



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of Machine Design

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

polish

Requirements

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

15

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

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Instytut Konstrukcji Maszyn

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

### Prerequisites

The student has knowledge of physics (mechanics in the field of: statics, kinematics and dynamics), mathematics, basics of machine design after passing as part of the study program.

The student has the ability to solve problems based on their knowledge (basics of machine design, mechanics, mathematics, materials science, strength of materials) and the ability to obtain information from indicated sources.

The student understands the need to expand their competences, shows readiness to cooperate within a team.



### Course objective

1. Providing students with knowledge of the basics of machine construction, to the extent specified by the curriculum content appropriate to the field of study.
2. Developing students' skills:
  - calculating and constructing machine components and assemblies,
  - documenting and reading technical documentation based on knowledge gained in the subject of machine engineering graphics,
  - practical use of knowledge gained in the subjects: mechanics, strength of materials, machine science, material science.

### Course-related learning outcomes

#### Knowledge

Has structured, theoretically founded knowledge of engineering graphics and machine construction: technical drawing, object projection, basic principles of engineering graphics, the use of CAD (Computer Aided Design) in machine design

Has basic knowledge of the main departments of technical mechanics: kinematics, material point dynamics and rigid body

Has basic knowledge of the strength of materials, including the basics of the theory of elasticity and plasticity, effort hypotheses, methods for calculating beams, membranes, shafts, joints and other simple structural elements, as well as methods for testing material strength and the state of deformation and stress in structures

#### Skills

Is able to communicate using various techniques in a professional environment and other environments using the formal record of construction, technical drawing, concepts and definitions of the field of study being studied

Is able to create a system diagram, select elements and perform basic calculations of the mechanical, aerodynamic, automatic, electrical and electronic systems of machine components or aviation devices

Is able to analyze facilities and technical solutions, is able to search in the catalogs and on the manufacturers' websites ready components of machines and devices, including means of transport and storage, assess their suitability for use in own technical and organizational projects

#### Social competences

Is aware of the importance of maintaining the principles of professional ethics

Understands the need for a critical assessment of knowledge and continuous learning

is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for decisions



## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing a self-made project.

## Programme content

Basic principles of the construction process, elements of the mechanism, characteristics of load types, definition of loads and formulation of appropriate strength conditions. Screw mechanisms: examples and applications, structural calculations.

PART - 66 (THEORY - 11.25 hours)

MODULE 6. MATERIALS AND EQUIPMENT

6.9 Gearbox

Types of gears and their application;

Gear ratios, reduction and multiplication systems, passive and active gears, tooth patterns;

Belts and pulleys, chains and sprocket teeth. [2]

MODULE 7A. MAINTENANCE ACTIVITIES

7.15 Welding, brazing, soldering and bonding

a) Soldering methods, testing of soldered joints. [2]

b) Welding and brazing methods;

Examination of welded and brazed joints;

Joining methods and testing of glued joints. [2]

## Teaching methods

Presentation illustrated with sample projects.

## Bibliography

Basic

1. Praca zbiorowa pod red. Z. Osińskiego, Podstawy konstrukcji maszyn, PWN, W-wa, 1999
2. Praca zbiorowa pod red. M. Dietricha: Podstawy konstrukcji maszyn. Tom 3, WNT, Wa-wa, 1999.
3. Osiński Zbigniew, Sprzęgła, PWN, Warszawa 1998
4. Dziama A., Michniewicz M., Niedźwiedzki A.: Przekładnie zębate. PWN, Wa-wa, 1989.
5. Ochęduszko K.: Koła zębate, WNT 1985.



6. Dudziak M.: Przekładnie ciągłowe. PWN, Warszawa, 1997.

Additional

1. Niemann G., Maschinenelemente t. I, II, III, Springer, Verlag Berlin, 1965

2. Müller L., Przekładnie obiegowe, PWN, Warszawa, 1983

3. Bahl G., Beitz W., Nauka konstruowania, WNT, Warszawa 1984

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	19	0,8
Student's own work (literature studies, preparation for project classes, project implementation) <sup>1</sup>	6	0,2

<sup>1</sup> delete or add other activities as appropriate