COURSE DESCRIPTION CARD - SYLLABUS

Course name
Advanced methods of computer aided design [S2MiBP1>ZMKWP]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/2

Area of study (specialization)
Hybrid Powertrain Systems

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
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Piotr Posadzy
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Lecturers

Prerequisites

KNOWLEDGE: Basics of computer graphics. Knowledge of physics, general mechanics, strength of materials, mechanical vibrations. Fundamentals of fluid mechanics and thermodynamicsSKILLS: The ability to use various sources of information, including manuals and technical documentation. Ability to model 3D parts and assemblies in CAD systems (e.g. Solid Works, Inventor, Catia) SKILLS: The ability to use various sources of information, including manuals and technical documentation. SOCIAL COMPETENCES: The student is able to work in a group, assuming different roles. The student demonstrates independence in solving problems, acquiring and improving his knowledge and skills.

Course objective

The ability to model and perform numerical calculations of advanced problems of mechanics of continuous media, fluids and thermal.

Course-related learning outcomes

Knowledge:
Has extended knowledge of mathematics in the field of numerical methods used in optimization tasks, computer simulation, linear algebra, interpolation and approximation.

Has extended knowledge in the field of computer science, concerning computer programming and engineering calculation programs in the field of computer simulation of physical systems.
He knows the modern engineering methods of computer graphics and the theoretical basis of engineering calculations using the finite element method.

Skills:
Can use a popular numerical system to program a simple system simulation task with a small number of degrees of freedom.
Can write a simple computer program with the use of modern RAD environments in a language known to him for the optimization calculations of structures using learned elementary numerical methods.
Is able to use the acquired knowledge in the field of thermodynamics and fluid mechanics to simulate thermodynamic processes in technological systems of machines, using specialized computer programs.

Social competences:
He is ready to critically assess his knowledge and received content.
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.
It is ready to fulfill social obligations, inspire and organize activities for the benefit of the social environment.

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 credit for the lecture (test). Ongoing assessment of the state of knowledge in the laboratory.

Programme content

Numerical calculations using: contact elements, composite materials. Modeling of pinned connections in FEM calculations. Problems of dynamics in the calculation of mechanical structures. Material and geometric nonlinearity. Thermal calculations and modeling of laminar and turbulent flows. Interdisciplinary issues, i.e. aeroelastic, aeroacoustics. Methods of data transfer between FEM grids.

Course topics

none

Teaching methods

Lecture with multimedia presentation
Laboratory - work on a computer in the Femap / Nastran, Solid Works environment

Bibliography

Basic
O.C. Zienkiewicz: Metoda Elementów Skończonych. WNT Warszawa 1977
J. Kruszewski, E. Wittbrodt, Z. Walczyk: Drgania układów mechanicznych w ujęciu komputerowym, T II, zagadnienia wybrane, Seria Wspomaganie Komputerowe CAD/CAM, WNT-Warszawa, 1996
M. Kleiber: Komputerowe Metody Mechaniki Ciał Stałych, PWN 1995, ISBN 83-01-11740-0
Additional
Didactic materials of the Department of Virtual Engineering (Institute of Applied Mechanics)

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00