COURSE DESCRIPTION CARD - SYLLABUS

Course name
Automation and Robotics [N1MiBP1>AiR]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
0

Other (e.g. online)
0

Tutorials
9

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr hab. inż. Wojciech Sawczuk prof. PP
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Lecturers

Prerequisites

KNOWLEDGE: the student has a basic knowledge of automation in means of transport. SKILLS: the student is able to use the acquired knowledge in learning and solving autoamatic problems. SOCIAL COMPETENCES: The student is able to define important priorities in solving the tasks set before him, is able to effectively cooperate in a group taking different roles in it Objective of the course Understanding the role of automation in transport, getting to know the construction and purpose of automatic devices, interpretation of the characteristics of automation components.

Course objective

Understanding the role of automation in transport and mechanics, and improving efficiency and effectiveness in traffic management and vehicle monitoring.

Course-related learning outcomes

Knowledge:
Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probability, analytical geometry necessary to: describe the operation of discrete mechanical systems, understand computer graphics methods, describe the operation of electrical and mechatronic systems.

Has knowledge in the field of physics, including the basics of classical mechanics, optics, electricity and magnetism, solid state physics, quantum and nuclear physics, necessary to understand specialist lectures in the field of the theory of construction materials and materials science, theory of machines and mechanisms, theory of electric drives and mechatronic systems .
Has basic knowledge of the basics of machine design and the theory of machines and mechanisms, including mechanical vibrations.

Skills:
Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.
Can properly use modern equipment for measuring major physical quantities, used in machine research and production control.
Can use learned mathematical theories to create and analyze simple mathematical models of machines and their elements, and simple technical systems.

Social competences:
Is ready to critically assess his knowledge and received content
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.
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:
For discussion, ongoing preparation and activity in class. Written credit for lectures and classes.

Programme content

Definition of control, control device and automatic control, definition of the set point, current value and control input, definition of the controller, control variable and control variable, diagram and description of the open and closed control system, control system in steady and transient states and what conclusions result from it, types and characteristics of input signals and their equations, operator and spectral transfer function, formulas and an example, the essence of the Laplace transform, an example of any two transformations, types of terms in an automatic control system with a diagram, Connecting terms (series, parallel, with feedback)) formulas and examples, connecting terms (serial, parallel, with feedback) formulas and examples, types of linear elements, f (t) functions, transfer functions, characteristics, and examples, Nyquist and Bode frequency characteristics, examples on any terms, testing properties static and dynamic (static and dynamic characteristics), time constant versus period, methods of determining on the example of any element, tasks of regulators in the automatic control system, division of regulators with description and examples, characteristics of P, I, PI, PD and PID regulators, error and insensitivity zone of selected controllers, integration time and differentiation time on the example of selected controllers, time waveforms at the output for ideal and real controllers.

Teaching methods

1. Lecture with multimedia presentation. 2. Exercises - solving problems.

Bibliography

Basic
1. Żelazny M., Podstawy automatyki, Materiały pomocnicze do wykładu,
2. Rumatowski K., Podstawy automatyki cz.1, Wydawnictwo Politechniki Poznańskiej 2004,
3. Rumatowski K., Podstawy automatyki cz.2, Wydawnictwo Politechniki Poznańskiej 2004.
Additional
1. Urbaniak A., Podstawy automatyki, Wydawnictwo Politechniki Poznańskiej 2001,
2. Horla D., Podstawy automatyki, Wydawnictwo Politechniki Poznańskiej 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	27	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	48	1,50