COURSE DESCRIPTION CARD - SYLLABUS

Course name
Designing power units [S1MiBP1>PZN]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
30

Number of credit points

6,00

Coordinators

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Lecturers

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:
Has basic knowledge of the basics of machine design and the theory of machines and mechanisms, including mechanical vibrations.

Has basic knowledge of the standardized rules of recording structures and engineering graphics.
Has basic knowledge of the strength of materials, including the basics of the theory of elasticity and plasticity, stress hypotheses, calculation methods for beams, membranes, shafts, joints and other simple structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in mechanical structures.

Skills:
Can plan and carry out the process of constructing uncomplicated machinery units or machines and formulate requirements for electronic components and automatic control systems for industry specialists in mechatronic systems.
Can perform basic functional and strength calculations of machine elements such as traction, gear, friction, bearings, rolling and sliding gears, clutches, brakes.
Can prepare a technical descriptive and drawing documentation of an engineering task.

Social competences:
Is ready to critically assess his knowledge and received content
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.
Is ready to fulfill professional roles responsibly, including:
- observing the rules of professional ethics and requiring this from others, - caring for the achievements and traditions of the profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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	150	6,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	3,00