



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of machine construction [N1Energ2>PKM]

Course

Field of study

Power Engineering

Year/Semester

2/3

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

10

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

10

Number of credit points

2,00

Coordinators

dr hab. inż. Michał Śledziński

michal.sledzinski@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge in the field of engineering. Engineering graphics - the ability to create sketches and technical drawings in orthogonal projection, executive and assembly drawings of simple machine assemblies. Fundamental knowledge of technical mechanics and strength of materials - analysis of load conditions, material selection, and elementary strength calculations.

Course objective

Transfer of theoretical and practical knowledge in a range of machine design fundamentals. Learning of structure, principles of design and calculations of mechanical devices and their elements. Acquisition of practical skills of designing on the basis of project of a screw gear.

Course-related learning outcomes

Knowledge:

1. Knows design methodology and formulates design and construction assumptions.
2. Identifies the state of loading and stress of machine elements.
3. Selects construction materials.
4. Characterizes the properties and use of joints and mechanical assemblies.

5. Has structured knowledge in the field of knowledge of materials that meet the construction and operational requirements of machines and devices, modeling of mechanical systems; strength analysis of basic mechanical constructions; has the knowledge needed to understand the principles of operation of basic machine parts, the selection of typical machine parts; knows and understands the essence of technically and technologically proper construction of machines and devices, as well as knows the economic aspects of their construction.

6. Has knowledge of the technique of writing and completing technical and design documentation; knows the basic principles of organizing and conducting research in the field of energy problems and presenting the results of their work.

Skills:

1. Analyzes the kinematics of designed devices.
2. Shapes the construction form of machine elements.
3. Calculates machine parts in terms of strength and stability.
4. Designs basic construction nodes.
5. Assesses variants of construction solutions.
6. Uses security standards and regulations.
7. Develops project documentation.

Social competences:

1. Creativity and conceptual thinking. Presentation of own technical solutions in the team.
2. Recognizes the impact of knowledge and professional development on the level of his life and society.
3. Is able to think environmentally.
4. Understands the need and knows the possibilities of continuous training, raising professional, personal and social competences (eg through second and third degree studies, postgraduate studies, courses); and is ready to critically assess knowledge, recognizes its importance in solving cognitive and practical problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: Assessment of knowledge and practical skills during written exam. Evaluation criteria: for each question there is a certain number of points to be scored. On this basis, the percentage score of the colloquium is calculated. Grading scale: up to 49% - 2.0, from 50% - 3.0, from 60% - 3.5, from 70% - 4.0, from 80% - 4.5, from 90% - 5.0.

Project classes: verification of individual projects. Assessment of knowledge and practical skills of design and calculation of machine elements, sketching and drawing of project solutions of individual project in a scope of assembly and production drawings and calculations.

Programme content

- 1) Design methodology
- 2) Identification of load and stress state in machine elements
- 3) Analysis of operation and kinematics of basic machine parts. Forming the structural design.
- 4) Analysis of design variants. Strength calculations.
- 5) Design of basic structural nodes. Selection of structural materials. Standardised elements.
- 6) Connections and assemblies in machine construction
- 7) Creating design documentation

Course topics

Lecture programme covers the following topics:

- 1) Modern approach to design – design thinking.
- 2) Stages of project task implementation.
- 3) Principles of construction. Requirements for constructions.
- 4) Connections in engineering structures – permanent and separable connections. Characteristics. Principles of design and calculation.
- 5) Screw connections and mechanisms. Threads – parameters and properties. Calculation algorithm.
- 6) Bearing assemblies in machine construction. Design and selection of bearings.
- 7) Machine assemblies – shaping structural features, properties, and design.

Project programme covers the following topics:

- 1) Analysis of kinematic schemes, geometry, and load state of screw-nut drive systems.
- 2) Determining forces in structural elements.
- 3) Selection of structural materials.
- 4) Strength calculations
- 5) Selection of standardised elements, working with standards.
- 6) Analysis of shaped connections.
- 7) Creating design documentation for the designed device: calculations, assembly drawings, and detailed drawings.

Teaching methods

Lecture: multimedia presentation.

Exercises: Problem-solving, discussion.

Project: Analysis of project components, discussion.

Bibliography

Basic:

1. Praca zbiorowa pod red. Z. Osińskiego: Podstawy konstrukcji maszyn. PWN Warszawa 2024
2. Horwatt W., Bartoszewicz J.: Podstawy konstrukcji mechanicznych dla elektryków. WNT Warszawa 1975.
3. Praca zbiorowa pod red. E. Mazanka: Przykłady obliczeń z podstaw konstrukcji maszyn. WNT Warszawa 2009
4. Juchnikowski W., Żółtowski J.: Podstawy konstrukcji maszyn. Pomoce do projektowania. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2004.
5. Skrzyszowski Z.: Podnośniki i prasy śrubowe. PKM projektowanie. Kraków 2001.
6. Praca zbiorowa pod red. M. Dietricha: Podstawy konstrukcji maszyn. Tom 3, WNT, Warszawa, 1999.

Additional:

1. Oleksiuk W., Paprocki K.: Konstrukcja mechanicznych zespołów sprzętu elektronicznego. WKŁ Warszawa 1997.
2. Poradnik mechanika. Wydawnictwo Rea. Warszawa 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00