COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical mechanics II [S1ETI2>MT2]

Course

Field of study
Education in Technology and Informatics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

5,00

Coordinators

Lecturers

Prerequisites

Basic knowledge of physics and mathematics, vector calculus, calculus. Ability to use textbooks and manuals. Understands the need to expand their competences and understands the need to acquire new knowledge

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:

The exam consists of a theoretical part and a practical part (tasks in statics, kinematics, and dynamics).
Course credit is based on quizzes and class participation, with a passing threshold of 50% of the total points.
Laboratory credit is based on tests, reports, and participation, with a passing threshold of 50% of the total points.

Programme content

1. Kinematics of complex motion
2. Dynamics of a material point
3. Work, power, energy, field of forces
4. Dynamics of a system of material points
5. Geometry of masses
6. Dynamics of a rigid body

Course topics

Lecture:
Ad.1. Reminder of basic relationships in the description of the kinematics of a rigid body, derivation of formulas for the velocity and acceleration of a point of its complex motion, description in a moving reference frame, the Coriolis force and its applications and its influence on natural phenomena
Ad.2. Fundamentals of dynamic modeling, equation of motion, description of motion in a Cartesian and natural frame of reference, the principle of momentum and the principle of conservation of momentum, the principle of angular momentum and the principle of conservation of angular momentum, d'Alembert's principle
Ad.3. Definition of work, power, kinetic energy, the theorem on the equivalence of work and kinetic energy, potential and conservative force fields, potential energy
Ad.4. Generalization of formulas for a material point to a system of material points, momentum, angular momentum, energy
Ad.5. Discussion of the meaning and application of mass moments, static moments and moments of inertia, Steiner's theorem
Ad.6. Derivation of the equations of motion of a rigid body, momentum, angular momentum, kinetic and potential energy of the rigid body

Teaching methods

1. Lecture: multimedia presentation illustrated by the examples given on the blackboard or using the graphical tablet
2. Tutorial: solving of the mechanical problems on the blackboard, discussion
3. Computer lab: solving computationally complex mechanics problems

Bibliography

Basic:
1. J. Leyko, Mechanika ogólna, t. 1 i 2, PWN, Warszawa, 2000

2. M. Lunc, A. Szaniawski, Zarys mechaniki ogólnej, PNW, Warszawa, 1959
3. M.E.Niezgodziński, T.Niezgodziński, Zbiór zadań z mechaniki ogólnej, PWN, Warszawa, 1998
5. J. Misiak, Zadania z mechaniki ogólnej, t. 1, 2 i 3, WNT, Warszawa, 1992
6. J. Nizioł; Metodyka rozwiązywania zadań z mechaniki, WNT, Warszawa, 2002
7. W. Biały, Metodyczny zbiór zadań z mechaniki, WNT, Warszawa, 2004

Additional:
1. A.Bedford, W.Fowler, Engineering Mechanics, Prentice Hall, 2002
2. R.C.Hibbeler, Engineering mechanics, PEARSON, 20133.
3. J.Awrejcewicz, Mechanika techniczna, Warszawa WNT 200980

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	62	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	63	2,50