



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Advanced methods of computer aided design

Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

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Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

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

Lecturers

Responsible for the course/lecturer:

Piotr Posadzy Ph.D.

Responsible for the course/lecturer:

second person allowed

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Faculty of Mechanical Engineering

Institute of Applied Mechanics

Division of Virtual Engineering

Jana Pawła II str. 24, 60-965 Poznań

Prerequisites

KNOWLEDGE: Basics of computer graphics. Knowledge of physics, general mechanics, strength of materials, mechanical vibrations. Fundamentals of fluid mechanics and thermodynamics SKILLS: 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)

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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, regarding 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

Has extended knowledge of material strength in the field of non-linear models, fracture and fatigue strength, calculations of statically indeterminate structures, structural stability

Has a general knowledge of the principles and methods of constructing working machines, in particular methods of functional and strength calculations, mathematical optimization of mechanical structures and modeling of machine structures in 3D systems

Skills

Student can use a popular numerical system to program a simple system simulation task with a small number of degrees of freedom

Student is able to use the acquired knowledge in the field of thermodynamics and fluid mechanics to simulate thermodynamic processes in the technological systems of machines, using specialized computer programs

Student is able to perform a medium complex design project of a working machine or its assembly using modern CAD tools, including tools for spatial modeling of machines and calculations using the finite element method

Social competences

Student is ready to critically assess his knowledge and received content

Student is ready to recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties in solving the problem on its own

Methods for verifying learning outcomes and assessment criteria

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.

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	74	4,0
Classes requiring direct contact with the teacher	47	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) ¹	45	2,0

¹ delete or add other activities as appropriate