



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automatics [S1ZiIP1>AUT]

### Course

Field of study

Management and Production Engineering

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

prof. dr hab. inż. Andrzej Milecki  
andrzej.milecki@put.poznan.pl

### Lecturers

### Prerequisites

Basic knowledge of mathematics including: set theory, algebra of complex number, differential equations, Boolean algebra and of other areas of education in the field of study. Systematized theoretical knowledge in the field of study. Basic command of complex and logical variables and sets, solving simple differential equations, describing basic physical phenomena in mechanics. Ability to use literature (acquire knowledge from the indicated sources) and the Internet. Understanding the need for lifelong learning. Understanding the social effects of engineering activities. Understanding the need for team collaboration.

### Course objective

Acquainting with the basics of automation and industrial automation.

### Course-related learning outcomes

Knowledge:

Knows what automation does, knows the basic concepts and systems of automation. Knows what an open and closed system is and knows what automation tasks are - [K\_W12]

Knows what are binary functions, combinational and sequential circuits - [K\_W12]

Knows what it is, how it works and how to program an industrial PLC controller - [K\_W12]

Knows what basic elements are used in automation: sensors, measuring devices, drives, etc. - [K\_W12]  
Knows the structure of complex automation systems and generally knows what computer production control is - [K\_W12]

Skills:

Is able to implement a given combinational and sequential binary function - [K\_U15]  
Can write and run a simple binary control program for the device - [K\_U15]  
Is able to select the basic elements of automation - [K\_U15]  
can propose the automation structure of the device and the production line - [K\_U15]

Social competences:

Understands the need for lifelong learning - [K\_K01]  
Is aware of the role of automation in the modern economy and its importance for the management and control of production - [K\_K04]  
Can define priorities for the implementation of the task of automation - [K\_K02]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

EXAM: Passed on the basis of an examination consisting of 5 general questions (for a correct answer to each question - 1 point. Grading scale: less than 2.6 points - 2, 2.6 ÷ 3.0 - 3.0, 3.1 ÷ 3.5 points - 3.5, 3.6 ÷ 4.0 points - 4.0, 4.1 ÷ 4.5 points - 4.5, 4.6 ÷ 5.0 points - 5.0 very good)

Laboratory: Credit based on the correct implementation of exercises and reports on each laboratory exercise according to the instructions of the laboratory teacher. Before the exercises, short entrance tests, and after the exercises, a written final test. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

### Programme content

- Signals in automation
- Open and closed loop automation system, regulators
- Basics of Boolean algebra, logical functions, memory
- Implementation of logical functions
- Automation elements and systems: sensors, drives
- Industrial controllers
- Controller networks, automation systems
- Management in automation systems
- Supervision and visualization of automated processes

### Course topics

- Continuous and discrete signals in automation and the basics of their processing
- Diagrams and principles of operation of open and closed loop automation systems,
- Types of regulators, applications
- Basics of Boolean algebra, truth tables of logical functions and their implementation on contact elements and bars
- construction of single-bit memories, application example
- Presence sensors: inductive, capacitive, optical
- Elements for measuring displacement, stress, force
- Industrial PLC controllers: structure and operation
- Basics of PLC, programming, example
- Construction and communication of a controller network,
- Construction of comprehensive automation systems
- Organization of management processes in automation systems
- Supervision and visualization of automated processes

### Teaching methods

Lecture: a lecture supported by a multimedia presentation containing the discussed program content.  
Tutorials: problem solving, discussion.  
Laboratory: practical exercises, teamwork.

## Bibliography

### Basic:

1. Modern Control Engineering (5th Edition) by Katsuhiko Ogata.
2. Introduction to PLCs: A beginner's guide to Programmable Logic Controllers, 2012 by E. Pérez Adrover

### Additional:

Handbook of SCADA/Control Systems Security, Robert Radvanovsky, Jacob Brodsky

## Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00