



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of machine design [S1ETI1>PKM]

### Course

Field of study

Education in Technology and Informatics

Year/Semester

2/4

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

26

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

15

### Number of credit points

5,00

### Coordinators

dr hab. inż. Michał Śledziński

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### 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 materials science, as well as technical mechanics and strength of materials - analysis of load conditions, material selection, and elementary strength calculations.

### Course objective

Provide knowledge in the general principles and methodology of machine design. Acquiring skills in designing simple machine components and assemblies, as well as preparing technical documentation. Developing practical application skills based on existing knowledge in areas such as mechanics, material strength, and materials science. Cultivating the ability to independently analyze the technical aspects of the construction, operation, and structural solutions of simple machine components and mechanical devices.

### Course-related learning outcomes

Knowledge:

1. Student has basic knowledge in the general principles of engineering design [K1\_W10].
2. Student is familiar with fundamental standards applied in the design of selected mechanical devices

[K1\_W07].

3. Student understands the principles of engineering graphics and applies them in design [K1\_W09].

4. Student understands the structure and operation of basic assemblies in selected mechanical designs [K1\_W10].

5. Student knows the principles of developing technical documentation for the designed structures [K1\_W09, K\_W10].

Skills:

1. Student can analyze the load condition of simple machine parts, select permissible stresses, and determine the geometry of components [K1\_U03, K1\_U16].

2. Student is capable of presenting individual conceptual design solutions within a team, designing connections, bearings, and drive components [K1\_U01, K1\_U05, K1\_U06].

3. Student can effectively apply acquired knowledge, including materials science, technical mechanics, and material strength, in the design process [K1\_U01, K1\_U06, K1\_U07].

4. Student is able to perform design calculations for simple machine elements, select standardized components, create conceptual sketches, and develop technical documentation [K1\_U06, K1\_U07, K1\_U10].

5. Student pursues creative, environmentally friendly, and cost-effective solutions [K1\_U15].

Social competences:

1. Student understands the need for continuous learning and expanding competencies [K1\_K03].

2. Student can work independently on assigned tasks as well as collaboratively within a team [K1\_K01].

3. Student respects the principles of professional ethics [K1\_K02].

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Examination covering theoretical and practical aspects (computational tasks).

Exercises: Quiz on simple computational tasks.

Project: Evaluation of an individual project related to the design of a simple mechanical device.

Grading principles: Passing based on knowledge of the construction, operation, and calculation of simple machine elements.

## Programme content

Basic principles and methodology of machine assembly. Static and fatigue strength, as well as stability analysis of structures. Topics include standardization, tolerances, and fits. Construction, operation, properties, and application of selected mechanical elements in drive systems, such as separable and inseparable connections, flexible elements, bearings, machine shafts, and gears.

## Teaching methods

Lecture: Multimedia presentation, solving sample problems on the board.

Exercises: Problem-solving, discussion.

Project: Analysis of project components, discussion.

## Bibliography

Basic:

1. Osiński Z.: Podstawy konstrukcji maszyn. PWN Warszawa 2020.

2. Praca zbiorowa pod red. E. Mazanka: Przykłady obliczeń z podstaw konstrukcji maszyn, t. 1-2. WNT Warszawa 2008, 2009.

3. Knosala R., Gwiazda A., Baier A., Gendarz P.: Podstawy Konstrukcji Maszyn: ćwiczenia, WNT, Warszawa 2018.

4. Juchnikowski W., Żółtowski J.: Podstawy konstrukcji maszyn. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004.

5. Korytkowski B.: Podstawy konstrukcji maszyn. Projektowanie I. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2009.

Additional:

1. Szopa T.: Podstawy konstrukcji maszyn. Zasady projektowania i obliczeń inżynierskich, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50