



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Safety of industrial processes - identification of industrial hazards.

### Course

Field of study

Circular System Technologies

Area of study (specialization)

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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

0

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

Ph.D. Eng. Piotr Tomasz Mitkowski

Responsible for the course/lecturer:

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tel. 61 665 3334

### 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 students with the basic principles and methods of identifying hazards in the process industry, with particular emphasis on fire and explosion hazards.

### Course-related learning outcomes

Knowledge

1. Student knows the legal basis of process safety according to the Polish and the European Union laws. [K\_W05]



2. Student knows the basic threats that may result from the chemicals used in the industrial processes. [K\_W28]
3. Student knows the basic principles of identifying hazards related to the industrial processes. [K\_W20, K\_W24, K\_W28]
4. Student knows the basic aspects related to the plant layout and location of chemical and related industries. [K\_W28]
5. Student knows the basic aspects of occupational health and safety in the chemical and related industries. [K\_W28]

#### Skills

1. Student is able to effectively use the material safety data sheets of chemical substances in order to identify the process hazards. [K\_U01]
2. Student is able to identify the main steps of hazard identification in the process industry. [K\_U05, K\_U10]
3. Student is able to use the basic methods of hazards identification, working both individually and in group. [K\_U08, K\_U09, K\_U15]

#### 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 and understands of social aspects of the practical application of the acquired knowledge and skills in the field of process safety and the related responsibility. [K\_K02]
3. Student is aware of the need for professional and reliable identification of the process hazards associated with hazardous substances. [K\_K04]

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge and skills acquired during the project classes are verified through the performance of project tasks: one individual task and one task performed in a group of at least 3 people. The basic material will be available in the university's e-Learning system.

#### Programme content

The course covers:

1. Basic terminology related to the process safety.
2. Principles of process safety management.



3. Legal bases related to the preparation of the safety report and location of an industrial plant (Environmental Protection Law with relevant regulations and directives).
4. Qualitative methods supporting the hazard identification, such as: HAZOP, Whatif, HAZID, FMEA.
5. Methods of quantifying the results of qualitative analyzes.

### Teaching methods

Multimedia presentation, materials made available in the university 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](http://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](http://www.library.put.poznan.pl)).

### Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	16	0,5
Student's own work (literature studies, project preparation) <sup>1</sup>	9	0,5

<sup>1</sup> delete or add other activities as appropriate