



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical mechanics

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Roman Starosta

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Wydział Inżynierii Mechanicznej

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

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### 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 knowledge in physics, covering the basics of classical mechanics, necessary to understand issues in the field of materials science, theory of machines and mechanisms, theory of drives and mechatronic systems -
2. has expanded knowledge necessary to understand profile subjects in the field of aviation engineering for selected specialties:
  - a. Piloting of aircraft
  - b. Aero engines and airframes -
3. has basic knowledge of the main areas of technical mechanics: kinematics and material point dynamics, as well as the rigid body -

#### Skills

1. has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books
2. is able to obtain information from literature, the internet, databases and other sources, is able to integrate obtained information, interpret and draw conclusions from it
3. can create a system diagram, select elements and perform basic calculations of the mechanical system, machine components or aviation devices -

#### Social competences

1. is able to properly set priorities for implementation of the task specified by himself or others based on available knowledge
2. understands the need for critical assessment of knowledge and continuous education -
3. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for the decisions taken -

### 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, illustrated 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.Niezdziński, Zbiór zadań z mechaniki ogólnej, Wydawnictwo Naukowe PWN, Warszawa, 2009



### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) <sup>1</sup>	30	1,0

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