COURSE DESCRIPTION CARD - SYLLABUS

Course name
Basics of CAx modeling [S2EPiO1>PM]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
1/2

Area of study (specialization)
Thermal and Renewable Energy

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Jędrzej Mosiężny

Lecturers

Prerequisites

The student knows the basics of engineering technical drawing, materials sciences and fluid dynamics. Student is capable of readin and understanding the engineering drawing up to component level. Student is apable of performing basic calculations on material science and fluid dynamics. Student is capable of self learning.

Course objective

The goal of the coure is to acquaint the students with necessary skills of working with CAx systems to create engineering documentation and performing engineering tasks in Industrial and Renewable energy industry.

Course-related learning outcomes

Knowledge:
has extended knowledge on computational fluid dynamics, cad. has extended knowledge on designing, manufacturing, exploitation, safety systems, imact on the economy, society and environment in areas of industrial and renewable energy
knows and understands the fundamental aspects related to cad and cfd
has knowledge of tinetelectual property management related wth creating the technical documentation

Skills:
is able to design - in accordance with the given specification - and make simple devices, objects, systems or implement processes for industrial and renewable energy, using appropriately selected research methods, measuring techniques, tools and materials.
is able to solve research and engineering tasks requiring the use of engineering standards and norms and the use of measurement technologies appropriate for industrial and renewable energy, using experience gained in an environment professionally engaged in engineering activities.
is able to use the experience gained in the construction of control and measurement systems related to the maintenance of devices, facilities and systems of industrial and renewable energy

Social competences:
student is ready to critically assess knowledge and received information
student is ready to recognize the importance of knowledge in solving cognitive and practical problems and to seek expert opinions in case of difficulties in solving the problems
student is ready to think and act in an entrepreneurial way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Written exam from the lecture, minimum to pass – 51% of total available points
passing the laboratory

Programme content

1. Historical outline of CAD, CAE and CFD methods
2. Representation of geometry: points, edgnes, surfaces and solids. CAD file formats and exchange files.
3. Rules for creating 2D and 3D documentation
4. FEM: element types, stifnes matrix, solving the stiffnes matrix, linear solvers. Solving the linear, non-linear and contact problems.
5. CFD: Finite Volume Metod, N-S equations disctretization, solving the discretized N-S equations, pressure-velocity coupling
6. Postprocessing of the results. Communicating the results.

Teaching methods

Multimedia & Blackboard Lecture, Computer laboratory

Bibliography

Basic
Tadeusz Dobrzański – Rysunek techniczny maszynowy
Bogusław Grochowski – Geometria Wykreślna
Additional
John D. Anderson – Computational Fluid Dynamics
Klaus-Jurgen Bathe – Finite Element Procedures

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	52	1,70
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00