COURSE DESCRIPTION CARD - SYLLABUS

Course name
Basic of Machin Design [S1IMat1>PKM]

Course

Field of study
Materials 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
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
15

Number of credit points

4,00

Coordinators

dr hab. inż. Michał Śledziński
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Lecturers

Prerequisites

Basics of mechanics and strength of materials as well as material science and heat treatment. Basics of engineering calculations. Engineering graphics - the ability to make sketches and technical drawings. Individual and team work. Creativity and regularity.

Course objective

Transfer of theoretical and practical knowledge in the field of machine construction. Understanding the construction and operation and methodology of designing simple technical devices and their elements. Acquiring the skills of analyzing construction solutions. Development of a simple device design documentation.

Course-related learning outcomes

Knowledge:
1. The student has knowledge from the basics of machine construction in the scope enabling the design of simple technical devices and their elements (K_W05).
2. The student has knowledge of technical mechanics and material strength that allows determining the state of load and stress of calculated machine elements and selecting permissible stresses (K_W09).

3. The student has knowledge in the field of construction, operation and structural features of connections as well as machines teams to analyze and develop simple design documentation (K_W05).
4. The student has knowledge from engineering graphics enabling analysis and presentation of variants of construction solutions (K_W05).
5. The student has knowledge about engineering materials that allows to select the appropriate structural materials and shape their features (K_W10, K_W14).

Skills:
1. The student can use the available sources of knowledge during the implementation of design work and has the ability to self -education (K_U01, KU_05).
2. The student can determine and check the strength criteria for calculated machine elements (K_U15).
3. The student has the ability to design simple technical devices using the principles of engineering graphics (K_U17).
4. The student can choose engineering materials and shape their properties in the design process of machine parts (K_U21).
5. The student can work individually and as a team using computer support techniques in design (K_U02).

Social competences:
1. The student sees the need to constantly acquire and update technical knowledge (K_K01).
2. The student is aware of the engineer's responsibility for technical decisions and their impact on the environment (K_K02).
3. The student sees the role of an engineer in shaping technical awareness in society (K_K05).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: credit based on the colloquium in general and detailed knowledge presented in lectures. Assessment criteria: knowledge of construction, operation and structural features of connections and machine elements. Principles of construction and selection of engineering materials.
Exercises: Passing based on a written test with solving simple computing tasks of machines in the field of machines processed in class. Assessment criteria: correctness of determining the state of load and stress, proper selection of strength criteria, correctness of calculations.
Project: credit based on an individual design task of a simple device. Assessment criteria: Review of the construction and justification of the adopted solution, design methodology, document development.

Programme content

1. Design principles, design methodology, determining the load and stress of machine parts, selection of permissible stresses.
2. Types and characteristics diiferent joints in machine design (riveted, welded, soldered, welded, glued, shaped).
3. Screw connections and mechanisms: types, properties and design algorithm.
4. Elastic elements: structural features.
5. Axles and shafts: design, fatigue strength, impact of notches.
6. Plain and rolling bearings: calculation and selection.
7. Gears and strand transmissions: application, kinematics, design

Teaching methods

Lecture: multimedia presentation, discussion of the presented issues.
Exercises: solving sample calculation tasks by the lecturer (presentation and/or board). Methodological commentary. Independent calculations made by students. Discussion and interpretation of the results.
Project: Student's own work (individual and team) in class. Presenting construction progress. Discussion. Project correctness control.

Bibliography

Basic
1. Osiński Z., Podstawy konstrukcji maszyn. PWN Warszawa 2022.
2. Praca zbiorowa pod red. E. Mazanka: Przykłady obliczeń z podstaw konstrukcji maszyn, t. 1-2. WNT Warszawa 2008, 2009.

3. Chomczyk W., Podstawy konstrukcji maszyn. Wydawnictwo Naukowe PWN, Warszawa 2017.
4. Juchnikowski W., Żółtowski J.: Podstawy konstrukcji maszyn. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004.
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5. Korytkowski B.: Podstawy konstrukcji maszyn. Projektowanie I. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2009.
6. Skrzyszowski Z.: Podnośniki i prasy śrubowe. PKM projektowanie. Wyd. Politechniki Krakowskiej. Kraków 2005.
7. Child P.R.C.: Mechanical Design. Theory and Applications. Elsevier 2021.
8. Mott R.: Machine Elements in Mechanical Design. Pearson 2017.
9. Raeymaekers B.: Design of Mechanical Elements. John Wiley and Sons Ltd 2022.
Additional
1. Szopa T.: Podstawy konstrukcji maszyn. Zasady projektowania i obliczeń inżynierskich, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012.
2. Kurmaz L W., Kurmaz O. L.: Projektowanie węzłów i części maszyn. Wyd. Politechniki Świętokrzyskiej. Kielce 2011.
3. Potrykus J.: Poradnik mechanika. Wyd. Rea 2020.
4. Śledziński M.: Kształtowanie cech konstrukcyjnych tłumika drgań ubijaka pneumatycznego. Rozprawa doktorska. Politechnika Poznańska. Poznań 2006.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	65	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	2,00