



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basic of Machin Design

Course

Field of study

Materials Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

15

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

dr inż. Dariusz Torzyński

Responsible for the course/lecturer:

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Prerequisites

Knowledge of the strength of materials, material science, manufacturing techniques, mechanics, metrology. Skills: logical thinking, recording the structure in the form of technical documentation.

Understanding the need to learn and acquire new knowledge

Course objective

Understanding the basics of an engineer's construction knowledge, acquiring construction skills, acquiring the ability to apply basic sciences, strength, materials science and manufacturing techniques to shape objects, learning the general principles of building assemblies and machine components.



Course-related learning outcomes

Knowledge

1. Student is able to characterize the subject and the design process - [K_W05]
2. Student is able to formulate and analyze construction problems - [K_W05]
3. Student has knowledge of the use of engineering materials for selected elements of machine parts - [K_W06, K_W08, K_W14]
4. Student should determine the loads on the structure and shape its form on this basis - [K_W09]
5. Student is able to characterize selected connections and construction of machine parts - [K_W05]

Skills

1. Student is able to perform strength analyzes of machine elements and mechanical systems - [K_U15]
2. Student is able to use analytical methods to shape selected parts of machines - [K_U10]
3. Student is able to present the designed objects including engineering graphics - [K_U02, K_U17]
4. Student is able to obtain information from the literature, databases, standards and catalogs regarding materials and machine parts used in the construction - [K_U01]

Social competences

1. Student is aware of the influence and responsibility of the designer for the developed design solutions - [K_K02]
2. Student is able to cooperate and work in project teams - [K_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: credit on the basis of tests of general and detailed knowledge presented during classes in the subject, conducted in the middle and at the end of the semester.

Classes: pass based on tests on solving simple construction tasks.

Designing: credit based on the presented effects of own design works and oral justification of their form.

Programme content

Lecture:

1. Design and construction? object, subject, process, need.
2. Modeling the structure? machine as a technical system, design tasks, types of structures, design features, design evaluation criteria, examples.
3. Principles of construction? unequivocally, simple, reliable, optimal loads, optimal construction material. Loads on machines? definitions, division, distribution in time, effects of occurrence.



4. Systematics of connections in machine building. Welded connections? applications, weldability of materials, types of welds, calculations. Riveted joints? applications, rules of forming connections, calculations.
5. Bolted connections? applications, thread features, normalization, connection loads, material combinations, calculations, connection protection. Other types of connections? welded, glued, soldered, rolled.
6. Shafts and axles? purpose, construction, rules of shaping, calculations.
7. Shaft to hub connections? form-fit connections? keyed, splined? shaping, calculating; friction connections? fits in connections, distribution of forces, calculations.
8. Bearing? rolling and plain bearings? application, construction, division, friction models, calculations.
9. Drive systems? characteristics, types, structure, kinematics.
10. Gear gears? geometry, loads, strength calculations.
11. Cable transmissions? pulleys? geometry, loads, stresses.
12. Couplings? types, functions, materials used, basics of calculations.

Tutorials:

1. Analysis of loads and stresses in statically determinate systems.
2. Calculations of beams.
3. Calculations of welded joints.
4. Calculations of bolted connections.
5. Geometric calculations of toothed and belt transmissions
6. Calculations of shafts, shaft-hub connections and rolling bearings.

Projects:

1. Design of a bending beam with consideration of the influence of the material on the design effects.
2. Design of objects of the connector, catch etc. class with the use of welded and bolted connections.
3. Design of the structure of the drive system and its parts.

Teaching methods

1. Lecture: presentation illustrated with examples given on the blackboard, solving problems.
2. Tutorials: problem solving, discussion.



3. Project: individual project work of the student.

Bibliography

Basic

1. Podstawy konstrukcji maszyn, praca zb. pod red. Zb. Osińskiego, PWN, W-wa, 1999.
2. Podstawy konstrukcji napędów maszyn, praca zb. pod red. B. Branowskiego, Wydawnictwo Politechniki Poznańskiej, Poznań, 2007.
3. Podstawy konstrukcji maszyn, praca zb. pod red. M. Dietricha, WNT, W-wa, 1999.

Additional

1. G. Pahl, W. Beitz.: Nauka konstruowania, WNT, W-wa, 1984.
2. L. Kurmaz, O. Kurmaz: Podstawy konstruowania węzłów i części maszyn, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,0
Classes requiring direct contact with the teacher	65	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	45	2

¹ delete or add other activities as appropriate