COURSE DESCRIPTION CARD - SYLLABUS

Course name
Exploitation and Process Safety

Course

Field of study
Chemical Technology
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
compulsory

Number of hours

Lecture
15
Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

Lecturers

Responsible for the course/lecturer:
Ph.D. Eng. Piotr Tomasz Mitkowski

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Responsible for the course/lecturer:

Prerequisites

Student knows basics of algebra and probability theory, basic laws of heat, mass and momentum transfers, basic chemical reaction engineering. Student has basic knowledge in the field of construction and operating principles of apparatus and fittings in chemical and related industries, and industrial

automation. Student is able to read and understand process flow diagrams (PFD) and simple piping and instrumentation diagrams (P&ID).

Course objective

The aim of the course is to familiarize the student with the basic principles of safe operation of industrial equipment and fittings as well as qualitative methods and techniques for identifying industrial risk.

Course-related learning outcomes

Knowledge

1. Student knows the legal basis of process safety under the Polish and European Union laws. [K_W18]

2. Knows the basic threats that may result from the use of chemical substances in industrial processes. [K_W18]

3. Knows the principles of process safety analyzes: HAZOP, FTA and ETA. [K_W18, K_W15]

4. Knows the basic aspects related to the location of process equipment and the location of chemical and related industries plants. [K_W15, K_W18]

5. Knows the basic aspects of occupational health and safety in the chemical industry. [K_W18]

Skills

1. Student is able to effectively use chemical safety data sheets to identify process hazards. [K_U01, K_U25]

2. Is able to identify the main steps of the chemical risk assessment. [K_U25]

3. Is able to use HAZOP, FTA and ETA for basic hazard identification. [K_U25]

Social competences

1. The student knows the limitations of her/his own knowledge and understands the need for continuous education and raising their professional competences, with particular emphasis on ongoing analysis of industrial accidents. [K_K01]

2. The student is aware and understands the social aspects of the practical application of acquired knowledge and skills in the field of process safety and related with it responsibility. [K_K02]

3. The student is aware of the professionalism and compliance with the principles of professional ethics in relation to the storage and processing of chemical substances and hazardous events. [K_K05]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The acquired knowledge during the lectures is by preparation of selected elements of the safety report of hypothetical installation. The task is performed in groups consisting of at least 3 students. The required material and appropriate references for questions will be delivered in the university's e-Learning system.

If the classes will be held remotely, the forms of course assessments will remain unchanged and will be carried out with the use of tools provided by the Poznań University of Technology (https://elearning.put.poznan.pl/), about which students will be informed as soon as possible.

Programme content

As part of the course the following issues are discussed:

1. Basic terminology related to the occupational health and safety risk and industrial risk analysis.

2. Legal basis related to preparation of a safety report and location of an industrial plant (Environmental Protection Law together with relevant SEVESO III Directive), fire protection and guidelines for the use of equipment in potentially explosive areas (ATEX Directive, selected standards).

3. Rules for the location of industrial apparatuses and the location of chemical and related industries plants.

4. Methods supporting the identification and assessment of hazards such as: HAZOP, fault tree (FTA), event tree (ETA), FMEA. The methods are supported by examples.

5. Analyzes of selected accidents and failures in the chemical, petrochemical and related industries.

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).

6. Zarządzanie ryzykiem w przemyśle chemicznym i procesowym, Praca zbiorowa pod redakcją Adama S. Markowskiego, Wydawnictwo Politechniki Łódzkiej, 2001.

7. Woliński M., Ogrodnik G., Tomczuk J., Ocena zagrożenia wybuchem, Szkoła Główna Służby Pożarniczej, Warszawa, 2002.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	25	1,0
Student's own work (literature studies, preparation for tests) [1]	25	1,0

[1] delete or add other activities as appropriate