# COURSE DESCRIPTION CARD - SYLLABUS

Course name
The practice of design in CAD / CAE systems [N2ZiIP2>PPSCC]

## Course

Field of study
Management and Production Engineering

Year/Semester
2/3

Area of study (specialization)
Quality Engineering and Management

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

## Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
8

Projects/seminars
8

## Number of credit points

2,00

## Coordinators

## Lecturers

## Prerequisites

The student has basic knowledge of the physics of phenomena and materials science (including heat transfer, flows, stresses, materials science, crystallization, phase transformations), CAD geometry systems and the basics of manufacturing engineering. Obtaining information from Polish and foreign- language literature and the Internet, can use the acquired knowledge to choose a technology selection strategy. In addition, understanding the need to learn, acquire new knowledge and cooperate in a team.

## Course objective

Mastering the basics of applying the theory of energy and mass flow in modeling and simulation of processes on the example of casting technology and metal forming technology.

## Course-related learning outcomes

Knowledge:
1. Has extended knowledge of the area of enterprise forecasting and process simulation
2. Knows the basic methods and techniques used to solve complex engineering tasks related to process improvement
3. Has theoretically based, detailed knowledge related to production preparation processes (constructional and technological preparation)

Skills:
1. Is able to make a preliminary economic analysis of production technology and present the results of the analysis
2. Is able to make a detailed assessment of the technological performance of a structure and indicate possibilities for its improvement. He is able to communicate with technologists and designers in this respect
3. Is able to use computer programs to support various areas of activity related to solving engineering problems

Social competences:
1. Is able to independently develop knowledge in the subject
2. Is able to work in a project team using computer systems supporting engineering work
3. Is open to the implementation of information technologies in engineering activities

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
Written assessment carried out at the end of the semester (pass if at least 50.1% of correct answers are obtained). Assignment of grades to percentage ranges of results: <90–100> very good; <80–90) good plus; <70–80) good; <60–70) satisfactory plus; <50–60) satisfactory; <0–50) unsatisfactory.
Laboratories:
Passing the laboratories - Final grade on a grade scale from 2 to 5 - average of the grades from the laboratories (all must be graded positively, above grade 2)

## Programme content

CAD-CAE systems and application principles.
Modeling as applied to computer simulation.
Conditions of uniqueness in terms of necessary model simplifications.
Simulation of the casting process in disposable molds.
Simulation of the die casting process.
Simulation of the die-casting process.
Forecasting product quality using examples of cast products.
Lab
Examples of virtual product designs (concept, geometry, geometry transfer in specific formats). CAE modules for casting technology (MagmaSoft, NovaFlow&Solid). Independent preparation and implementation of simulations of the gravity casting process. Identification of phenomena based on simulation results. Forecasting product quality using examples of cast products. Validation of CAE systems.

## Course topics

Practical skills in modeling and simulation of casting and metal forming processes.

## Teaching methods

LLecture: multimedia presentation, illustrated with examples on the blackboard.
Laboratory: practical exercises.

## Bibliography

Basic:
1. Jaskulski A., Autodesk Inventor 2020 PL, Podstawy metodyki projektowania, Wydawnictwo Naukowe PWN, Warszawa 2019
2. Poradnik Odlewnika Tom II. Komputerowe wspomaganie produkcji odlewów, Kraków 2023
3. Z. Ignaszak, Podstawy modelowania CAD/CAE. Wybrane zagadnienia, e-skrypt, Poznań, 2008
4. Magmasoft academy, Kom-Odlew, Kraków 2022
5. Nova Flow&Solid CV manual, 2021

Additional:

K1. W. Przybylski, M. Deja Komputerowe wspomagane wytwarzanie maszyn. Podstawy i zastosowanie, WNT, 2007.
2. Z. Ignaszak Virtual prototyping w odlewnictwie, Bazy danych i walidacja. WPP Poznań 2002
3. E. Chlebus Techniki komputerowe CAx w inżynierii produkcji, WNT, 2000
4. B. Mochnacki, J. Suchy Modelowanie i symulacja krzepnięcia odlewów, , PWN, 1993

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 50 | 2,00 |
| Classes requiring direct contact with the teacher | 16 | 0,50 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 34 | 1,50 |