COURSE DESCRIPTION CARD - SYLLABUS

Course name

Strength of materials

Course

Field of study

Aerospace Engineering

Year/Semester

2/3

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

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

Solving basic problems of technical mechanics.

Solving 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

1. The graduate has a basic knowledge of metal materials used in mechanical engineering, in particular their mechanical properties, and factors affecting their strength.

2. The graduate has a basic knowledge of the rigid body.

3. The graduate has basic knowledge in the field of strength of materials, including the basics of the theory of elasticity and plasticity, strain hypotheses, methods for calculating structural elements in simple load states, as well as methods for testing strength of materials and the state of deformation and stress in structures.

Skills

1. Has the ability to self-study using websites.

2. Can use mobile engineering applications, formulas and strength tables.

3. Is able to analyze technical solutions and assess their suitability for use in their own technical projects.

Social competences

1. Has awareness of the importance of professional ethics behavior.

2. Understands the need for lifelong learning.

3. Has understanding and knows the non-technical aspects and effects of engineering activities and the related responsibility for decisions.

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

Classification of loads acting on an elastically deformable body, stresses and internal forces. Internal forces in the bar.

Tests of mechanical properties of materials.

Tension and compression. Strength conditions, generalized Hooke's law.

Tension and compression within the limits of elasticity, the statically determinate bar systems.

Stress Analysis, plane stress. Transformation formulas and main stresses.

Strength theories.

Moments of inertia of flat figures.

Torsion of round bars.

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

Normal stresses in beams.

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

Oblique bending.

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

PART - 66 (THEORY - 22.5 hours, PRACTICE - 11.25 hours)

MODULE 6. MATERIALS AND EQUIPMENT

6.1 Aircraft construction materials containing iron

b) Testing iron-containing materials for hardness, strength

tensile strength, fatigue strength and impact strength. [1]

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, str. 554, WPP, wyd. III, Poznań 2000

2. Z. Dyląg, A. Jakubowicz, Z. Orłoś, Wytrzymałość materiałów, WNT, Warszawa, 2012

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	85	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) [1]	35	1

[1] delete or add other activities as appropriate