COURSE DESCRIPTION CARD - SYLLABUS

Course name

Strength of materials and structures

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

18

Laboratory classes

16

Other (e.g. online)

Tutorials

10

Projects/seminars

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Mechanicznej

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of mathematics, phisics, mechanic, strength of materials and other areas of education i the field of study.

Ability to search for necessary information in literature, databases, catalogues. The ability to self-study.

Course objective

Introduction to the basic principles of mechanics of deformable bodies.

Course-related learning outcomes

Knowledge

The graduate knows and understands the basics of theoretical and experimental analysis of the strength of materials to the extent necessary for the field of study.

The graduate understands the basic models and computational methods used in construction. He has ordered basic knowledge in the field of mechanics of solids and strength of materials.

The graduate has basic knowledge of computational methods in mechanics and strength of materials and has knowledge of material properties research.

Skills

Has self-education skills.

Is able to carry out basic tests of mechanical properties of materials and measurements of the stress state in construction elements, and to operate specialized research equipment.

Can use analytical, simulation and experimental methods to formulate and solve engineering strength problems. Can formulate problems; can use mathematical methods in engineering practice.

Can solve technical problems based on the laws of applied mechanics, perform strength analyzes of machine elements and mechanical systems.

Social competences

Understanding the need for self-education related to the development of technology. Can inspire and organize the learning process of other people.

Understanding the social and systemic effects of engineering activities.

The ability to make appropriate decisions in the area of feasible solutions and to make the right choice.

Understanding the importance of teamwork.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture, tutorials - written test and assessment of activity in the classroom:

3 50.1% -70.00%

4 70.1% -90.0%

5 from 90.1%

Laboratory classes - ongoing control of theoretical preparation for classes, discussion of results, substantive assessment of test reports.

Programme content

Graphs of bending moments and shear forces. Bending of beams.

Normal and shear stresses in beams.

Beam Design. Differential equation for beam deflection lines and beam deflection lines.

Generalized Clebsch method. Graphic-analytic method. Application of the superposition principle and the deformation comparison method to determine the deflection and deflection angles of beams. Statically indeterminate beams. The equation of the three moments.

Strength theories.

Bars and beams subject to combined loadings. Diagonal bending. Simultaneous stretching or compression with bending, core cross-section. Bending with torsion.

Program content of laboratory classes: tensile test, hardness measurements using Brinell, Vickers, Poldi, Rockwell methods, fatigue tests, impact bending test, spring characteristics, strain gauges tests.

Teaching methods

Live lecture with multimedia illustrations, tutorials with problems solved on the board, laboratories - measurements performed by students under the supervision of a teacher.

Bibliography

Basic

1. J. Zielnica, Wytrzymałość materiałów, WPP, wyd. III, Poznań 2000

2. A. Jakubowicz, Z. Orłoś, Wytrzymałość materiałów, WNT, Warszawa, 1984

3. K. Magnucki, W. Szyc, Wytrzymałość materiałów w zadaniach, PWN, 1987

Additional

1. N. Willems, T. J. Easley, S. T. Rolfe, Strength of Materials, Mc Graw-Hill Book Company, 1981

2. M. Gere, S. Timoshenko, Mechanics of Materials, PWS-Kent Publishing Company, Bos-ton, 1984

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) [1]	80	3,0

[1] delete or add other activities as appropriate