COURSE DESCRIPTION CARD - SYLLABUS

Course name

Programming robots

Course

Field of study

Education in Technology and Informatics

Year/Semester

3/6

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Instytut Technologii Mechanicznej

Wydział Inżynierii Mechancznej

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of mathematics, physics (mechanics) and programming principles (core curriculum for secondary schools, basic level). The ability to solve elementary problems in the field of building control algorithms (programming principles) based on the possessed knowledge, the ability to obtain information from indicated sources. Understanding the need to expand your competences, readiness to cooperate within the team.

Course objective

1. Providing students with theoretical and practical issues related to the construction, programming and application of robots in the scope specified by the program content appropriate for the field of study.

2. Developing students' ability to solve simple problems and perform simple experiments as well as to analyze the results based on the acquired knowledge.

3. Shaping students' teamwork skills.

Course-related learning outcomes

Knowledge

1. The student is able to identify, describe and explain the principle of operation of the basic elements of the construction of an industrial robot along with the meaning and role of basic programming (control) instructions [K1_W01, K1_W02, K1_W16].

2. The student is able to select appropriate programming instructions for a specific task in the field of programming industrial robots [K1_W15, K1_W16].

3. The student is able to identify and describe the issues (problems) of the operation and diagnostics of industrial robots, including their life cycle [K1_W16].

Skills

1. The student is able to identify a technical problem, determine its complexity level, and then propose a solution, taking into account the final goal (effect) [K1_U10, K1_U11, K1_U16, K1_U17].

2. The student is able to develop control programs for industrial robots cooperating with external devices (sensors, control-measuring and technological devices, etc.) and to test the control program taking into account the initial and final conditions [K1_U07, K1_U08, K1_U09].

Social competences

1. The student is able to actively engage in solving given problems, independently develop and expand his competences and cooperate in a team [K1_K01, K1_K03].

2. The student is able to properly determine the priorities for the implementation of the tasks specified by himself or others [K1_K04].

3. The student is able to act in an entrepreneurial and creative (innovative) way [K1_K06].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Final test (20-question test at the end of the semester)

51-60% dst; 61-70% dst +; 71-80% db; 81-90% db +; 91-100% very good

Laboratory

Passing on the basis of an oral or written answer concerning the content of each performed laboratory exercise, a report on each laboratory exercise according to the guidelines set out in the guide to exercises and indications of the laboratory teacher. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

Lecture

Basic concepts: definition, classification and application of robots, construction of robots and manipulators, kinematic chains (open, closed, flat and spatial, series and parallel, designation, kinematic pairs, number of degrees of freedom and mobility); coordinate systems; Kinematics of an industrial robot - simple and reverse transformation; PTP, MP and CP control, Fundamentals of industrial robot programming; Biomechanics of human movement, Health and safety conditions when working with manipulators and robots.

Laboratory

Practical exercises in the field of principles and methods of programming educational and industrial robots.

Teaching methods

Lecture: multimedia presentation, presentation illustrated with examples given on the board

Exercises: problem solving, practical exercises, discussion, team work.

Bibliography

Basic

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

2. Morecki A., Knapczyk J., Podstawy robotyki. Teoria i elementy manipulatorów i robotów. WNT, Warszawa

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

4. Podręczniki programowania robotów, IRp-6, Fanuc, Panasonic

Additional

1. Szkodny T., Podstawy robotyki. Wydawnictwo Politechniki Śląskiej, Gliwice, 2012

2. Morecki A., Knapczyk J., Kędzior K., Teoria mechanizmów i manipulatorów. Podstawy i przykłady zastosowań w praktyce, WNT, Warszawa, 2004

3. Zielińska T., Maszyny Kroczące. Podstawy, projektowanie, sterowanie i wzorce biologiczne, PWN, Warszawa, 2003

4. Kurfess R.T., Robotics and Automation Handbook, CRC Press 2005

5. http://ocw.mit.edu/courses/mechanical-engineering/2-12-introduction-to-robotics-fall-2005/lecture-notes/

Breakdown of average student's workload

	Hours	ECTS
Total workload	82	3,0
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]	45	2,0

[1] delete or add other activities as appropriate