



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical Mechanics

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### Course

Field of study

Management and Production Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

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### Number of hours

Lecture

16

Laboratory classes

Tutorials

12

Projects/seminars

Other (e.g. online)

### Number of credit points

3

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### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Roman Starosta

Responsible for the course/lecturer:

email: Roman.Starosta@put.poznan.pl

Faculty of mechanical Engineering

CMBiN, room 437

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### Prerequisites

Basic knowledge of physics and mathematics, vector calculus, calculus



### Course objective

Providing students with basic knowledge of engineering mechanics, in the field of statics, kinematics and dynamics, which will enable them to study further subjects

### Course-related learning outcomes

#### Knowledge

Student 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,

has basic knowledge of the main areas of technical mechanics: statics, kinematics and dynamics of the material point and rigid body.

#### Skills

Student has the ability to self-study using modern teaching tools, such as remote lectures, websites, databases, e-books, etc.

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

can create a free-body diagram, select elements and perform basic calculations of the mechanical system.

#### Social competences

Student is able to properly set priorities for implementation of the task specified by himself or others based on available knowledge,

understands the need for critical assessment of knowledge and continuous education

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 decisions made.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written test verifying proper understanding of the concepts of engineering mechanics

Tutorials: tests and assessment of classroom activity

### Programme content

Elements of vector algebra. Statics including: axioms of statics, theorem of three forces, equilibrium equations for various force systems (concurrent, parallel, any 2D and 3D), moment of force, resultant of two parallel forces, pair of forces, reduction of any set of loading, change of the reduction pole, invariants of the reduction, concentrated and distributed loads, trusses, frames, friction, belt friction, center of gravity.



Kinematics including: kinematics of point, velocity, acceleration, description of motion in the absolute coordinate system (Cartesian and polar) and in the natural coordinate system, tangent and normal acceleration, kinematics of a rigid body, various kinds of motion (translation, rotation, planar), complex motion of a point

Elements of dynamics of a material point and a rigid body

### Teaching methods

Lecture: multimedia presentation illustrated by the examples given on the blackboard

Tutorial: solving of the mechanical problems on the blackboard, discussion

### 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  | 75    | 3,0  |
| Classes requiring direct contact with the teacher   | 30    | 1,5  |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup> | 45    | 1,5  |

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