COURSE DESCRIPTION CARD - SYLLABUS

Course name

CAE systems for manufacturing processes

Course

Field of study

Management and Production Engineering

Year/Semester

4 / 7

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

10

Laboratory classes

8

Other (e.g. online)

-

Tutorials

-

Projects/seminars

-0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge of physics and materials science (including heat transfer, flows, stresses, materials science, crystallization, phase transformations), CAD geometry systems and the basics of manufacturing engineering. Has also skills in Acquiring information from literature survey and internet, is able to use the acquired knowledge to choose a technology selection strategy and understand the necessity to learn, taking new knowledge and collaboration in a workgroup.

Course objective

Student should obtain knowledge about the principles of designing manufacturing processes using CAE systems.

Course-related learning outcomes

Knowledge

1. Student knows engineering databases and computer aided design (CAD) programs.

2. Has a general knowledge of manufacturing technologies used mainly in machinery industry plants. It concerns the processes of metallurgy and foundry, plastic working, processing of plastics, heat and thermo-chemical treatment, welding, machining, abrasive and erosive treatment.

3.Has detailed knowledge of basic and auxiliary processes in machine building. Has the knowledge to design the flow of production (forms of production flow). Has the knowledge necessary to organize the work of the production system. He knows computer-aided process design systems.

Skills

1. Can interpret technical drawing. Can use CAD computer programs to make a drawing of a part and an assembly drawing.

2. Is able to characterize the manufacturing technology.

Social competences

1. Is able to define priorities related to activities in the field of production preparation. Understands technical and non-technical conditions of the technology used.

2. Understands technical and non-technical aspects related to the development of the structure in terms of the impact of the device on the society and the environment. He is responsible for the decisions made in the construction process.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written test carried out on the end of the term (in case of a credit min. 50.1% correct). Up to 50.0% - 2.0, from 50.1% to 60.0% -3.0, from 60.1% to 70.0% - 3.5, from 70.1 to 80 - 4.0, from 80.1% to 90.0% - 4.5, from 90.1% - 5.0

Laboratory classes:

Completion of laboratories - Final grade on a scale of marks from 2 to 5 - average of three marks from laboratories (all must be positively assessed, above the mark 2)

Programme content

Lecture

Principles of formulating mathematical and physical models. Identification of models in the technological process. The certain conditions in terms of the necessary model simplifications. Analytical and numerical solutions. Macro and micro modeling of phenomena. Theoretical basis of flows. The basics of heat flow. Direct and inverse modelling. Material and physical coefficients determined from inverse problems. Modeling of coupled phenomena. Modeling in application to computer simulation.

Examples of applications in material processing technologies (foundry, metal forming, plastics processing).

Laboratory classes

CAD-CAE systems and application rules. Examples of virtual product designs (concept, geometry, geometry transfer in specific formats). CAE modules for individual NovaFlow & Solid, ProCast, Calcosoft, PamStamp, MoldFlow technologies). Independent preparation and implementation of the casting process simulation. Identification of phenomena on the basis of simulation results. Forecasting the quality of products on the basis of examples of cast products.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

Laboratory classes: practical exercises.

Bibliography

Basic

1. Z. Ignaszak Virtual prototyping w odlewnictwie, Bazy danych i walidacja. WPP Poznań

2. E. Chlebus Techniki komputerowe CAx w inżynierii produkcji, WNT, 2000

3. M. Perzyk i inni, Odlewnictwo. WNT, Warszawa 2004.

Additional

1. W. Przybylski, M. Deja Komputerowe wspomagane wytwarzanie maszyn. Podstawy i zastosowanie, , WNT, 2007.

2. J. Braszczyński, Teoria procesów odlewniczych, PWN, Warszawa, 1989

3. B. Mochnacki, J. Suchy Modelowanie i symulacja krzepnięcia odlewów, , PWN, 1993.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	35	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	40	1,0

[1] delete or add other activities as appropriate