SYLLABUS

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:	Bechelor's degree, Full-time
Term:	summer semester 2020/2021
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:

K1A_W06 at an advanced level, selected facts, objects and phenomena and their related methods, theories and conditions explaining the complex interrelationships between them, forming a basic general knowledge of mechanical engineering
K1A_W13 the basic components of automation systems and robotic systems, together with a selection of automation and robotic systems for production processes
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
K1A_U13 in the identification and formulation of specifications for engineering tasks and their solution:
- use analytical, simulation and experimental methods,
- recognise their systemic and non-technical aspects, including ethical aspects,
- make an initial economic assessment of proposed solutions and engineering actions taken
K1A_K02 recognise the importance of knowledge in solving cognitive and practical problems and consult experts when having difficulty solving a problem themselves

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