



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automation of the machine design process [N1Mech2>APPM]

Course

Field of study
Mechatronics

Year/Semester
4/7

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
8

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
16

Number of credit points

4,00

Coordinators

Lecturers

Prerequisites

Knowledge: Knowledge of the basics of machine construction and drive systems, basics of electrical engineering, basics of computer science, elements of the mechatronic system. Skills: Ability to independently formulate a technical problem, develop a construction record in accordance with the principles of technical drawing, calculate the strength of machine elements and shape the design features of machine components. Social competences: Understanding the need to expand one's competences, readiness to cooperate within a team.

Course objective

The aim of the course is to become acquainted with the methodology of model-oriented mechatronic design of special purpose machines focused on the implementation of a specific machine function and the methodology of modular design focused on simplifying the structure, standardization of components and faster assembly of a complete machine, as well as acquiring the skills of an interdisciplinary approach to issues related to machine design.

Course-related learning outcomes

Knowledge:

Knows basic assumptions and methods used in the methodology of designing modular machines and special purpose machines.

Skills:

Is able to use methods of automating the design process of machines.

Is able to parameterize the structure and create a 3D model of machine parts using parametric modeling.

Is able to determine maps or design curves used to automate the design process.

Social competences:

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

Able to cooperate and work in a group, taking on various roles.

Is able to set priorities for the implementation of tasks specified by himself or others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written assessment during the last lecture, containing 2 theoretical questions and 2 practical tasks. Duration: 90 minutes.

Assessment criteria: 2 points for each theoretical question, 3 points for each task, points are awarded with an accuracy of 0.5 points, a total of 10 points can be obtained.

Grading scale: below 50% - 2.0, from 50% - 3.0, from 60% - 3.5, from 70% - 4.0, from 80% - 4.5, from 90% - 5.0.

Project: Designing a working, positioning or transporting machine module using methods of automating the design process and in accordance with the guidelines and design data received by the teacher during the first class. The project is carried out individually. Ongoing verification of the progress of design work.

Assessment criteria: the project is presented to the teacher during the last class (max. 5 minutes per group) and submitted to the teacher in paper form. The final grade is the result of the grade from the project presentation (25% of the grade) and the substantive grade from the completed project (75% of the grade).

Programme content

Basic and advanced methods used to automate the design process of modular and special purpose machines, parameterization and typification in machine construction, parametric modeling, determining design maps and curves.

Course topics

Lectures:

Lecture 1 (2) - Introduction to programming using the iLogic module

Lecture 2 (2) - Design automation in modular design

Lecture 3 (2) - Parameterization and typification of machine structures

Lecture 4 (2) - Determining design maps and curves in machine construction

Lecture 5 (2) - Design automation in the design of special purpose machines

Lecture 6 (2) - Practical examples of the use of automation in the machine design process

Lecture 7 (1) - Practical examples of the use of automation in the machine design process - part 2

Lecture 8 (2) - Assessment

Projects:

Project 1 (2) - Discussion and distribution of project topics.

Project 2 (2) - Structure parameterization and parametric modeling in Autodesk Inventor

Project 3-4 (4) - Application of the iLogic module in the design of machine parts

Project 5-6 (4) - Product configuration - creating configuration forms

Project 7-8 (4) - Generating databases in an MS Excel spreadsheet and their integration with Autodesk Inventor to automate the generation of 3D models of designed machine parts.

Project 9-10 (4) - Control of project compliance in terms of part geometry, manufacturing technology or compliance with standards

Project 11-12 (4) - Automation of assembling machine parts into subassemblies

Project 13-14 (4) - Automation of generating manufacturing and assembly drawings.

Project 15 (2) - Assessment

Teaching methods

Lecture: Lecture with multimedia presentation, using the case study method - analysis of solutions to real construction problems.

Project: Workshop methods of practical construction classes at computer workstations. Project methods.

Bibliography

Basic:

1. Jaskulski A., Autodesk Inventor Professional 2024 PL / 2024+ / Fusion 360. Metodyka efektywnego projektowania, wyd. Helion, Gliwice 2023.
2. Heimann B., Gerth W., Popp K.: Mechatronika. Komponenty. Metody. Przykłady, PWN, Warszawa 2001.
3. Ito Y.: Modular Design for Machine Tools, McGraw-Hill Professional 2008.
4. Wcisło G.: Jak budować maszyny modułowe? dostępne w: <https://automatykab2b.pl/technika/37587-jak-budowac-maszyny-modulowe>

Additional:

1. Autodesk, PRAKTYCZNE ZASTOSOWANIA AUTOMATYZACJI PROJEKTOWANIA, dostępne w: <https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/Practical-Applications-Design-Automation-eBook-pl.pdf.pdf>
2. Domański J.: SolidWorks 2022. Projektowanie maszyn i konstrukcji, wyd. Helion, Gliwice 2022.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	24	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	76	3,00