



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Elements of Automation and Measurements in Chemical Technology

### Course

Field of study

Chemical Technology

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

III/6

Profile of study

general academic

Course offered in

English

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

Tutorials

Projects/seminars

15

Other (e.g. online)

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Marek Ochowiak Eng, PhD, DSc, Assoc Prof. PP

Responsible for the course/lecturer:

Andżelika Krupińska Eng, PhD

### Prerequisites

As a preliminary requirement the student should have basic knowledge of chemical and process engineering, electronics and electrical engineering, construction and operation principles of process apparatus. He should also be able to analyze the obtained measurement data in the field of chemical technology and engineering as well as to perform mathematical calculations.

### Course objective

Obtaining knowledge in the field of technological measurements, control and measuring apparatus in the chemical industry as well as elements of industrial automation and process control.

### Course-related learning outcomes

Knowledge

1. Has knowledge in the field of automation and industrial metrology to the extent needed to formulate and solve simple computational tasks aimed at the selection of proper instrumentation. K\_W5
2. Knows the basics of control and measurement systems and control systems. K\_W6



3. Has knowledge about the control of quantities and technological processes as well as metrology in chemical technology and engineering. K\_W6

#### Skills

1. Use the understanding of the indicated sources of knowledge (list of basic literature) and acquire knowledge from other literature sources. K\_U1

2. Has the ability to present in the form of a presentation. K\_U2, K\_U4

3. The student is able to use knowledge to design and optimize automatic control systems and measuring systems. K\_U8

#### Social competences

1. Understands the need for further training and improving their professional competences as well as teamwork. K\_K1, K\_K3

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

Learning outcomes presented above are verified as follows:

Lecture: Exam in the form of a test (about 20 closed questions), additional presentation. The minimum passing grade/mark (acceptance pass mark) at the exam is 51%. It is allowed to carry out pass the exam in a remote form depending on the epidemic situation.

Project: Project, presentation, oral and written answers

#### Programme content

As part of the classes, the following are discussed:

- Basic issues.
- Automatic adjustment systems.
- Adjustment and executive elements.
- The role of executive systems in industrial control systems.
- Regulators.
- Control stability and quality.
- Signaling, blockades and security.
- Measuring sensors.
- Measurements, measuring instruments and transducers.
- Control of quantities and technological processes in chemical technology and engineering.

#### Teaching methods



Multimedia presentation.

## Bibliography

### Basic

1. Luyben W.L.: Process Modeling, Simulation, and Control for Chemical Engineers. McGraw-Hill, New York 1973.
2. Considine Douglas M.: Process Instruments and Controls Handbook. Prepared by a staff of specialists, McGraw-Hill, New York 1957.
3. Shinnars S.M.: Modern control system theory and design. John Wiley & Sons, New York 1998.

### Additional

1. Ludwicki M., Sterowanie procesami w przemyśle spożywczym. PTTŻ Oddział Łódzki, Łódź 2002.
2. Astrom K., Murray R.: Feedback Systems. An Introduction for Scientists and Engineers, Princeton University Press, New Jersey 2012.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2
Classes requiring direct contact with the teacher	35	1,5
Student's own work (literature studies, preparation for classes, preparation for exam, project and presentation preparation) <sup>1</sup>	15	0,5

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