COURSE DESCRIPTION CARD - SYLLABUS

Course name

Designing power units

Course

Field of study

Construction and exploitation of means of transpor

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

30

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

PhD. Eng. Krzysztof Talaśka

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Tel. No.: 61 665-2244

Faculty of Mechanical Engineering

Piotrowo Str. 3, 60-965 Poznań

Responsible for the course/lecturer:

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Tel. No.: 61 224-4512

Faculty of Mechanical Engineering

Piotrowo Str. 3, 60-965 Poznań

Prerequisites

Student has knowledge of physics (statics, kinematics

and dynamics), mathematics, Basic of machines design I after completing the program of study.

Student has the problem-solving skills of the basics of machine design based on their knowledge, ability to obtain the information from identified sources.

Student understands the need to broaden their competence, willingness to work together as a team.

Course objective

1. Provide students with knowledge of the basics of machine design.

2. Develop students' skills:

- calculation and design of components and assemblies of machines,

- making and reading the technical documentation on the basis of the knowledge from the Engineering Drawing course

- practical use of the knowledge gained from the course: Mechanics, Strength of materials, Theory of machines, Materials, Basics of Machines Design I.

3. Development of students' teamwork skills.

Course-related learning outcomes

Knowledge

1. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about the structure of power transmission system, of kinematic diagrams and functions of gears.

2. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about couplings, parameters of power transmission systems and kinds of power transmission systems.

3. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about belt drives.

4. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about chain drives.

5. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about power screw assemblies.

6. Is up-to-date with the latest trends in mechanical engineering, i.e. machine design, increase in safety and ease of operation, use of modern construction materials.

Skills

1. Is able to prepare technical documentation (descriptive and graphic)of an engineering task.

2. Is able to use acquired mathematical theories to create and analyze simple mathematical models of machines, their components and simple technical systems.

3. Is able to create a diagram of a system, select its items and perform basic calculations using ready-made computational packages for mechanical propulsion of a machine.

4. Is able to perform strength calculations of frames and supporting structures in machines using basic theories of strength.

5. . Is able to use popular packages for technical drawings edition and 3D modeling in sufficient detail to enable the creation of documentation in accordance with the applicable standards and models of virtual machines in three-dimensional space.

6. able to hand draw a simple schematic or a machine component in accordance with the principles of technical drawing.

7. Is able to plan and carry out the process of constructing simple assemblies or machines and formulate requirements for electronic and automatic control systems for industry professionals in mechatronic systems.

Social competences

1. Understands the need and knows the possibilities of lifelong learning.

2. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions.

3. Is aware of the importance of behavior in a professional manner, compliance with the rules of professional ethics and respect for cultural diversity.

4. Has a sense of responsibility for one?s own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam from the lecture, tutorials and project execution.

Programme content

The structure of the machine drive system, the functions of transmission, clutch, the basic parameters of the drive, drive types, kinematic diagrams. Split couplings, design review and applications. Starting layout drive with clutch. Clutch: fixed, controlled, sensitive, overload. Calculation of couplings and the rules for the selection. The general division of drives, design review, the basic parameters. Rules for selection of gear ratios and the calculation of torques. Gears: classification, the outline of the teeth. Helical gear: geometry, kinematics. wheels, interdental force, the base of the structure. Bevel gear, the geometric parameters of the wheels, interdental force. State of stress in the gear wheel teeth. Design calculations of spur gear. Worm gears, geometry, kinematics. Planetary Gear, examples of construction. General characteristics of belt drives, power and tension in the belt cords, power and gear efficiency. The calculation and selection of the design characteristics of belt drives. Chain drives. Power screw assemblies.

Teaching methods

Lecture, project

Bibliography

Basic

1. J. Żółtowski, Podstawy Konstrukcji Maszyn, Oficyna Wydawnicza Politechniki Warszawskiej, 2002.

2. R. Knosala, A. Gwiazda, A. Baier, P. Gendarz, Podstawy Konstrukcji Maszyn, WNT, Warszawa 2000.

3. A. Dziurski, L. Kania, A. Kasprzycki, E. Mazanek, Przykłady obliczeń z Podstawy Konstrukcji Maszyn, Tom 1 i 2, WNT, Warszawa 2005.

Additional

1. Dietrich M.; Podstawy konstrukcji maszyn, Wydawnictwo Naukowo - Techniczne 1995.

2. Niezgodziński M. E., Niezgodziński T.; Wzory, wykresy i tablice wytrzymałościowe, Wydawnictwo Naukowo Techniczne, 1996.

3. Sempruch J., Piątkowski T,; Podstawy konstrukcji maszyn z CAD, Piła, Państwowa Wyższa Szkoła zawodowa w Pile, 2006.

Breakdown of average student's workload

	Hours	ECTS
Total workload	180	6,0
Classes requiring direct contact with the teacher	90	3,0
Student's own work (literature studies, preparation for tutorials, preparation for exam, project preparation) [1]	90	3,0

[1] delete or add other activities as appropriate