COURSE DESCRIPTION CARD - SYLLABUS

Course name
Theory of structures [N1Bud1>TK]

Course

Field of study
Civil Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
12

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
20

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Mathematics: matrix calculus, knowledge of definitions and integration rules, elements of probability theory, elements of differential calculus; Skills: operating a computer station, using matrix calculus, basic techniques for solving differential equations, basics of differential calculus; Social competences: awareness of the need to raise professional and personal competences, updating knowledge and skills. Ability to cooperate in a group, respect for Polish;

Course objective

To familiarize students with unconventional models used in the analysis of engineering structures. The goals include further advancement of knowledge about known analytical and numerical models such as the finite element method or the finite difference method. The course program also includes the acquisition of further programming skills, determining the goals and expectations of simple engineering computational applications.

Course-related learning outcomes

Knowledge:
1. Student knows basic numerical methods used in engineering practice - [KSB_W01]

2. The student knows the possibilities of using selected computer programs to implement specific numerical algorithms - [KSB_W12]
3. The student knows the basic methods of construction of numerical algorithms, and measures of their assessment - [KSB_W12]

Skills:
1. Student is able to correctly determine the calculation model used to solve a specific engineering task - [KSB_U01]
2. Student is able to make the right choice of the algorithm needed to solve a given numerical task, and based on the algorithm is able to develop an intermediate application that solves a given task - [KSB_U02, KSB_U09]
3. Student is able to make a critical assessment of the results of numerical analysis - [KSB_U07]

Social competences:
1. Student is able to work independently and with team on a given task - [KSB_K01]
2. Student is able to formulate conclusions and describe the results of own work - [KSB_K02, KSB_K03]
3. Student recognizes the need to respect the Polish language, the need for continuous learning and cooperation in a group. Is aware of the need for self-education - [KSB_K05]
4. Understands the need to protect copyright and the principles of professional ethics - [KSB_K09]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: checking knowledge through written colloquium - answer to 4-6 questions. Passing threshold: 50% of points.
Laboratory: knowledge checked by:
a) assessment of student activity in classes,
b) assessment of completed project tasks during classes during the semester (independent or in small teams) involving the preparation of a short application implementing the indicated numerical algorithm, and carrying out calculations for the prepared data sets.
c) tests: two credits in the middle and at the end of the course - independent work at the computer. Passing threshold: 50% of points.

Programme content

Lecture program:
Euler-Bernoulli beam model - repetition
Timoshenko beam model - basics
Vlasov beam model - the basics
Fundamentals of plane stress models
Fundamentals of plane strain models
The problem of heat flow and the basis of thermoelasticity
Basics of plate theory
Written test
Laboratory program:
Implementation and problem solving using selected beam theories
Implementation and solution of tasks from plane stress and strain
Assesment I
Implementation and solution of tasks from plate constructions
Implementation and solving of heat flow and thermoelasticity
Assesment II

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.
2. Laboratory: multimedia presentation, illustrated with examples given on a board, and performance of tasks given by the teacher.

Bibliography

Basic
1. Andrzej Gawęcki, Mechanika materiałów i konstrukcji prętowych, WPP, 1998
2.G. Rakowski, Z. Kacprzyk, Metoda elementów skończonych w mechanice konstrukcji, OWPW, 2005.
Additional
1. T.Łodygowski, W.Kąkol, Metoda elementów skończonych w wybranych zagadnieniach mechaniki konstrukcji inżynierskich, Skrypt PP, 1994 - Nr 1779
2. J. Chróścielewski, J. Makowski, W. Pietraszkiewicz, Statyka i dynamika powłok wielopłatowych – nieliniowa teoria i metoda elementów skończonych, IPPT PAN, 2004.etody numeryczne, PWN, Warszawa 1983.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	38	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	62	2,50