COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanisms and machines theory

Course

Field of study

Mechanical engineering

Year/Semester

III/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Institute of Applied Mechanics

Faculty of Mechanical Engineering

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge of physics on the level of studies of the first degree and knowledge of mechanics comprising statics, kinematics of material point, rotational motion, planar notion, dynamics of rotational and planar motions.

Deep knowledge of the advanced mathematics comprising algebra, trigonometry, vectors, differential and integral calculus necessary to describe phenomena accompanying work of machines.

Knowledge of basic computer tools and numerical methods enabling performing numerical experiment.

Course objective

Acquisition of knowledge on mechanism theory to solve problems related to design, action and exploitation of machines.

Course-related learning outcomes

Knowledge

Student has a knowledge

1. To explain the meaning of structural analysis of mechanisms, apply physical laws to describe and analyze motion of mechanisms, formulate principles of motion and forces transmission, carry out analysis of machine motion under action of forces.

2. To explain limitations of simplified mathematical models describing actions of machines and point out their effects, carry out critical analysis of theoretical calculations.

3. To use computer software which aids kinematic and dynamic analysis of mechanical systems.

4. To point out current studies on development of mechanism theory and development of computer software for kinematic and dynamic analysis of complex mechanical systems.

5. To apply the scientific method in solving engineering problems related to design and exploitation of machines, to adapt methods of mechanism theory to related scientific fields.

Skills

1. To extract information from the literature, databases and other properly selected sources, ability to reconstruct reasoning described in literature regarding taken assumptions and simplifications.

2. To exploit relevant analytical methods, formulate and solve engineering problems.

3. To communicate effectively with specialists as well as with non-specialists in the field of engineering.

4. To specify ways of further acquisition of knowledge and skills in the field of mechanism theory.

Social competences

1. The student understands the need of life-long learning, of inspiring and organising other person's teaching process.

2. Is aware of importance of engineering knowledge and its importance for society and environment.

3. Understands the need for popularisation of knowledge of mechanical engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Colloqium consisting of 5 problems. Maximum number of points 5; criteria of assessment 3.0 (50%-70%), 4.0 (71%-90%), 5.0 (>90%). Up to 3.5 grade can be obtained on the basis of presence at the lectures and home project.

Programme content

Structure of mechanisms Basic definitions.

Classification of kinematic pairs. Structural and functional classification of mechanisms. Mobility of mechanisms.

Kinematics of mechanisms. Analytical methods of kinematic analysis of lever mechanisms: four-bar linkage, crank-slider mechanism.

Total compensating torque.

Balancing of planar mechanisms.

Selection of flywheel.

Teaching methods

1. Lecture: the presentation ilustrated with examples and problems solutions written down on the blackboard.

Bibliography

Basic

1. Foundations of mechanism and machine theory. In polish: Podstawy Teorii Maszyn i Mechanizmów, Olędzki A, WNT, Warszawa, 1987.

2. Mechanism and machine theory. In polish: Teoria Maszyn i Mechanizmów, Parszewski Z, WNT, Warszawa, 1983.

3. Mechanism and manipulators theory. Foundations and applications. In polish: Teoria mechanizmów i manipulatorów. Podstawy i przykłady zastosowań w praktyce, Morecki A.; Knapczyk J., Kędzior J., WNT, Warszawa, 2001.

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	20	1,0
Classes requiring direct contact with the teacher	15	1,0
Student's own work (literature studies, preparation for classes, preparation for test, report preparation) [1]	5	0,0

[1] delete or add other activities as appropriate