COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanical Structures

Course

Field of study

Environmental Engineering

Year/Semester

2 / 3

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

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

15

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

1. Knowledge:

Knowledge of selected topics in mathematics, physics, engineering mechanics, materials strength and thermodynamics

2. Skills:

Use the knowledge to explain processes and phenomena in mechanical and flow devices

3. Social competencies:

Awareness of the need to constantly update and supplement knowledge and skills

Able to share their skills with people in the group

Course objective

1. Purchase by the students skills of resolving basic problems of mechanical strength in mechanical constructions

2. Getting to know with flow devices used in heating, ventilation and air conditioning.

Course-related learning outcomes

Knowledge

1. Basic rules of calculation and selection of the most commonly used machine connections [KIS_W02]

2. Types, principles and functions of valves used for cold and hot water [KIS_W02]

3. Types, principles of operation, methods of selection and adjustment of pumps used for cold and hot water [KIS_W02]

4. Types, principles and ways to adjust the fan in the ventilation and air conditioning [KIS_W02]

Skills

1. Execution of construction drawings of single parts and assembly drawing of simple devices [KIS_U09]

2. Execution of drawings of buildings in sections and rectangular projections in accordance with the applicable rules and graphical notations [KIS_U10, KIS_U11]

3. Execution of installation drawings on rectangular projection construction layouts as well as in axonometric [KIS_U07]

Social competences

1. The student understands the need for consultation with experts [KIS_K02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: Written final test

Project: Execution and completion of design projects: 2 (typical mechanical constructions) + 1 (pumping station).

Programme content

Mechanical loads and stresses. Fatigue strength. Uncoupled connections - welded and rivet connections, and coupled connections screw connections. The function of fittings. Shutoff valves, dampers and non-return valves. Control valves and safety valves - construction, principles of functioning, application. Thermostatic valves - construction, principles of functioning, criterion of throttling. Types of pumps - operation parameters: capacity, pumping pressure, power, efficiency. Pumping system - geometrical and energy quantities. Cavitations in pumping systems. Characteristics of rotary pumps and their

operating point. Parallel and series operation of pumps. Control of pumps capacity. Fans and blowers - characteristics of devices, specific measures. Types of fans. Characteristics of centrifugal fans. Axial fans - construction, velocity and pressure pattern, supply power. Control of axial fans.

Teaching methods

Lecture with multimedia presentation. Design exercises (2-3 projects) and auditoriums (calculation tasks).

Bibliography

Basic

1. Janiak M.: Urządzenia mechaniczne w inżynierii środowiska. Cz.1. Wydawnictwo Politechniki Poznańskiej 1993.

2. Janiak M., Krzyżaniak G.: Urządzenia mechaniczne w inżynierii środowiska. Cz. 2. Wydawnictwo Politechniki Poznańskiej 1995.

3. Praca zbiorowa: Mały Poradnik Mechanika tom I i II. Warszawa 1998

Additional

1. Stępniewski : Pompy. PWN Warszawa, 1985.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	65	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	60	2,0

[1] delete or add other activities as appropriate