COURSE DESCRIPTION CARD - SYLLABUS

Course name
Strength of Materials [N1IZarz1>WM]

Course

Field of study
Engineering Management

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
part-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
10

Other
0

Tutorials
14

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr Marcin Rodak
marcin.rodak@put.poznan.pl

Lecturers

Prerequisites

Has a basic knowledge in mathematics Ability to solve basic tasks in geometry and mathematical analysis. Ability to search for necessary information in literature, databases, catalogues. The ability to self-study. Using information and communication techniques appropriate to carry out engineering tasks.

Course objective

Introduction to the basic principles of mechanics of deformable bodies.

Course-related learning outcomes

Knowledge:
The student describes the conditions for the equilibrium of a rigid body [P6S_WG_14].
The student defines the classification of loads acting on an elastically deformable body and understands stresses and internal forces [P6S_WG_15].
The student recalls and describes the study of mechanical properties of materials [P6S_WG_16].
The student characterizes the processes of stretching and compression within the limits of elasticity, including the generalized Hooke's law [P6S_WG_17].
The student explains the bending of beams and the normal stresses in bent beams [P6S_WG_17].

Skills:
The student prepares and conducts laboratory tests, such as tensile tests, hardness measurements, fatigue tests, impact bending tests, and analyzes their results [P6S_UW_14].
The student applies typical methods for solving simple problems in the field of machine construction and operation, including the design of beams and solving differential equations of beam deflection lines [P6S_UW_15].
The student plans and carries out the design of structures and technologies for simple parts and subassemblies of machines, and organizes first-degree complexity production units

Social competences:
The student is aware of the importance of a systemic approach in creating products, considering technical, economic, marketing, legal, organizational, and financial issues [P6S_KO_02].

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

The content of the course includes a discussion of the basics of rigid body statics and the concepts of mechanics of deformable solids (stresses, strains, Hook's law for isotropic materials), which are the basis for the strength of materials.
Theoretical calculations of the strength and stiffness of typical structural elements such as rods, shafts, and beams, as well as simple trusses.
Experimental research.

Course topics

Conditions of equilibrium of a rigid body.
Classification of loads acting on an elastically deformable body, internal forces, stresses, and strains.
Generalised Hooke's law. Strength conditions.
Rods (tension and compression): internal forces, stresses, strains, and displacements.
Statically determinate and indeterminate rod systems.
Moments of inertia of flat figures.
Shafts (torsion) with circular cross-sections: internal forces, stresses, deformations, and displacements.
Beams (bending): internal forces, stresses, strains and displacements.
Programme content of laboratory classes: tensile test, hardness measurements using Brinell, Vickers, 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. M. Ostwald, Podstawy wytrzymałości materiałów i konstrukcji, WPP, Poznań 2017
2. Ostwald M., Wytrzymałość materiałów i konstrukcji. Zbiór zadań. Wydawnictwo PP, Poznań, 2018.
3. Badania eksperymentalne w wytrzymałości materiałów. Pod redakcją S. Joniaka, WPP. 2006.
4. Misiak J., Mechanika techniczna t.1, WNT, Warszawa, 1998, 2012.

Additional:
1. Magnucki K., Szyc W., Wytrzymałość materiałów w zadaniach: pręty, płyty i powłoki obrotowe,

Wydawnictwo Naukowe PWN, 2000.
2. Dyląg Z., Jakubowicz A., Orłoś Z., Wytrzymałość materiałów t.1 i 2, WNT, Warszawa, 2000.

Breakdown of average student's workload

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