COURSE DESCRIPTION CARD - SYLLABUS

Course name
Engineering mechanics [S1Lot2-SLiPL>MT]

Course

Field of study
Aviation

Year/Semester
2/3

Area of study (specialization)
Aircraft Engines and Airframes

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

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 ordered and theoretically founded general knowledge in the field of key technical issues and detailed knowledge of selected issues related to air transport, knows the basic techniques, methods and tools used in the process of solving tasks related to air transport, mainly of an engineering nature
2. has basic knowledge of research methods and how to prepare and conduct research, and knows the rules of editing a scientific work

3. the student has knowledge of aviation safety and management. The student knows the concept of the human factor and methods of assessing human reliability, has detailed knowledge related to selected issues in the field of human capabilities and limitations during aircraft operation in flight, its impact on health and the ability to perform air operations, as well as the possibility of improving physical condition
4. has the ability to self-study with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books

Skills:
1. is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret them and make a critical evaluation, draw conclusions and exhaustively justify the opinions they formulate
2. is able to properly use information and communication techniques, applicable at various stages of the implementation of aviation projects
3. is able to properly plan and perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions from them
4. can, when formulating and solving tasks related to civil aviation, apply appropriately selected methods, including analytical, simulation or experimental methods
5. student can use theoretical probability distributions. Student is able to analyze and interpret statistical data. Student is able to use the methods and tools of mathematical statistics in engineering practice
6. is able to prepare a short research paper while maintaining the basic editorial rules. He can choose appropriate methods for the conducted research and is able to carry out a basic analysis of the results.
7. is able to organize, cooperate and work in a group, assuming various roles in it, and is able to properly define priorities for the implementation of a task set by himself or others
8. is able to plan and implement the process of own permanent learning and knows the possibilities of further education (2nd and 3rd degree studies, postgraduate studies, courses and exams conducted by universities, companies and professional organizations)

Social competences:
1. is aware of the social role of a graduate of a technical university, in particular understands the need to formulate and communicate to the public, in an appropriate form, information and opinions on engineering activities, technical achievements, as well as the achievements and traditions of the engineering profession
2. correctly identifies and resolves dilemmas related to the performance of the profession of an aviation and astronautics engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Final exam including a theoretical part and accounting tasks. The issues on the basis of which the questions are developed will be sent to students by e-mail using the university e-mail system.

Programme content

Kinematics of spherical and general motion of a rigid body
Kinematics of complex movement, Coriolis effect, zygomatic mechanisms
Selected issues of the dynamics of a material point, including: principles of dynamics (momentum, rotation, work and energy), dynamic equations of motion of a material point in a stationary system and in a natural system, work, power, energy, force field.
Vibrations of a system with one degree of freedom, free, forced and damped vibrations, Dynamics of the arrangement of material points, theorem on the motion of the center of mass,
Geometry of masses; centers of gravity, moments of inertia, deviation moments, Steiner's theorem,
Dynamics of a rigid body, dynamic reactions

Course topics

Kinematics of complex motion, General motion of a rigid body
Dynamics of a material point and a system of material points Vibrations of a system with one degree of freedom
Mass geometry Solid dynamics

Teaching methods

Lecture: multimedia presentation, illustrated with examples given 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

Additional:
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

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	10	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50