COURSE DESCRIPTION CARD - SYLLABUS

Course name

Performance of machines and process safety

Course

Field of study

Environmental Protection Technologies

Year/Semester

4/7

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

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 ofapparatus 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 and semi-qualitative methods and techniques for identifying industrial risk. In addition, the student is acquainted with the analysis of selected industrial accidents.

Course-related learning outcomes

Knowledge

1. Student knows the legal basis of process safety under the Polish and European Union laws. [K_W16]

2. Knows the basic threats that may result from the use of chemical substances in industrial processes. [K_W16]

3. Knows the principles of qualitative and semi-qualitative analyzes: HAZOP and FMEA. [K_W16, K_W12]

4. Knows the rules of creating logical trees: FTA and ETA. [K_W10, K_W15]

5. Knows the basic aspects related to the location of process equipment and the location of chemical and related industries plants. [K_W10, K_W15]

6. Knows the basic aspects of occupational health and safety in the chemical industry. [K_W10]

Skills

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

2. Is able to identify the main steps of the chemical risk assessment. [K_U14, K_U16]

3. Is able to use HAZOP and FMEA for hazard identification and initial risk assessment of industrial equipment. [K_U16]

4. Is able to perform a risk analysis of chemical industry processes with event and fault trees. [K_U16]

5. Is prepared to write selected aspects regarding the hazard identification required by Polish law, e.g. in the safety report. [K_U14]

Social competences

1. Student is aware of and understands the social aspects of the practical application of acquired knowledge and skills in the field of process safety and related responsibility. [K_K02]

2. Student is aware of the advantages and limitations of individual and group work in solving interdisciplinary problems in industry. Is aware of the responsibility of jointly implemented tasks as part of teamwork. [K_K03]

3. 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]

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The acquired knowledge during the lectures is verified by the test. The test consists of about 30 closed test questions. Passing from 50% of points according to the following criteria: 50%-60% (3.0), 61% -70%

(3.5); 71% -80% (4.0), 81% -90% (4.5), 91% -100% (5.0). The required material and appropriate references for questions will be delivered in the university's e-Learning system.

Practical application of acquired skills will be verified by the prepared report on selected aspects of process safety analysis for the sample part of the process installation. The report is going to be made in a group of several people.

If the classes will be held remotely, the form of course assessment 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 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 of using them to create workplace and technological instructions, and selected sections of a safety report.

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

[1] delete or add other activities as appropriate