COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical Mechanics

Course

Field of study
Technical Physics

Year/Semester
1/2

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
30

Laboratory classes

Other (e.g. online)

Tutorials
30

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge: basic knowledge of mechanics in the field of basic physics course in the field of technical physics, vector and tensor calculus, differential and integral calculus.

Skills: the ability to solve elementary problems in mechanics based on the acquired knowledge, the ability to obtain information from indicated sources.

Social competences: understanding the need to broaden one's own competences.

Course objective

1. Provide students with general and specific knowledge of technical mechanics, related to the issues specified in the course program.

2. Developing students' skills in solving problems in technical mechanics based on the acquired knowledge.

Course-related learning outcomes

Knowledge

1. Knowledge of physical concepts within the scope of the technical mechanics course program. - [K1_W03, K1_W07].

2. Knowledge of the laws of technical mechanics and their explanations in the scope covered by the course program and knowledge of the scope of their applicability. - [K1_W03, K1_W07].

3. Knowledge of general calculation methods used in solving problems in technical mechanics. - [K1_W03, K1_W07].

Skills

1. Ability to apply the laws and calculation methods of technical mechanics in solving common problems within the scope of the course program. - [K1_U01].

2. Ability to use the indicated sources of knowledge with understanding (list of basic literature) and to acquire knowledge from other sources. - [K1_U02].

Social competences

1. Active involvement in solving given problems. - [K1_K01, K1_K08].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning effect	Form of evaluation	Evaluation criteria	
W03	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%
W07	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%
U01	test	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%

U02	test	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%
K01, K08	oral answers during exercises		

The student independently seeks a solution based on the acquired knowledge and shows great commitment to solving problems - the student receives an additional point to the result of the test for each presentation of the solution to the problem at the blackboard.

Programme content

1. Mathematical description of mechanical quantities

(vectors, tensors, vector differential operators)

2. Kinematics

(natural coordinate system, curvilinear coordinate systems, description of the movement of a material point and a rigid body)

3. Dynamics

(determining the path of motion of a material point using Newton's equations, general definition of momentum, angular momentum and mechanical energy of a material point, conservation laws in mechanics, potential forces, central force field, systems of many material points, static moment and center of mass, reduction of the system of forces acting on a rigid body, motion of a rigid body)

4. Statics

(equations of equilibrium of forces acting on a rigid body, reaction forces, internal forces, pair of forces, convergent force systems, any planar force systems, spatial force systems, equilibrium of rigid body systems, flat gratings)

5. Analytical mechanics

(mechanical constraints, degrees of freedom, generalized coordinates, possible, real and virtual shifts, virtual work, generalized forces, d'Alembert's principle, virtual work principle, Lagrange equations of the second kind)

Teaching methods

Lecture: multimedia presentation, solving sample tasks on the blackboard.

Exercises: problem solving, practical exercises, discussion, team work.

Bibliography

Basic

1. T. J. Hoffman, Podstawy mechaniki technicznej, Wydawnictwo Politechniki Poznańskiej, Poznań, 2000.

2. J. Leyko, Mechanika ogólna. Tom 1. Statyka i kinematyka, Tom 2. Dynamika, Wydawnictwo Naukowe PWN, Warszawa, 2011.

3. Zbiór zadań z mechaniki. Cz. 1. Statyka. Cz. 2. Kinematyka, Cz. 3. Dynamika, red.: J. Leyko, R. Kurowski, J. Szmeltera, PWN, Warszawa, 1970.

Additional

1. I. I. Olchowski, Mechanika teoretyczna, Wydawnictwo Naukowe PWN, Warszawa, 1978.

2. W. Rubinowicz, W. Królikowski, Mechanika teoretyczna, Wydawnictwo Naukowe PWN, Warszawa, 1998.

3. E. Karaśkiewicz, Zarys teorii wektorów i tensorów, Wydawnictwo Naukowe PWN, Warszawa, 1971.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	66	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	48	2,0

[1] delete or add other activities as appropriate