COURSE DESCRIPTION CARD - SYLLABUS

Course name
Accidents in the process industry [N2TCh2-TCO>WwPC]

Course

Field of study
Chemical Technology

Year/Semester
2/4

Area of study (specialization)
General Chemical Technology

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Student knows: • basics of algebra and probability theory, • basic laws of heat, mass and momentum transfers, • basic chemical reaction engineering, • legal basis for process safety according to Polish and the European Union laws, • basic hazards that may arise from the use of chemical substances in industrial processes, • principles of conducting analyzes: HAZOP, FTA and ETA. Student possesses the following skills of: • reading and understanding of process flow diagrams (PFD) and simple piping and instrumentation diagrams (P&ID), • identification of the main steps of risk analysis of chemical processes, • basic risk management by identification of the main steps in the risk assessment of chemical processes.

Course objective

The aim of the course is to familiarize students with accidents that occurred in the process industry (chemical, petrochemical, food and related industries) and with the analysis of their causes and effects as well as with the possibilities of calculating the substance releases to the environment.

Course-related learning outcomes

Knowledge:
1. Student knows the basic hazards that may result from the chemicals used in industrial processes. -

[K_W08]
2. Student knows the basic calculations substance dispersion in the air. - [K_W12]
3. Student knows the causes of industrial accidents discussed during classes. - [K_W12]

Skills:
1. Student is able to effectively use material safety data sheets of chemical substances in order to identify process hazards and determine safe conditions for conducting processes. - [K_U03, K_U20]
2. Student is able to use the results of industrial accident analyzes. - [K_U03, K_U04, K_U19]
3. Student can use logical trees to analyze industrial accidents and present them in the form of a report. - [K_U03, K_U04; K_U06]

Social competences:
1. Student knows the limitations of her/his own knowledge and understands the need for continuous education and improving her/his professional competences, with particular emphasis on current analyzes of industrial accidents. - [K_K01]
2. Student is aware of professionalism and compliance with the rules of professional ethics in relation to hazardous events. - [K_K03]
3. Student is aware and understanding of the social aspects of the practical application of the acquired knowledge and skills in the field of process safety and the related responsibilities. - [K_K05, K_K07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge and skills acquired during the course are verified by preparation of a report on selected aspects of the process safety analysis for the sample process installation or another issue related to the topics presented during the classes.The report is going to be made in a group of several people.

Programme content

Familiarize students with accidents that occurred in the process industry
(chemical, petrochemical, food and related industries) and with the analysis of their causes and effects as well as with the possibilities of calculating the substance releases to the environment.

Course topics

The course covers:
• accidents in the petrochemical, chemical, food and related industries.
• basic models describing the dispersion of substances.
• mathematical models describing the basic types of chemical releases from industrial processes, e.g. liquid discharge through an opening, liquid discharge through an opening in a tank, pipeline liquid flow, gas flow through an opening, gas flow through a pipeline, evaporation of the liquid surface and boiling liquid pool.

Teaching methods

Multimedia presentation, materials shared in the university's e-Learning system.

Bibliography

Basic:
1. Markowski Adam S., Bezpieczeństwo procesów przemysłowych, 2017, Wydawnictwo Politechniki Łódzkiej, ISBN: 978-83-7283-805-6
2. Mitkowski P.T., Analiza ryzyka w przemyśle chemicznym, 2012, Wydawnictwo Politechniki Poznańskiej, ISBN: 978-83-7775-202-9.

Additional:
1. Crowl D. A., Louvar J. F., Chemical Process Safety. Fundamentals with Applications, Pearson Education INC, 2011.
2. Atherton J., Gil F., Hoboken, N.J,. Incidents that define process safety, Center for Chemical Process Safety, Wiley, 2008.
3. Guidelines for Process Safety Fundamentals in General Plant Operations, Center for Chemical Process

Safety of the American Institute of Chemical Engineers, Nowy Jork, 1995 (dostęp elektroniczny przez www.library.put.poznan.pl).
4. Sanders R. E., Chemical Process Safety - Learning from Case Histories (3rd Edition), Elsevier, 2005 (dostęp elektroniczny przez www.library.put.poznan.pl).

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00