COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basic Machine Design

Course

Field of study

Mechanical Engineering

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

part-time

Requirements

compulsory

Number of hours

Lecture

14

Laboratory classes

0

Other (e.g. online)

0

Tutorials

8

Projects/seminars

8

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

dr inż. Rafał Mostowski

email: rafal.mostowski@put.poznan.pl

tel. 61-6652257

Faculty of Mechanical Engineering

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

second person allowed

Prerequisites

KNOWLEDGE: the student has knowledge of mathematics, physics, technical mechanics (including: statics, kinematics and dynamics), engineering graphics, material strength, material science.

SKILLS: the student is able to properly plan the time of the tasks, is able to solve basic problems in the field of machine construction. The student is able to develop and produce technical documentation.

SOCIAL COMPETENCES: the student understands the need for self-education, is able to cooperate in a group and define tasks and priorities for their realization. The student demonstrates independence in solving problems and acquiring and improving acquired knowledge and skills.

Course objective

Passing on knowledge from the fundamentals of machine construction covered by the program content, acquisition and development of skills in constructing machine elements, nodes and assemblies, creating technical documentation, practical use of knowledge from mechanics, durability of materials and stadies of materials, inspiration and shaping teamwork skills.

Course-related learning outcomes

Knowledge

Students have knowledge of mathematics including the basics of analytical geometry, solving systems of linear algebraic equations, differential and integral calculus of the function of one and many variables, and the knowledge necessary to use the mathematical apparatus to describe mechanical issues in machine construction.

He has knowledge of physics concerning analysis of physical phenomena and solving technical (constructional) issues based on the laws of physics.

He has an orderly, theoretically based knowledge of technical mechanics, which allows him to calculate: force systems, equilibrium of flat and spatial systems; determine support values; describe: elements of stress and strain theory, linear-elastic systems; elements of kinematics and dynamics of a material point, material point system and rigid body.

They have a structured knowledge of material strength (in relation to connections and machine elements covered by the software content): methods of determining external and internal forces and moments, methods of determining geometrical characteristics (moments of inertia) of cross-sections. They know and understand the methods: determination of normal and tangential stresses in dangerous machine elements' sections, determination of strength conditions in complex states, simple structural stability analysis (buckling).

They have detailed knowledge of machine design and engineering graphics, to the extent necessary to produce professional technical documentation.

They have basic knowledge of materials science including principles of selection of engineering materials in machine construction.

Skills

Can work individually and in a team; can estimate the time needed to complete a task; can develop and implement a work schedule to ensure that deadlines are met.

Can develop documentation on the implementation of an engineering task in the field of machine construction basics.

Can use the mathematical apparatus to describe mechanical construction issues and apply familiar methods and mathematical models.

Can solve technical problems based on the laws of mechanics, in particular concerning machine elements and mechanical systems.

Can develop technical documentation: copy and measure machine elements and apply additional information concerning tolerances, fits and surface condition. They are able to construct typical machine elements and assemblies based on an appropriate load model taking into account: surface pressures, stresses, friction effects, fatigue strength principles.

Is able to formulate and solve tensile/compression, torsional and bending strength problems in the basic design of machines covered by the software content; effectively determine the basic characteristics of complex cross-sections. They have the ability to determine the computational strength test in complex states taking into account stress hypotheses.

They are able to select engineering materials for mechanical and mechanical engineering applications.

Social competences

Understands the need for lifelong learning; can inspire and organise the learning of others.

Can interact and work in a group, assuming different roles.

Can identify priorities for achieving a specific task or tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

a credit in writing from a lecture and exercises. credit for project work.

Programme content

The concept of construction, its mathematical model with limitations and criteria, features and principles of construction, the process of construction. Issues of normalization, tolerances and fits. Basic phenomena in machines: volumetric, contact, static, and fatigue strength, relaxation and creeping, friction and wear, structural stability. Classifications, construction, functions, principles of selection, applications and problems of construction of mechanical connections: detachable (screw and threaded, shaped), inseparable (welded, soldered, glued, riveted), frictional (pressed, clamped). Susceptible elements: springs and rubber.

Teaching methods

1. Lecture with multimedia presentation.

2. Exercises - solving tasks.

3. Project - a staged realization of project tasks based on presented examples of studies.

Bibliography

Basic

1. Skoć A., Spałek J.: Podstawy konstrukcji maszyn 1, WNT, 2006, 2012

2. Skoć A.: Przykłady obliczeń, zadania do rozwiązania z podstaw konstrukcji maszyn tom I i II, WPŚ Gliwice 2014, 2009

3. Praca zbiorowa pod red. E. Mazanka.: Przykłady obliczeń z podstaw konstrukcji maszyn Tom 1. Połączenia, sprężyny, zawory, wały maszynowe, WNT W-wa 2005, 2012.

Additional

1. Kurmaz L.W., Kurmaz O.L., Podstawy konstruowania węzłów i części maszyn. Podręcznik konstruowania, WPŚ, Kielce 2011.

2. Decker K-H.: Meschinenelemente Fuktion, Gestaltung und Berechnung, Carl Hanser Verlag, München 2009.

3. Pahl G., Beitz W., Nauka konstruowania, WNT, W-wa 1988.

4. Kyzioł L.: Podstawy konstrukcji maszyn część I i II, AMW Gdynia 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	55	2,2
Student's own work (literature studies, preparation for tutorials, preparation for tests, project preparation) [1]	45	1,8

[1] delete or add other activities as appropriate