COURSE DESCRIPTION CARD - SYLLABUS

Course name

Industrial robots

Course

Field of study

Mechatronics

Area of study (specialization)

-

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

-

Projects/seminars

-0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Piotrowo 3, 60-965 Poznan

Responsible for the course/lecturer:

Prerequisites

A student starting this subject should have basic knowledge of the programs and subjects provided for students of Mechatronics at the first degree of studies (in particular: basics of robotics, mechanics, theory of mechanisms, automation, basics of programming, ...). He should also have the ability to obtain information (library, electronic databases of scientific publications and patents, the Internet and others), process and analyze sources of knowledge leading to logical conclusions. Understand the need to learn, acquire new knowledge, organize the information obtained, verbalize own conclusions (self-presentation).

Course objective

Presentation of current trends in the construction, equipment and applications of industrial robots.

Course-related learning outcomes

Knowledge

Student should knows:

- classification and construction of todays industrial robots

- current trends in the construction and applications of industrial robots

- technical characteristics of industrial robots in terms of application requirements

- rules for the selection and technical requirements of industrial robots for production tasks, in compliance with the principles and requirements of the machinery directive and the safety of robotic stations- technical and technological equipment (e.g. cooperating devices) and configuration of robotic cells

- technical and technological equipment of industrial robots (e.g. sensors, vision systems, grippers, technological heads, etc.) and the configuration of robotic stations, e.g. associated devices (feeders, tracks, positioners, etc.)

- construction and configuration of robotic production stations.

Skills

Student should be able to:

- select an industrial robot for the production task / develop multi-variant solutions for a robotic production cell, taking into account the initial and final conditions

- analyze the proposed variants of the robotic production cell and choose the preferred solution

- develop control programs for industrial robots cooperating with external devices (sensors, control-measurement and technological devices, etc.) and take into account the initial and final conditions, and conduct control program tests (online or offline).

Social competences

Students should be able to cooperate in a group, express and justify their opinion, act in accordance with the rules of ethics.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Exam - the knowledge acquired in the lecture is verified by the test (approx. 20 questions). Passing threshold 50%.

Laboratory: to pass on oral or written answers in the scope of each laboratory exercise, report on each laboratory exercise according to the guidelines set out in the guide for exercises and guidance for conducting laboratory exercises. To qualify for laboratories all exercises must be credited (positive feedback and report).

Programme content

Lecture: Development and forecasting on the robotics market; Application areas of robots; Technical and organizational aspects of robotization; Profitability of robotization (components of robotic production costs, the impact of robotization on investment costs, economic efficiency calculation); Modern industrial robots and trends in their development; Technical and technological equipment of robotic cells (grippers, technological heads, cooperating devices); Methodology of selecting an industrial robot, taking into account the conditions of its work at a production stations; Machinery Directive and work safety in robotic positions; Examples of the configuration of robotic stations.

Laboratory: Practical exercises in the field of the principles and methods of programming robots educational and industrial with cooperation with technological equipment. Work with the computer aided engineering system to design, programming and analysis of robotic cells (e.g. RobotStudio, RoboGuide) - practical exercises in developing a robotic cell design for a specific manipulation or technological task.

Teaching methods

Lecture: multimedia presentation illustrated with videos, problematic discussion.

Laboratory: solving practical problems, searching for and using knowledge sources, teamwork, discussion.

Bibliography

Basic

- Szkodny T., Podstawy robotyki, WPŚ, Gliwice, 2011

- Zdanowicz R. Podstawy robotyki, WPŚ, Gliwice, 2011

- Honczarenko J., Roboty przemysłowe. Budowa i Zastosowanie, WNT, Warszawa, 2010

- Zdanowicz R., Robotyzacja dyskretnych procesów produkcyjnych, WPŚ, Gliwice, 2011

- Wrotny T., Robotyka i elastycznie zautomatyzowana produkcja, WNT, Warszawa, 1991

- Appleton, E., Williams D. J., Industrial Robot Applications, Springer, 1987, ISBN 978-94-009-3125-1, DOI: 10.1007/978-94-009-3125-

- Żurek J., Podstawy Robotyzacji - Laboratorium., WPP, Poznań, 2006

Additional

- Wilson M., Implementation of robot systems: an introduction to robotics, automation, and sucesssful systems integration in manufacturing, But-Hein, 2015, ISBN: 9780124047334

- Pires J. N., Robótica Industrial Indústria 4.0, Lidel, 2018, ISBN-13: 978-989752226

- Dinwiddie K., Industrial Robotics, Cengage Learning, 2018, ISBN-13: 978-1133610991

- Ross L. T., Fardo S. W., Walach M. F.,Industrial Robotics Fundamentals: Theory and Applications, Goodheart-Wilcox Publisher, 2017, ISBN-13: 978-1631269417

- Ross L. T., Fardo S. W., Masterson J., Towers R. L., Robotics: Theory and Industrial Applications, Goodheart-Willcox, 2014, ISBN-13: 978-1605253213

- Olszewski M., Barczyk J., i inni, Manipulatory i roboty przemysłowe, WNT, 1992

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- Gołda G., Kost G. (red.), Swider J. (red.), Zdanowicz R., Programowanie robotów online, WPŚ, Gliwice, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	32	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	18	1,0

[1] delete or add other activities as appropriate