COURSE DESCRIPTION CARD - SYLLABUS

Course name
Virtual modeling and simulations with the basics of CFD

Course

Field of study
Mechanical engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
3/6
Profile of study
general academic
Course offered in
Polish
Requirements
elective

Number of hours

Lecture
15
Laboratory classes
15
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points
3

Lecturers

Responsible for the course/lecturer:
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Faculty of Mechanical Engineering
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Responsible for the course/lecturer:
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Institute of Applied Mechanics
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Prerequisites

KNOWLEDGE: the student has basic knowledge of the methods of computer-aided engineering works, computer recording of structures, has basic knowledge of the strength of materials.

SKILLS: the student is able to plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions.

SOCIAL COMPETENCES: the student is able to interact and work in a group.

Course objective

Acquiring knowledge of the methods and processes related to computer modeling and simulation, in the field of solids and fluid mechanics. Acquiring practical knowledge and skills to use specialized CAx engineering software, including computational fluid dynamics (CFD) software.

Course-related learning outcomes

Knowledge

Has a basic knowledge of information technology and computer science in the use of software in the processes of information processing and presentation, allowing the use of CAx computer engineering systems in product design and improvement and in preparing the product for production.

Has detailed knowledge of engineering design and graphics, including Computer Aided Design (CAD), to the extent that it enables the design of machines with the use of computer aided design.

Has basic knowledge of technical mechanics, fluid mechanics and computational methods in mechanical engineering (including FEM and other methods).

Skills

Can develop documentation for the implementation of an engineering task in the field of mechanical engineering and prepare a text containing an overview of the results of this task.

Can use the known methods and tools supporting design in mechanical issues. He can conduct computer simulations to analyze and evaluate the operation of components and systems in devices (including FEM and CFD).

Can assess the usefulness of routine methods and tools for solving a simple engineering task of a practical nature and select and apply the appropriate method and tools.

Social competences

Understands the need for lifelong learning; can inspire and organize the learning process of other people.

Can properly define priorities for the implementation of a task set by himself or others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Oral and written tests. Assessment of individually made projects.

Programme content

The subject is a general introduction to modeling and computer simulation in mechanics.

The student learns about selected issues related to computer static and dynamic analysis, computer analysis of natural vibrations, stability analysis and the basics of computer fluid mechanics. Theoretical issues are illustrated with solutions using specific modeling and numerical computation systems.

Laboratory lectures conducted in the form of a project on the design and analysis of mechanical elements, including numerical experiments using software to support the work of an engineer such as SolidWorks, SolidWorks Simulation, SolidWorks Flow Simulation, Catia v5, Blender, in particular in the field of modules: 3D modeling, static analysis and evaluation of flow parameters of the designed structure.

Teaching methods

Lectures: presentation of the so-called Case study, multimedia presentation.
Laboratory: presentation and realization of tasks by the student tasks entrusted to him.
Report on the implementation of laboratory tasks assigned to the student.

Bibliography

Basic

John Willis, Sandeep Dogra," SOLIDWORKS Simulation 2019: A Power Guide for Beginners and Intermediate Users", CADArtifex, 2019. ISBN: 1798925478

Matsson John E., "An Introduction to SOLIDWORKS Flow Simulation 2017", 2017

G. Kazimierczak, B. Pacula, A. Budzyński: Solid Edge. Komputerowe wspomaganie projektowania, Wydawnictwo Helion 2004, ISBN: 83-7361-174-6

M. Kleiber: Komputerowe Metody Mechaniki Ciał Stałych, PWN 1995, ISBN 83-01-11740-0

Tkacz E., Borys P., "Bionika", WNT, Warszawa, 2006

Additional

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	40	1,5
Student's own work (literature studies, preparation for laboratory lectures, preparation for test, project execution) [1]	35	1,5

[1] delete or add other activities as appropriate