COURSE DESCRIPTION CARD - SYLLABUS

Course name

Interrim project

Course

Field of study

Mechatronics

Area of study (specialization)

Mechatronic design of machines and vehicles

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

elective

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

45

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Prof. Krzysztof Talaśka

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Tel. 61 224-4512, 61 665 2244

Faculty of Mechanical Engineering

Piotrowo Street 3, 61-138 Poznań

Responsible for the course/lecturer:

PhD Eng. Dominik Wojtkowiak

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tel. 61 224 4516

Faculty of Mechanical Engineering

Piotrowo Street 3, 61-138 Poznań

Prerequisites

Knowledge: Knowledge of the basics of the construction of machines and drive systems, the basics of electrical engineering, the basics of computer science, elements of the mechatronic system.

Skills: The ability to independently formulate a technical problem, develop a construction record in accordance with the rules of a technical drawing, calculate the strength of machine elements and shape the design features of machine components.

Social competences: Understanding the necessity to expand one's competences, readiness to cooperate within the team.

Course objective

The aim of the course is to learn the structure and elements of the mechatronic system, to become familiar with the methodology of the model-oriented mechatronic design of specialized machines focused on the implementation of a specific function of the machine and to acquire the skills of an interdisciplinary approach to issues related to machine design.

Course-related learning outcomes

Knowledge

Has an extended knowledge of mechatronics, knowledge of the analysis and design of complex mechatronic systems, systems theory and technology, and the application of modeling and simulation in mechatronic design. [K2_W09]

Has knowledge of computer structure analysis including advanced operations in the CAD environment, regarding 3D visualization and analysis of the cooperation of mechanical elements. [K2_W15]

Has knowledge of development trends and the most important new achievements in mechatronics. [K2_W16]

Skills

Can design complex mechatronic devices and systems, using modeling and simulations. He can plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions. [K2_U14]

He can use computer systems to design and operate mechatronic devices. Can implement control systems in the real-time operating system. He can use the basic methods of image processing and analysis. He can prepare software documentation. [K2_U15]

He can visualize a mechanical element in a 3D environment and analyze the cooperation of elements shown in the drawing. [K2_U19]

Social competences

Understands the need for lifelong learning; can inspire and organize the learning process of other people. [K2_K01]

Can interact and work in a group, assuming different roles in it. [K2_K03]

Can set priorities for the implementation of a task set by oneself or others. [K2_K04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Project: Preparation of a project of a specialized machine in accordance with the design data received by the teacher during the first class. The project is made individually. Ongoing verification of the progress of design works by means of periodic presentations.

Assessment criteria: project submitted to the lecturer in paper form. The final grade is the result of the evaluation of the presentation of the current progress of project works (25% of the evaluation) and the substantive evaluation of the completed project (75% of the evaluation).

Programme content

Projects:

Project 1 - Handing out and discussion of the topics of specialized machinery projects.

Handing out and discussing the topics of specialized machinery projects. Presentation of sample projects.

Project 2-3 - Presentation of the concept of solutions

A short presentation of the 3 concepts developed for the construction of an automated mechatronic device by each person (max. 5 minutes per person) with a discussion.

Project 4-6 - Overview of the state of the art in the field of machine parts

The latest trends in machine building. Overview of available machine parts from selected manufacturers. Selection of machine components from catalogs and standards. Selection of actuators.

Project 7-9 - Presentation of the mechanical structure of a specialized machine

A short presentation of the developed structures of specialized machines designed by each group (max. 10 minutes per person) with a discussion. Functional analysis of mechanical structure.

Project 10-12 - Overview of the state of the art in the field of control system elements

The latest trends in machine control. Overview of available control system components from selected manufacturers. Selection of control system elements from catalogs and standards. Selection of sensors.

Project 13-15 - Presentation of specialized machine control systems

A short presentation of the developed control systems of specialized machines designed by each person (max. 10 minutes per person) with a discussion.

Project 16 - Integration of the mechanical system with the control system

Integration of the designed basic system (mechanical system) with the designed control system. Functional analysis of the mechatronic device.

Project 17 - Development of documentation for a mechatronic device.

Project 18-19 - Consultation classes

Project 20-23 - Presentation of final projects

Presentation of projects (max 15 minutes per person) and submission of project documentation to the teacher in paper form.

Teaching methods

Project: Workshop methods of practical construction classes. Design methods.

Bibliography

Basic

1. Heimann B., Gerth W., Popp K.: Mechatronika. Komponenty. Metody. Przykłady, PWN, Warszawa 2001,

2. Gawrysiak M.: Mechatronika i projektowanie mechatroniczne, Wyd. Politechniki Białostockiej, Białystok 1997.

3. Olszewski M.: Podstawy mechatroniki, wyd. REA, Warszawa 2006.

4. Kosmol J.: Napędy mechatroniczne, wyd. Politechniki Śląskiej, Gliwice 2013.

Additional

1. Uhl T. Projektowanie mechatroniczne zagadnienia wybrane, Kraków 2007

2. Gawrysiak M.: Analiza systemowa urządzenia mechatronicznego, Wyd. Politechniki Białostockiej, Białystok 2003.

3. Wojtkowiak D., Talaśka K., Wilczyński D. i inni: Determining the Power Consumption of the Automatic Device for Belt Perforation Based on the Dynamic Model, Energies 14:1, 317, 1-15, 2021.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for project classes, project preparation) [1]	55	2,0

[1] delete or add other activities as appropriate