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
Computer-aided design

Course

Field of study

Engineering Management

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30		
Tutorials	Projects/seminars	
15		

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

PhD. Eng. Krzysztof Talaśka

email: krzysztof.talaska@put.poznan.pl

Tel. No.: 61 224 45 12; 61 665 22 46

Faculty of Mechanical Engineering
ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

PhD. Eng. Dominik Wilczyński

email: dominik.wilczynski@put.poznan.pl

Tel. No.: 61 224 45 12

Faculty of Mechanical Engineering
ul. Piotrowo 3, 60-965 Poznań

Prerequisites

Knowledge of physics (mechanics in the field of: statics, kinematics and dynamics), mathematics, after passing as part of the study program.

Ability to solve problems with the basics of machine design based on knowledge and the ability to obtain information from specified sources.

Awareness of the need to expand their competences, readiness to cooperate within a team.

Course objective

1. Providing students with knowledge of the basics of machine design, to the extent specified by the curriculum content appropriate to the field of study.

2. Developing students' skills:

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- calculating and designing machine components and assemblies,

- documenting and reading technical documentation based on acquired knowledge

   in the field of machine engineering graphics,

- practical use of knowledge gained in the subjects of mechanics,

   strength of materials, machine science, material science.

3. Developing teamwork skills in students

Course-related learning outcomes

Knowledge
Knows the basic issues of construction, technology and techniques related to design and production.

Knows the basic issues of mechanics, design and operation of machines.

Skills
Is able to apply the proper experimental and measurement techniques to solve the problem within the studied subject, including computer simulation in the design, construction and related issues.

Is able to choose the right tools and methods to solve the construction problem in the field of design and operation of machines, and to use them effectively.

Is able to identify changes in requirements, standards, regulations, technical progress and reality of the labor market, and based on them determine the needs of supplementing knowledge.

Social competences
Is aware of initiating activities related to the formulation and transfer of information and cooperation in society in the field of machine design and operation.

Is aware of cooperation and work in a group on solving technical problems within the field of machine design and operation.

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:
Written exam from lecture, test from classes.

Programme content

Lecture:

Basic principles of the design process, elements of the mechanism, characteristics of load types, definition of loads and formulation of appropriate strength conditions. Connections and their calculation: soldered, welded, pressure welded, glued, riveted connections, shaped connections: key, spline, pin, spigot and threaded connections. Screw mechanisms: examples and applications, structural calculations. Flexible components: springs, flexible rubber components.

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The structure of the machine's propulsion system, gears and clutches functions, basic parameters of the drive, types of drives, kinematic diagrams. Clutch breakdown, design and application overview. System start with clutch. Clutches: permanent, controlled, flexible, overload. Calculation of couplings and selection rules from catalogs. General distribution of gears, kinematic diagrams, structure review, basic parameters. Gear selection rules, calculation of gear ratios and moments Toothed gears: classification, meshing principle, tooth outline. Helical gears: meshing geometry, kinematics, geom parameters. wheels, inter-tooth force, base of structure. Bevel gears, systems, teeth variations, wheel geometrical parameters, inter-tooth force. Stress condition in gear teeth of gears. Design calculations of front gears. Worm gears, geometry, kinematics. Planetary gears, construction examples. General characteristics of belt transmissions, forces and stresses in belt tendons, transmitted power and transmission efficiency. Calculation and selection of design features of belt transmissions. Chain gears. Friction gears, selection of materials for wheels, slips, efficiency. Helical-ball gears, types, load capacity, efficiency, examples of structures, selection of structural features.

Tutorials:

Basics of the strength of materials, determining the allowable stress. Example of design process of the machine assembly. Elaboration of technical documentation. Designing of welded joints. Designing of riveted joints. Designing of pin and spigot connections. Designing of key and splined connections. Designing of threaded joints and screw mechanisms. Designing of the drive shafts along with its bearing and selection of the clutch.

Teaching methods

Informative lecture, problem lecture.

Exercise method (subject exercises, exercises) - in the form of auditorium exercises.

Bibliography

Basic

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4. Dietrich M., Podstawy konstrukcji maszyn, Wydawnictwo Naukowo Techniczne 1995.

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

6. 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	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	55	2,0

[1] delete or add other activities as appropriate