COURSE DESCRIPTION CARD - SYLLABUS

Course name
CAD/CAM [S1MiTPM1>CAD/CAM]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Paweł Zawadzki
pawel.zawadzki@put.poznan.pl

Lecturers

Prerequisites

Students are expected to have general IT skills, including the ability to use a computer and software, as well as basic technical knowledge, particularly regarding the principles of technical drawing and material selection for construction. Logical thinking and problem-solving abilities, as well as basic proficiency in any computer-aided design (CAD) system, are required. Students should also be able to utilize information from libraries and the internet and be aware of the necessity for continuous learning and acquiring new technical knowledge.

Course objective

The aim of the course is to familiarize students with the applications of CAx computer engineering systems, covering the entire process from geometric representation in CAD systems, through the preparation of the technological process in CAPP systems, to CNC programming in CAD/CAM environments. The course aims to equip students with skills in designing, planning technology, and programming CNC machines using modern engineering tools.

Course-related learning outcomes

Knowledge:

1. Has basic knowledge of informatics, allowing them to describe computer systems and apply graphic software and engineering support systems in the automotive industry.
2. Possesses knowledge in engineering design, particularly in technological and material design within the automotive context, and understands the principles of operation of technical devices used in the industry.
3. Understands the basics of technical mechanics and material strength, essential for designing vehicle components and mechanical parts.

Skills:
1. Can use computer support for solving technical tasks, including designing and simulating material processing.
2. Is capable of analyzing and solving technical problems related to production processes in the automotive industry using CAD/CAM tools.
3. Is able to identify engineering problems and select appropriate methods for computer design and mechanical processing using CAD/CAM.

Social competences:
1. Understands the need for continuous self-education, especially regarding modern technologies used in the automotive industry.
2. Can work in a team, taking on different roles, and collaborate in the execution of engineering projects.
3. Can set priorities in the execution of project tasks related to production and engineering design processes.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge
Lecture: Knowledge is verified through one test/colloquium at the end of the lecture, covering the material discussed. The test assesses knowledge of the basics of CAD and CAM systems and their applications in the automotive industry.
Skills
Exercises: Practical skills are assessed through the evaluation of tasks completed during laboratory exercises. Partial grades for each task (e.g., creating 3D models, CNC programming, solving technical problems) contribute to the final exercise grade. Each task verifies a specific part of practical knowledge.
Social Competences
Verified based on active participation in teamwork during projects and involvement in solving tasks during classes.
Final Grade
The final grade consists of the result from the test/colloquium for the lecture and the sum of partial grades from tasks performed during laboratory exercises, as well as activity evaluation. The passing threshold is 50%.

Programme content

1. Creating 3D models based on technical documentation: designing mechanical components in a CAD environment, including solid and surface modeling based on the provided documentation.
2. Selection of manufacturing methods for prepared components: analyzing production capabilities and choosing appropriate manufacturing methods for designed components according to technological and material requirements.
3. Developing machining processes using programming tools: programming machining operations in CAM systems, considering technological parameters and process optimization.
4. Tool and machining technology selection: selecting appropriate tools for machining and determining the technology and machining parameters to achieve optimal production results.

Course topics

1. Introduction to CAD/CAM and its role in the automotive industry.
2. Basics of component design in CAD systems.
3. Creating complex 3D models and preparing technical documentation.

4. Analysis and optimization of CAD designs.
5. Introduction to CAM - generating CNC programs.
6. Simulations and CNC machining tests.
7. Integration of CAD/CAM systems and production automation.

Teaching methods

Lecture: Theoretical issues related to CAD and CAM systems, including their role in the automotive industry, are discussed during lectures. Lectures also cover the presentation of basic methods of engineering design, material processing technologies, and CNC programming. The instructor presents selected examples of CAD/CAM tool applications in the industry and discusses current trends and developments in these technologies. Lecture materials are available in the form of presentations and notes.
Exercises: Practical exercises focus on acquiring skills in designing and programming in CAD and CAM environments. Students complete tasks according to the provided instructions, creating 3D models based on technical documentation. They then develop machining processes in CAM software according to the instructor's guidelines. The classes also involve solving practical engineering problems that require the use of CAD/CAM tools, including simulations and process optimization.

Bibliography

Basic:
1. Zawora, J., Woźnicka, D., & Walicka, B. (2021). Podstawy technologii maszyn: Podręcznik. WSiP.
2. Rutkowski, A. (2011). Części maszyn. Polska: Wydawnictwa Szkolne i Pedagogiczne.
3. Sharma, V., Sharma, V., & Shukla, O. J. (2024). Principles and practices of CAD. C&H/CRC Press.

Additional:
1. Polish standards for technical drawing.
2. Training materials provided by the authors of CAD/CAM software.

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