COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanics and theory of mechanisms

Course

Field of study

Mechanical engineering

Year/Semester

2/3

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

22

Laboratory classes

0

Other (e.g. online)

0

Tutorials

22

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Institute of Applied Mechanics

Faculty of Mechanical Engineering

Poznan University of Technology

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of physics and mathematics including algebra, trigonometry, vector calculus, differential calculus, integral calculus.

Ability to solve tasks in the field of linear algebra, trigonometry, differential and integral calculus, the ability to obtain information from indicated sources.

Understanding the need to expand own competences.

Course objective

Obtaining knowledge in mechanics of material point and rigid body in technical terms, needed to solve technical problems related to the operation of machinery and equipment.

Course-related learning outcomes

Knowledge

1. Student has ordered, theory-founded knowledge in statics, which allows to calculate: systems of forces, balance of planar and spatial systems; determine support values; analyze: beams, columns, frames and trusses static.

2. Student has ordered, theory-founded knowledge in kinematics of material point, system of material points and rigid body.

3. Student has ordered, theory-founded knowledge in dynamics of material point, system of material points and rigid body.

4. Student knows the limitations of simplified mathematical models used to describe the balance and movement of real bodies and indicate their potential effects. He/she can make a critical analysis of theoretical calculations.

5. Student can indicate recent development of computer aided design software, supporting static, kinematic and dynamic analysis of complex mechanical systems.

6. Student can apply scientific methods in solving problems related to the description and analysis of the movement of mechanical systems. He/she can apply the knowledge and methodology of technical mechanics, as well as theoretical methods in other scientific disciplines.

Skills

1. Student can obtain information from literature, databases and other properly selected sources (also in English) in the field of mechanical engineering and other engineering and technical areas in line with the studied field; can integrate and interpret obtained information, as well as draw conclusions, formulate and justify opinions.

2. Student can use mathematical apparatus to describe concepts of mechanics.

3. Student can evaluate the usefulness of routine methods and tools to solve simple practical engineering tasks and select and apply appropriate method and tools.

4. Student can effectively communicate both with specialists and non-specialists in a given field.

5. Student has the ability to self-learning, including "improving" own professional competences in the area of mechanics.

Social competences

1. Student is aware of the validity and understanding of non-technical aspects and results of engineering activity.

2. Student understands the need for lifelong learning. He/she can put precise questions.

3. Student understands the need to formulate and communicate to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering activity.

4. Student is aware of the risks of obtaining information from unverified sources, including the Internet.

5. Student is aware of the need to use technical solutions with the lowest energy consumption, meeting all other design criteria at the same time.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Credit based on an test consisting of six questions. Each question 1 point. The final grade based on the following grading scale::

2 (not enough) <0%; 50%>

3 (sufficient) (50%; 60%>

3+ (positive plus) (60%; 70%>

4 (good) (70%; 80%>

4+ (good plus) (80%; 90%>

5 (very good) (90%; 100%>

Tutorials: Credit based on three tests in:

- statics,

- kinematics,

- dynamics.

Depending on the obtained sum of points and resulting percentage, the following scores are awarded:

2 (not enough) <0%; 50%>

3 (sufficient) (50%; 60%>

3+ (positive plus) (60%; 70%>

4 (good) (70%; 80%>

4+ (good plus) (80%; 90%>

5 (very good) (90%; 100%>

Programme content

1. Basic definitions in mechanics.

2. Statics of 2D systems of forces.

3. Trusses.

4. Statics of 3D systems of forces.

5. Kinematics of material point in the Cartesian and natural coordinate systems.

6. Kinematics of rigid body: translational and rotary motions.

7. Geometry of masses.

8. Dynamics of material point in the Cartesian and natural coordinate systems.

9. Dynamics of rigid body in translational and rotational motions.

10.Work and power.

11. Mechanical energy, the principle of conservation of mechanical energy, theorem on the equivalence of work and kinetic energy.

Teaching methods

1. Lecture: multimedia presentation supported by examples on the blackboard.

2. Tutorials: solving problems, discussion.

Bibliography

Basic

1. Leyko J., Mechanika ogólna. T. 1, Statyka i kinematyka, Wydawnictwo Naukowe PWN 2010 [in Polish].

2. Leyko J., Mechanika ogólna. T. 2, Dynamika, Wydawnictwo Naukowe PWN 2008 [in Polish].

3. Misiak J., Zadania z mechaniki ogólnej, cz. I, statyka, WNT, Warszawa, 1999 [in Polish].

4. Misiak J., Zadania z mechaniki ogólnej, cz. II, kinematyka, WNT, Warszawa, 1999 [in Polish].

5. Misiak J., Zadania z mechaniki ogólnej, cz. III, dynamika, WNT, Warszawa, 1999 [in Polish].

Additional

1. Niezgodziński M. E., Niezgodziński T., Zbiór zadań z mechaniki ogólnej, Wydawnictwo Naukowe PWN, 2009 [in Polish].

2. Nizioł J., Metodyka rozwiązywania zadań z mechaniki, WNT, Warszawa 2002 [in Polish].

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	65	2,6
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	60	2,4

[1] delete or add other activities as appropriate