COURSE DESCRIPTION CARD - SYLLABUS

Course name

Strength of materials

Course

Field of study

Aviation

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. has extended knowledge in the field of material strength, including the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures, and has basic knowledge of the main departments of technical mechanics: statics, kinematics and dynamics of a material point and a rigid bodyas methods for testing strength of materials and the state of deformation and stress in structures.

Skills

1. can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites, ready components of machines and devices, including means and devices, assess their suitability for use in their own technical and organizational projects2. Can use mobile engineering applications, formulas and strength tables.

2. can use the mathematics (differential and integral calculus) to describe simple engineering problems.

Social competences

1. is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession2. Understands the need for lifelong learning.

2. correctly identifies and resolves dilemmas related to the profession of an aerospace engineer

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	75	3,0
Classes requiring direct contact with the teacher	47	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) [1]	28	1,0

[1] delete or add other activities as appropriate