COURSE DESCRIPTION CARD - SYLLABUS

Course name
Automatics [N1ZiIP1>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
part-time

Requirements
compulsory

Number of hours

Lecture
12

Laboratory classes
8

Other (e.g. online)
0

Tutorials
4

Projects/seminars
0

Number of credit points

4,00

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

Learning the basics of the construction and operation of automation systems Binary control systems and their implementation Learning about the elements and systems of automation and automation systems Learning how to supervise and manage industrial automation systems

Course-related learning outcomes

Knowledge:
The student knows what an automation system is, knows the difference between an open- and closed-loop control, knows the basic concepts of automation and knows the tasks of automation.

The student knows what are Boolean functions, combinational and sequential systems, the phenomenon of hazard in on-off control systems.
The student knows the methods of implementing Boolean functions in the form of contact elements and logic gates as well as on-off control of fluid systems.
The student knows what the transfer function is and knows the unit-step response of basic linear automation systems.
The student knows what the definitions and how to determine the frequency characteristics of automation components. Knows the basic concept and methods of system stability.
The student knows the definitions and how classic controllers are built, knows the problem of stability determination.
The student knows the structure of comprehensive automation systems and knows, in general, what the production control is.

Skills:
The student is able to describe the basic components of linear control systems, including the transfer characteristics and examples.
The student knows how to perform a given combination and sequential binary function using contact, contactless and fluid systems in a hazard-free manner.
The student knows how to determine the frequency characteristics of basic elements and determine the stability of a simple automation system.
The student is able to determine the transfer function of any connected basic elements of control system.
The student can describe the operation of the PID controller and determine the stability of a simple automation system.
The student knows how to define the tasks of a comprehensive automation system and production control.

Social competences:
The student understands the need to track currently available solutions in the field of automation and control systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Tutorials: Completion of exercises, based on preparation for classes and the test. The test, in a written form, with a minimum of three open problems to solve. Positive grade >50% of correct answers.
Laboratory: Completion of the laboratory excercises, based on the preparation for classes and reports on completed classes. Credit based on the correct execution of the exercises and a report on each laboratory exercise according to the instructions of the laboratory teacher. Short entrance tests before exercise. In order to get a credit for the laboratories, all exercises must be passed (positive assessment of the introductory test and reports).
Lecture: Exam in the form of a written test, within the scope of lectures, consisting of a minimum of 10 questions. Multiple choice test with a minimum of 4 possible answers to each question. Positive grade >50% of correct answers.

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. Żelazny M., Podstawy automatyki, PWN, 1976
2. Horla D., Podstawy automatyki - ćwiczenia rachunkowe, WPP, 2008
3. Traczyk W., Układy cyfrowe automatyki, WNT, 1974

Additional:
1. Mikulski A., Elementy przekaźnikowych urządzeń automatyki, WKŁ, 1970
2. Kindler H., Buchta H., Wilfert H., Zadania z techniki regulacji automatycznej, WNT, 1971
3. Urbaniak A., Podstawy automatyki, WPP, 2001
4. Kostro J., Elementy, urządzenia i układy automatyzacji, WSiP, 1993
5. Kosmol J., Automatyzacja obrabiarek i obróbki skrawaniem, WNT, 1995

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,50