COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of Machine Design

Course

Field of study

Aviation

Year/Semester

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

15

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

The student has knowledge of physics (mechanics in the field of: statics, kinematics and dynamics), mathematics, after passing the course of study.

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

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

Course objective

1. Providing students with knowledge of the basics of machine design, to the extent specified by the curriculum content appropriate for the field of study.

2. Developing students' skills:

- calculation and construction of machine elements and assemblies,

- documenting and reading technical documentation based on the knowledge gained in the field of machine engineering graphics,

- practical use of knowledge acquired in the following subjects: mechanics, strength of materials, machine science, materials science.

3. Developing teamwork skills in students

Course-related learning outcomes

Knowledge

1. has an ordered, theoretically founded knowledge in the field of engineering graphics and machine construction: technical drawing, object projection, basic principles of engineering graphics, the use of CAD (Computer Aided Design) graphic programs in the construction of machines

2. has extended knowledge in the field of material strength, including the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures, and has basic knowledge of the main departments of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body

Skills

1. can solve tasks using basic knowledge of aerodynamics, flight mechanics and flow around a body

2. can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites, ready components of machines and devices, including means and devices, assess their suitability for use in their own technical and organizational projects

Social competences

1. understands that in technology, knowledge and skills very quickly become obsolete

2. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

L- Written exam from the lecture, passing the exercises.

Programme content

Basic principles of the construction process, mechanism elements, characteristics of types of loads, defining loads and formulating appropriate strength conditions. Connections and their calculation: soldered, welded, welded, glued; riveted, shaped connections: groove, pin, threaded connections. Screw mechanisms: examples and application, structural calculations. Flexible elements: springs, rubber flexible elements

PART - 66 (THEORY - 22.50 hours)

MODULE 6. MATERIALS AND EQUIPMENT

6.5 Fasteners

6.5.1 Threads

Thread nomenclature;

Thread forms, sizes and tolerances for standard ship threads

air;

Measuring threads. [2]

6.5.2 Bolts, studs, screws

Types of bolts: specification, identification and marking of aircraft bolts,

international standards;

Nuts: self-locking, anchors, standard types;

Screws for metal parts: specification of screws used in ships

air;

Stud bolts: types and use, insertion and removal;

Self-tapping screws, dowel pins. [2]

6.5.3 Latches

Spring and tab washers, retaining plates, cotter pins, locknuts

single coil, wire protection, quick release latches, keys,

snap rings, pins. [2]

6.5.4 Aircraft Rivets

Types of solid and blind rivets: specification and identification, processing

thermal. [2]

6.6 Pipes and joints

a) Identification and types of rigid and flexible pipes and their fittings used in ships

air. [2]

b) Standard fittings in high pressure water lines, fuel lines, oil lines, pneumatic lines and air systems used in aircraft. [2]

6.7 Springs

Types of springs, materials, properties and application. [2]

6.8 Bearings

Bearing purposes, loads, materials, construction;

Types of bearings and their application. [2]

6.10 Control lines

Types of lines;

End fittings, tension nuts and compensating devices;

Pulleys and components of cable systems;

Bowden links;

Flexible aircraft control systems. [2]

MODULE 7A. MAINTENANCE ACTIVITIES

7.10 Springs

Study and testing of springs. [2]

7.11 Bearings

Testing, cleaning and examination of bearings;

bearing lubrication requirements;

Bearing damage and its causes. [2]

7.12 Gearbox

Examination of gears, play;

Testing of belts and pulleys, chains and sprocket teeth;

Testing of screw jacks, lifting devices, push-pull systems. [2]

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.

Classes: performing tasks given by the teacher - practical exercises.

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 cięgnowe. 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	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for written tests)[1]	20	0,5

[1] delete or add other activities as appropriate