



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Robotics in technology

### Course

Field of study

Year/Semester

Construction and Exploation of Means of Transport

1/1

Area of study (specialization)

Profile of study

Machines

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

part-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

18

0

0

Tutorials

Projects/seminars

9

0

**Number of credit points**

3

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr inż. Bartosz Minorowicz

email:

tel.

Faculty of Civil and Transport Engineering

ul. Piotrowo 3, 60-965 Poznań

### Prerequisites

The student has basic knowledge of the theory of mechanisms, automatics, electrical engineering and electronics. Can write a simple computer program in a higher level language.

### Course objective

To acquaint students with the general essence of robotics, principles of operation and the possibilities of using robotics in technology. Presentation of the range of applications of robots in present and future technology, especially in the field of working machines.

### Course-related learning outcomes

Knowledge

The student has an elementary knowledge of the construction and kinematic structures of industrial



robots and manipulators. Has basic knowledge of programming techniques for industrial robots and CNC machines. Has a basic knowledge of the directions of development of robotization in agriculture and construction.

#### Skills

Can create a simple control program for the CNC machine and the # U / industrial manipulator.

#### Social competences

Understands the directions and importance of changes in social life caused by the progress of robotization

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assessment of the task solved during the exercises. Final exam consisting of 20 test questions, a computational task and a programming task.

#### Programme content

1. Definition of a robot and systematics of robots and autonomous handling machines
2. Applications of robots in technology
3. Prospects for robotization of works in agriculture and construction
4. Kinematic structures of robots and CNC machine tools. Simple and vice versa
5. Mechanical drive systems in robotics
6. Electric drive in robots and CNC machines
7. Pneumatic drives
8. Electric drive control problems
9. Measurements of position, velocity and forces in robotics.
10. Control systems of robots and CNC machines. Microcomputers and microcontrollers
11. Robot programming techniques
12. Communication in robot control systems: RS, USB, WiFi, CAN, ISO standards
13. Image analysis in robot control
14. Navigation systems for mobile robots
15. Directions of development of robotics. Examples of applications and development works in construction and agriculture. Contour Crafting

#### Teaching methods



Problem lecture with a multimedia presentation. Exercises - problems to be solved on the computer.

## Bibliography

### Basic

1. M. W. Szelecki: Robotyka przemysłowa. KaBe. Krosno 2019.
2. W. Tarnowski, T. Kiczowski, W. Kęska, Z. Ociepa: Napędy w układach mechatronicznych. WPK Koszalin 2015.
3. B. Heinmann, W. Gerth, K. Popp: Mechatronika. Komponenty, metody, przykłady PWN Warszawa 2001.

### Additional

1. M. Evans, J. Noble, J. Hochenbaum: Arduino w akcji. Helkion 2014.
2. K. Kozłowski, P. Dotkiewicz, W. Wróblewski: Planowanie zadań i programowanie robotów. WPP, Poznań 1999.
3. G. Nykiel Programowanie obrabiarek cnc. <http://www.darmowe-ebooki.com/programowanie-cnc/programowanie-obrabiarek-cnc.pdf>.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	27	1,0
Student's own work (literature studies, preparation for tutorials, preparation for exam) <sup>1</sup>	43	2,0

<sup>1</sup> delete or add other activities as appropriate