



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automation and Robotics

### Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/5

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

Ph.D., D.Sc. Wojciech Sawczuk

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tel. +48 61 224 4510

Faculty of Civil and Transport Engineering

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Responsible for the course/lecturer:

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### 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 automatic 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 of the theory of control, including differential equations, necessary to: describe the operation of mechatronic systems in transport. Has ordered, theoretically founded general knowledge in the field of automation in technology and in means of transport. He has knowledge of regulators used in both industrial and on-board automation on automotive and rail vehicles.

### Skills

Is able to formulate and solve tasks in the field of automation in transport, apply appropriately selected methods, including analytical, simulation or experimental methods.

### Social competences

Understands the need for lifelong learning; can inspire and convey knowledge, organize the learning process of other people. Correctly identifies and resolves dilemmas related to the profession of automation.

## Methods for verifying learning outcomes and assessment criteria

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	90	3,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	45	1,5

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