COURSE DESCRIPTION CARD - SYLLABUS

Course name
Robotics in technology [S2MiBP1-MR>RwT]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/1

Area of study (specialization)
Heavy-duty Machines

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Bartosz Minorowicz
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Lecturers

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 studHas extended knowledge in the field of computer science, concerning computer programming and engineering calculation programs in the field of computer simulation of physical systems.
Has extensive knowledge of modern machine manufacturing technologies in the field of designing the production process of machine parts and their assembly using computer CAM tools
He knows the main development trends in the field of mechanical engineering.

Skills:
Can program the technological process of manufacturing machine parts, including the development of a simple program to control the machine tool.
He can advise on the selection of machines for the technological line as part of the specialization.
Can perform a medium complex design of a working machine or its assembly using modern CAD tools, including tools for spatial modeling of machines and calculations using the finite element method.

Social competences:
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.
It is ready to initiate actions for the public interest.
Is willing to think and act in an entrepreneurial manner.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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

Course topics

none

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. Kiczkowiak, 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	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00