COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanics and theory of mechanisms

Course

Field of study

Mechanical engineering

Year/Semester

2/4

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

14

Laboratory classes

0

Other (e.g. online)

0

Tutorials

12

Projects/seminars

0

Number of credit points

4

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 knowledge of mechanics including statics, kinematics of material points, rotational and translational motions, dynamics of rotational and translational motions.

In-depth knowledge of mathematics including algebra, trigonometry, vector calculus, differential calculus, integral calculus, necessary to describe physical phenomena accompanying machine operation.

General theoretical knowledge in the field of mechanical engineering.

Ability to solve tasks in the field of mechanics, the ability to obtain information from indicated sources.

Understanding the need to expand own competences.

Course objective

Obtaining knowledge in theory of mechanisms in technical terms, needed to solve technical problems related to design, built and exploitation of machinery and equipment.

Course-related learning outcomes

Knowledge

1. Student can explain the importance of structural analysis of mechanisms. He/she can apply physical laws to describe and analyze the movement of mechanisms, formulate the principles of motion and force transferring in machines. He/she can analyze machine motion under the action of forces.

2. 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.

3. Student can indicate computer aided design software, supporting static, kinematic and dynamic analysis of mechanisms.

4. Student can indicate recent development in theory of mechanisms.

5. Student can apply scientific methods in solving problems related to designing and exploitation of machines. He/she can apply the knowledge and methodology of theory of mechanism, 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 and theory of mechanisms.

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 exam consisting of six theoretical questions and three problems. Each theoretical question 1 point, each problem 2 points. 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 two tests. 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 theory machines and mechanisms.

2. Structure of mechanisms.

3. Mobility of mechanisms.

4. Kinematics of lever mechanisms: four-bar mechanism, crank-slider mechanism, rocker arm mechanism.

5. Determination of the balancing moment and power of the propulsion motor.

6. Flywheel selection.

7. Balancing of lever mechanisms.

Teaching methods

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

2. Tutorials: solving problems, discussion.

Bibliography

Basic

1. Podstawy Teorii Maszyn i Mechanizmów, Olędzki A, WNT, Warszawa, 1987 [in Polish].

2. Teoria Maszyn i Mechanizmów, Parszewski Z, WNT, Warszawa, 1983 [in Polish].

3. Teoria mechanizmów i manipulatorów. Podstawy i przykłady zastosowań w praktyce, Morecki A.; Knapczyk J., Kędzior J., WNT, Warszawa, 2001 [in Polish].

Additional

1. Mechanism Design: Analysis & Synthesis. A.G. Erdman, G.N. Sandor, & S. Kota 4th Ed. (Web Enhanced), Volume I, Prentice-Hall, 2001.

2. Kinematics and mechanism Design, Suh C. H. Radcliffe C. W., Wiley, New York, 1978.

3. Mechanics of Machines, V. Ramamutri, Alpha Science International Ltd., Harrow U.K., 2005.

4. Mechanisms and Dynamics of Machinery, H. H. Mabie; F. W. Ocvirk, John Wiley & Sons, 1975.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (preparation for tutorials, preparation for tests/exam) [1]	50	2,0

[1] delete or add other activities as appropriate