



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of CAx modeling [S2EPI01>PM]

Course

| | |
|---|-------------------|
| Field of study | Year/Semester |
| Industrial and Renewable Energy Systems | 1/2 |
| Area of study (specialization) | Profile of study |
| Gas Technology and Renewable Energy | general academic |
| Level of study | Course offered in |
| second-cycle | Polish |
| Form of study | Requirements |
| full-time | compulsory |

Number of hours

| | | |
|-----------|--------------------|-------|
| Lecture | Laboratory classes | Other |
| 15 | 30 | 0 |
| Tutorials | Projects/seminars | |
| 0 | 0 | |

Number of credit points

3,00

Coordinators

dr inż. Przemysław Grzymisławski
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Lecturers

Prerequisites

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

Course objective

The goal of the course 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, impact 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 intellectual property management related with 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:

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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, edges, surfaces and solids. CAD file formats and exchange files.
3. Rules for creating 2D and 3D documentation
4. FEM: element types, stiffness matrix, solving the stiffness matrix, linear solvers. Solving the linear, non-linear and contact problems.
5. CFD: Finite Volume Method, N-S equations discretization, solving the discretized N-S equations, pressure-velocity coupling
6. Postprocessing of the results. Communicating the results.

Course topics

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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 |