COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical machanics

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

0

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic mathematics in the field of vector, differential and integral calculus and physics in the field of mechanics

Skills: Logical and creative thinking, using the Internet and library resources

Social competences: Understands the need for continuous learning and acquiring new knowledge

Course objective

Presentation of the basics of statics, kinematics and dynamics, enabling further study of issues in the field of the basics of machine construction, vibration and dynamics of machines, theory of machines and mechanisms, strength of materials.

Course-related learning outcomes

Knowledge

1. The student has an extensive knowledge of the strength of materials, including the theory of elasticity and plasticity, stress hypotheses, calculation methods for 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 [K2A_W12]

Skills

1. Can use the language of mathematics (differential and integral calculus) to describe simple engineering problems [K2A_U11]

2. Can use learned mathematical theories to create and analyze simple mathematical models of machines and their components as well as simple technical systems. Is able to use integrated with the packages for spatial modeling, programs for the calculation of mechanical structures by the finite element method and correctly interpret their results [K2A_U26]

Social competences

1. The student understands the need for lifelong learning; can inspire and organize the learning process of other people [K2A_K01]

2. The studnet is ready to critically evaluate his knowledge and received content, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties with solving the problem on his own [K2A_K02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE: Passing the lecture on the basis of the test

TUTORIALS: Passing the exercises on the basis of systematic tests

Programme content

Selected problems from vector algebra. Axioms of statics. Bonds and their reactions. Friction and friction laws, tendon friction. Convergent system of forces: reduction of the system, equilibrium conditions, theorem about three forces. A pair of forces. Any system of forces: reduction of the system, equilibrium conditions. Special cases of any system of forces. Statically determinate and statically indeterminate systems. Centers of gravity of solids, surfaces and lines. Point kinematics equations of motion, velocity and acceleration. Movement of a point in the natural and polar coordinate systems. Velocity and acceleration of any point in a solid in general motion. Special cases of general body motion: translational, spherical and plane rotation. Composite point motion. Two basic problems of dynamics. DAlembert's principle. Moments of inertia. Vibrations of a material point. Work, power, kinetic and potential energy. Dynamics of motion of a complex material point. The momentum of a system of material points and a solid. The principle of momentum and drive, the principle of conservation of momentum. Center of mass motion theorem. Variable mass system movement - rocket movement

Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character.

The exercise method (subject exercises, practice exercises) - in the form of auditorium exercises (applying the acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition).

Bibliography

Basic

1. Sałata W., Mechanika ogólna w zarysie, Poznań, Wyd. PP 1998.

2. Leyko J., Mechanika ogólna. T. 1, Warszawa, PWN 2008.

3. Leyko J., Mechanika ogólna. T. II, Warszawa, PWN 2008.

4. Misiak J. Zadania z mechaniki ogólnej. Część I, II i III, Warszawa, WNT 1994

5. Nizioł J. Metodyka rozwiązywania zadań z mechaniki. Warszawa, WNT 2002.

Additional

1. Awrajcewicz J. Mechanika techniczna, Warszawa WNT 2009

2. Arczewski K. Drgania układów fizycznych, Warszawa, Wyd. PW. 2008

3. Szcześniak W. Dynamika teoretyczna w zadaniach dla dociekliwych, Warszawa, Wyd. PW. 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for tests/exam) [1]	30	1,0

[1] delete or add other activities as appropriate