COURSE DESCRIPTION CARD - SYLLABUS

Course name
Strength of materials [S1FT2>WM]

Course

Field of study
Technical Physics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge of physics, mechanics, basic mathematical analysis, and planimetry. Ability to solve simple problems in mechanics, mathematics, observance, and association of facts, ability to obtain information from indicated sources. Understanding the need to expand one's competencies, readiness to cooperate within a team.

Course objective

1. To impart students with basic knowledge in the mathematical methods of describing the strength of materials and simple structural elements such as shafts, beams. 2. To develop students' skills in modeling simple physical phenomena arising as a result of loading structures or their elements and their mathematical description. 3. To develop practical skills in the practical interpretation of obtained results. 4. To cultivate teamwork skills among students.

Course-related learning outcomes

Knowledge:
The student will have organized knowledge in the fundamentals of the strength of materials, knows assumptions and the applicability of the most significant analytical models for describing basic physical

phenomena in the field of the strength of materials, has knowledge in solving simple strength problems analytically.

Skills:
The student will be able to use their skills to solve simple practical problems, select the most relevant information about a problem and search for missing data, draw significant conclusions from the solutions of individual strength problems thus increasing their qualifications.

Social competences:
The student will be able to work independently and in a team on a given task, showing responsibility in their work, demonstrates conscientiousness and thoroughness in performed actions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The learning outcomes are verified through a written exam (lecture part), quizzes (exercise part), and evaluation of teamwork and problem-solving creativity.
Assessment criteria:
0%-49.9% (2) F
50%-59.9% (3) E
60%-69.9% (3.5) D
70%-79.9% (4) C
80%-89.9% (4.5) B
90%-100% (5) A

Programme content

The curriculum focuses on the basics of modeling the mechanical properties of materials and the analytical description of the strength of selected structural elements. The program content is provided in the form of lectures and exercises.

Course topics

1. Division and definitions of loads, stress definitions, differential equilibrium equations for the stress state in a material continuum.
2. Plane stress state - determination of main directions and stresses using analytical and graphical methods (Mohr's circle).
3. Relations between displacement vector fields and strain tensor fields.
4. Plane strain state.
5. Pure shear state, generalized Hooke's law.
6. Moments of inertia of plane figures.
7. Elementary torsion theory - section modulus for torsion.
8. Torsion of thin-walled closed profiles - Bredt's formulas.
9. Bending theory.
10. Strength hypotheses - material strength assessment in a complex loading state.

Teaching methods

Lecture: Multimedia presentation, solving example problems on the board.
Exercises: solving tasks, discussion.

Bibliography

Basic:
1. Wytrzymałość materiałów, J. Zielnica
2. Wytrzymałość materiałów T., M. Niezgodzińscy
3. Zbiór zadań z wytrzymałości materiałów F. Twardosz

Additional:
1. Wytrzymałość materiałów Bielajew

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50