COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical mechanics [S1Energ1>MT]

Course

Field of study
Power Engineering

Year/Semester
1/2

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
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

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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. Developing students" skills: analytical thinking, associating and conscious use of computational methods, modeling of physical phenomena occurring in technology.

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 ordered knowledge of materials that meet the construction and operational requirements of machines and devices, modeling of mechanical systems; strength analysis of basic mechanical constructions; has the knowledge needed to understand the principles of operation of basic machine parts, the selection of typical machine parts; knows and understands the essence of technically and technologically proper construction of machines and devices, as well as knows the economic aspects of their construction
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:

Learning outcomes presented above are verified as follows:
Lecture: written egzam verifying proper understanding of the concepts of technical mechanics. Issues of theory will be delivered to the students
Exercises: tests and assessment activities in the classroom

Programme content

Elements of vector algebra. Statics including: axioms of statics, theorem of three forces, equilibrium equations for various force systems (concurrent, parallel, 2 and 3 dimensional), 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, centers of gravity and moments of inertia. Strength of materials: concepts and principles of strength of materials, state of stress, deformation, Hooke"s law, conditions of strength and stiffness for simple load cases, complex state of stress, material strain and strength hypotheses.
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 rigid body, various kinds of motion (translation, rotation, planar, spherical, general), complex motion of a point.
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

Teaching methods

Lectures: multimedia presentation, ilustrated 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.Niezgodzińscy, Zbiór zadań z mechaniki ogólnej, Wydawnictwo Naukowe PWN, Warszawa, 2009

Breakdown of average student's workload

	Hours	ECTS
Total workload	144	5,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	67	2,00