, however, they make their own design decisions for which they are responsible.

Bibliography

Basic

1. Best Available Techniques (BAT).

2. Current articles 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	75	3,0
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for tutorials) [1]	37	1,5

[1] delete or add other activities as appropriate