Name: Automation and robotics of production processes
Name in Polish: Automatyzacja i robotyzacja procesów produkcyjnych
Name in English: Automation and robotics of production processes

Information on course:

Course offered by department:	Faculty of Organisation and Management
Course for department:	Silesian University of Technology
Study level and form:	~~Master's degree~~/Bechelor's degree, Full-time
Term:	winter semester 2025/2026
Coordinator of course edition:	Magdalena Palacz, Ph.D., D.Sc.

Default type of course examination report:

credit

Language:

English

Course homepage:

[link]

ECTS

3

Short description:

The course contents include:
• The organized knowledge of theoretical and practical aspects in the field of automation and robotization.
• The basic information about fundamental principles of construction and functioning of automation and robotization elements in production processes.
• The basic knowledge of the construction and functioning of simple control systems, regulation, measuring elements.

Description:

Lecture: Overview on manufacturing (definition and examples); manufacturing industries, manufactured products, production quantity and product variety, manufacturing capacity, manufacturing processes, processing operations (shaping processes like solidification, particulate, deformation, material removal, property enhancing, surface processing, assembly operations, production machines and tooling), production systems, manufacturing systems, fundamentals of production lines; Control engineering: parameters of a control loop, construction of controllers, process variables, characteristic values of process in control, types of controllers; robotic systems: definitions, general structure, typical structures of robotic manipulators, classification of robotic manipulators, examples of robotic manipulators; Directives and the standards of on machine and process safety – basic terminology and normative description. Introduction to microcontrollers – basics.

Project: Students learn how to use in practice a numerical tool for modern automation purposes and prepare a project that is a numerical implementation of the chosen detail.

Number of hours of classes with the direct participation of academic teachers or other persons teaching courses and students

Contact hours

Lecture: 15h; Project: 30h

Student's own work
Preparation for the final test: 10h
Preparation for project classes and preparation of project reports: 30h
Preparation of final report: 5h

Total workload: 90
Number of ECTS credits: 3
including
Number of ECTS credits covered by the study program to be earned as part of the courses taught with the direct participation of academic teachers or other persons teaching courses and students: 1,5

Bibliography:

Fundamentals of Modern Manufacturing Materials, Processes, and Systems
The Global Manufacturing Revolution Product-Process-Business Integration and Reconfigurable Systems
Controller design for industrial robots and machine tools – Applications to manufacturing processes
Principles and Practice of Automatic Process Control

Learning outcomes:

KNOWLEDGE: the student knows and understands

K1A_W03 Basic engineering processes and technologies in the life cycle of technical equipment, objects and systems and ways of solving typical engineering tasks, particularly in relation to the organization of production processes and production management. K1A_U07 design - to a given specification - and perform a simple technical system and implement a technological process, using an adequate selection of methods, techniques, tools and materials.

SKILLS: the student is able to

K1A_U1 Identify, formulate, and solve complex and unusual engineering problems related to the field of management and production engineering by applying the principles of engineering, science and mathematics, as well as perform tasks under conditions that are not fully predictable.

K1A_U4 When identifying and formulating specifications for engineering tasks and solving them:

-select and use analytical, simulation and experimental methods, including computer-aided methods,

-recognize their system and non-technical aspects, including ethical aspects

-make preliminary economic assessment of the proposed solutions and engineering actions taken,

-analyse technology transfer and innovation.

K1A_U5 Make a critical analysis of the functioning of existing technical and technological solutions in production systems function, evaluate these solutions and suggest appropriate improvements and innovations in this regard

SOCIAL COMPETENCE: the student is ready for

K1A_K03 Responsible performance of professional roles, compliance with the rules of professional ethics and requiring it from others, care for the achievements and traditions of the profession; is aware of the importance and understands non-technical aspects and effects of engineering activities.

Assessment methods and assessment criteria:

Students take a test on a remote learning platform with supplementary materials that are an extension of the knowledge presented in class - the outcome of the test constitutes a credit for the lecture.

In order to pass the project, students develop a simulation programme in FlexSim and prepare a description of the operation of the developed model including an explanation of the adopted process data.

In addition, students prepare reports on study visits that constitute a presentation of practical applications of the discussed issues.

The final grade is determined as a weighted average of 0.3*lecture+0.6*project+0.1*report.

Practical placement:

Not applicable