COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical mechanics [S1Lot2>MT]

Course

Field of study
Aviation

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

A student starting this subject should have basic knowledge of physics and mathematics, including the basics of classical mechanics and the basics of differential and integral calculus. He should also have the ability to think logically, obtain information from indicated sources and be ready to cooperate within a team.

Course objective

Providing students with basic knowledge of mechanics, in the field of statics, kinematics and dynamics, which will enable them to study further subjects, including: in the field of strength of materials, basics of machine construction, vibrations, theory of machines and mechanisms, etc.

Course-related learning outcomes

Knowledge:
1. has an extensive knowledge of the strength of materials, 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

Skills:
1. can analyze facilities 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 projects
2. can use the language of mathematics (differential and integral calculus) to describe simple engineering problems.
Social competence:
1. is aware of the social role of a graduate of a technical university, in particular understands the need to formulate
and convey to the society, in an appropriate form, information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession
2. correctly identifies and resolves dilemmas related to the profession of an aerospace engineer

Social competences:
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Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The final exam consists of a theoretical and task part. Theoretical issues on the basis of which questions are developed will be sent to students by e-mail using the university e-mail system.
Completion of tutorials based on tests and activity during classes.

Programme content

Elements of vector calculus.
Statics, the study of the balance of various systems of forces
Reduction theorem
Balance of trusses, beams, frames
Static friction
Point kinematics
Kinematics of a rigid body

Course topics

Lecture:
- Elements of vector calculus: vector addition, scalar and vector products, vector moment about a point, vector moment about an axis; postulates of statics, resultant of a convergent system, three-force theorem, equilibrium equations of plane and spatial systems of forces
- Force pair, reduction theorem, resultant, main vector, main moment, wrench, theorem about main moment; resultant of a system of parallel forces, equilibrium of any plane system of forces
- Continuous load, bound solids, spatial systems
- Trusses, determining forces in members using the method of balancing nodes and the Ritter method; static and kinetic friction, cable friction, rolling resistance,
- Elements of mass geometry, static moment, center of gravity and center of mass; point kinematics, description of motion in the Cartesian system and in the natural system, speed, acceleration, tangential and normal acceleration,
- Solid kinematics; classification of motions, number of degrees of freedom, kinematic equations of motion, velocity projection theorem, translational, rotational, plane, spherical and general motion.
- elements of the dynamics of a material point, equation of motion, momentum, moment of momentum.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board
Tutorials: solving tasks on the board

Bibliography

Basic:
1. J. Leyko, Mechanika ogólna, tom I i II, PWN, Warszawa, 2008
2. J. Misiak, Mechanika techniczna, tom I i II, WNT, Warszawa, 1996
3. M. Łunc, A.Szaniawski, Zarys mechaniki ogólnej, PWN, Warszawa, 1959
4. J. Misiak, Zadania z mechaniki ogólnej, Część I, II i III, Warszawa, WNT 2009
5. J. Nizioł, Metodyka rozwiązywania zadań z mechaniki, Warszawa, WNT 2007
Complementary
1. A. Bedford, W.Fowler, Engineering mechanics, Prentice Hall, New Jersey, 2002
2. D.J. McGill, Engineering Mechanics, PWS Publishers, Boston, 1985
3. J. Awrejcewicz, Mechanika techniczna, Warszawa WNT 2009
4. M.T. Niezgodzińscy, Zbiór zadań z mechaniki ogólnej, Wydawnictwo Naukowe PWN, Warszawa, 2009

Additional:
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Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	28	1,00