



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Dynamics of mechatronical devices

Course

Field of study

Mechatronics

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr inż. Wojciech Łapka

Responsible for the course/lecturer:

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tel. 61 665 2302

Faculty of Mechanical Engineering

Piotrowo 3 Street, 60-965 Poznań

Prerequisites

Basic engineering knowledge: mathematics, mechanics, material strength, vibration theory, basics of machine construction, ergonomics.

Skills of describing automation systems, defining digital functions, designing digital relay and contactless switching systems.

Understands the need to learn

Course objective

1. Acquainting with the theoretical foundations of dynamics of mechatronic machines and devices, their dynamic analysis and methods of reduction.



2. Development of the ability to identify and analyze dynamical systems.

Course-related learning outcomes

Knowledge

1. Has knowledge of dynamic analysis of mechanical systems. He knows the devices used in mechatronic systems and their operation. He knows the methods of dynamic optimization of machines and devices.
2. Has knowledge of the application of dynamics in the design and operation of machines and devices.
3. Knows the dynamic properties of devices, a description of their dynamic characteristics and their applications. Knows the methods of stabilizing the movement of machine elements.

Skills

1. Obtaining information from the Internet and technical literature on dynamics and mechatronic systems.
2. Can synthesize the subsystems of mechatronic structures into a complex system and perform its dynamic analysis.
3. Can perform a dynamic analysis of mechatronic machines and devices and energetically evaluate the dynamics of the tested systems.

Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people.
2. Is aware of the role of optimization of mechatronic systems in the modern economy and its importance for society and the environment.
3. Can define priorities for the implementation of a specific task.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Credit on the basis of a written exam, which will consist of five theoretical questions in the field of the subject.

Exercises:

Completion of the exercises consists of two parts: 1) solving a task in the field of dynamics of machines in the form of a written project (possible to obtain a maximum of 50% pass), 2) a test with three questions / tasks (possible to obtain a maximum of 50%). The final grade for the exercises results from the sum of the points obtained from the two parts of the test.

Assessment criteria (applies to exercises and exam):



less than 50% insufficient (F), 50-59% satisfactory (E), 60-69% sufficient plus (D), 70-79% good (C), 80-89% good plus (B), 90 -100% very good (A)

Programme content

Lectures:

1. Place and role of machine dynamics in engineering education and mechatronics.
2. Machines, mechanism and their elements. Classical problems of dynamics, differential and integral problems.
3. Analysis of dynamical systems: fundamentals of dynamics, modeling of mechanical systems, dynamic parameters of mechanical systems, reduction of mechanical systems, composing equations of motion of mechanical systems, dynamic characteristics.
4. The theory of vibrations of linear systems with one degree of freedom: natural vibrations - free undamped vibrations, free vibrations with damping, harmonically forced vibrations.
5. Vibrations of machines and structures reduced to the study of a linear system with one degree of freedom.
6. Vibrations of the model with two degrees of freedom.
7. Selected issues of dynamics implemented to mechatronics.

Exercises:

Dynamic analysis of specific structures of mechanical mechatronic systems, physical and mathematical modeling, solving developed mathematical models

Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples given on the board, discussion and analysis of problems.
2. exercises: problem solving, practical exercises, discussion.

Bibliography

Basic

1. Parszewski Z., Drgania i dynamika maszyn, WNT Warszawa 1982.
2. Misiak J., Zadania z mechaniki ogólnej – część III dynamika, WNT, Warszawa, 1999.
3. Osiński Z., Teoria drgań, PWN, Warszawa, 1978.
4. Red. Osiński, Zbiór zadań z teorii drgań, PWN Warszawa 1989.
5. Kozesnik J., Dynamika maszyn, WNT, 1963.



6. R. H. Cannon jr.; Dynamika układów fizycznych, WNT, Warszawa 1973

Additional

1. S. Wiśniewski; Dynamika maszyn, Wyd. Politechniki Poznańskiej

2. Parszewski Z., Teoria maszyn i mechanizmów, WNT, Warszawa, 1978

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	20	1,0

¹ delete or add other activities as appropriate