COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical mechanics

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

10

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Roman Starosta

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tel. 61 6652021

Wydział Inżynierii Mechanicznej

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

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Wydział Inżynierii Mechanicznej

ul. Piotrowo 3 60-965 Poznań

Prerequisites

Basic knowledge of mechanics and mathematics, vector calculus, calculus, integrals, ordinary differential equations. Logical thinking, use of the Internet and the library, the use of computer calculation programs.

Course objective

Providing students with basic knowledge of mechanics, in the field of statics, kinematics and dynamics, which will enable him to study further subjects in the field of material strength, fundamentals of machine construction, vibrations, machine dynamics, machine theory 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 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 profession

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: written exam covering theory questions and accounting tasks verifying proper understanding of the concepts of technical mechanics. Issues of theory will be delivered to the students via university email

Exercises: tests and assessment activities in the classroom

Programme content

Dynamics including: rules of dynamics, d'Alembert principle, momentum, moment of momentum, equation of motion of the material point, vibration (free, damped, forced, resonance), work, energy, power, force field, description of motion of set of material points, theorem of movement of mass centre, mass geometry, centre of mass, moments of inertia, Steiner theorem, mathematical and physical pendulum, equation of motion of the body, dynamical reactions

PART - 66 (THEORY - 19.5 hours)

MODULE 2. PHYSICS

2.2 Mechanics

2.2.2 Kinetics

Periodic motion: swing motion;

Simple theory of vibration, harmony and resonance;

Speed ratio, power transmission and mechanical efficiency. [2]

Teaching methods

Lectures: multimedia presentation, ilustrated by the examples on the blackboard

Tutorials: solving exemplar problems on blackboard

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	1,0
Classes requiring direct contact with the teacher	10	0,5
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) [1]	15	0,5

[1] delete or add other activities as appropriate