POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechanical vibrations

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Tutorials

Laboratory classes

Projects/seminars

Other (e.g. online)

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

Dr hab. inż. Maciej TABASZEWSKI

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tel. 61 665 23 90

Faculty of Mechanical Engeenering

ul. Piotrowo 3, 60-965 Poznań

tel.: 61 665 23 61

Responsible for the course/lecturer:

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Prerequisites

Basic knowledge from the fields of mathematics (integration of differential equations, complex numbers, linear algebra, Fourier series), mechanics (dynamics), mechanics of materials

Course objective

Skill of modeling of dynamical systems, knowledge of mechanical vibration theory and vibration analysis.

Course-related learning outcomes

Knowledge

The student knows the basic types of mechanical vibrations, sources and causes of their occurrence, their effects and ways to minimize vibrations

The student knows the principles of building physical and mathematical models of mechanical systems with one and many degrees of freedom

Skills

The student is able to classify and identify the sources of vibration of mechanical systems

The student is able to mathematically describe the vibrations of mechanical systems with one and many degrees of freedom

The student is able to theoretically, and using approximate methods, calculate the amplitude of vibrations and the natural frequencies of mechanical systems

The student is able to identify dynamic properties in mechanical systems

The student is able to apply the methods to minimize machine vibration

Social competences

The student is aware of the negative impact of vibrations on humans, buildings, machines and understands the necessity of minimizing them

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Test, 15- 20 closed questions, passing the subject -50% of the maximum points

Programme content

Basic definitions regarding vibrations. Sources of vibration in machines and devices. Mechanical vibrations in machine construction. Vibration classification. Determination of reduced parameters: mass, stiffness and damping. Mathematical modeling of system - Newton and Lagrange approaches. Description of natural and forced vibrations of the system with one degree of freedom for different excitation forces. Application of Fourier series. Kinematic excitation. Vibroinsulation. Description of motion of multi-degree-of-freedom system. Eigenvalues, eigenvectors. Elimination of vibration. Bending and torsional vibrations of shafts. Estimation of natural frequencies using approximate methods.

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Fundamentals of mechanical systems identification. Basics of vibration measurements. Numerical solution of dynamic motion equations.

Teaching methods

Multimedia presentation with theory and examples.

Bibliography

Basic

1.Arczewski K. i inni, Drgania układów fizycznych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2008

2. Giergiel J. Drgania układów mechanicznych, skrypt 1037, Skrypty uczelnianie AGH, Kraków 1986

3.Parszewski Z., Drgania i Dynamika Maszyn, WNT, Warszawa 1982

Additional

1.Osowski Z. Tłumienie drgań mechanicznych, PWN Warszawa 1986

2.Giergiel J., Uhl T., Identyfikacja układów mechanicznych PWN, Warszawa 1990

3.Harris C.M, Crede C.E., Shock and Vibration Handbook, McGRAW-HILL, New York 1976

Breakdown of average student's workload

	Hours	ECTS
Total workload	315	1,0
Classes requiring direct contact with the teacher	215	0,7
Student's own work (literature studies, preparation for lecture, for laboratory classes, preparation for tests) [1]	10	0,3

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[1] delete or add other activities as appropriate