



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical mechanics

### Course

Field of study

Year/Semester

Transport

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

part-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

9

0

0

Tutorials

Projects/seminars

9

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Hubert JOPEK

Responsible for the course/lecturer:

second person allowed

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Wydział Inżynierii Mechanicznej

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### Prerequisites

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

Skills: The ability to model basic mechanical phenomena, represent and read geometry, the ability to constructive, analytical thinking.

Social competences: Understanding the need to learn, expand knowledge, the role of the designer and his responsibility for his works

### Course objective

Expanding students' knowledge in the field of mechanics (i.e. statics, kinematics and dynamics), and in



particular providing them with the tools necessary for the theoretical analysis of mechanical devices, which is necessary in the later stages of teaching subjects related to the design of machines and devices.

### Course-related learning outcomes

#### Knowledge

The student has an extended and deepened knowledge of mathematics useful for formulating and solving complex technical tasks concerning various means of transport

The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems

The student has a basic knowledge of the life cycle of means of transport, both equipment and software, and in particular about the key processes occurring in the product life cycle

#### Skills

Student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods

Student is able to make a critical analysis of the functioning of transport systems and other technical solutions and to evaluate these solutions, including: is able to effectively participate in the technical inspection and assess the transport task from the point of view of non-functional requirements, has the ability to systematically conduct functional tests

#### Social competences

The student correctly identifies and solves dilemmas related to the profession of a transport engineer

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing the lecture on the basis of a written and oral exam.

Completion of exercises on the basis of a test.

### Programme content

Fundamentals of vector calculus, axioms of statics, types of constraints, internal and external forces. Equilibrium conditions of a planar and spatial convergent force system and the equilibrium conditions of any planar and spatial force system, statically determinate systems.

Reduction of the system of forces, a pair of forces. Discussion of issues related to friction.

Kinematics of a point, equations of point motion, motion of a point on a path, velocities and accelerations in Cartesian and in the natural coordinate system.

Rigid body motion: velocity and acceleration of any point in the body, rotary motion and plane motion. Dynamics: two basic tasks of dynamics: simple and inverse, basic principles of behavior in mechanics, d'Alembert's principle.



The principle of momentum and drive, the principle of conservation of momentum, the Center of Mass theorem, The principle of the twist and turn.

### Teaching methods

Traditional lecture or webinar with the use of multimedia presentations

Exercises at the blackboard

### Bibliography

Basic

1. Sałata W., Mechanika ogólna w zarysie, Poznań, Wyd. PP 1998.
2. Leyko J., Mechanika ogólna. T. 1-2, Warszawa, PWN 2012
3. Misiak J. Zadania z mechaniki ogólnej. Część I, II, III Warszawa, WNT 2012
4. Nizioł J. Metodyka rozwiązywania zadań z mechaniki. Warszawa, WNT 2002
5. Niezgodziński T., Mechanika ogólna, Warszawa, PWN, 2011

Additional

1. Osiński Z. Mechanika ogólna. Warszawa, PWN 2000
2. Taylor J., Mechanika klasyczna T1-2 Warszawa PWN 2013

### Breakdown of average student's workload

	Hours	ECTS
Total workload	48	2,0
Classes requiring direct contact with the teacher	18	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate