



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Hydraulic and Pneumatic Drives

### Course

Field of study

Mechanical Engineering

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

18

Laboratory classes

9

Other (e.g. online)

Tutorials

0

Projects/seminars

0

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

dr inż. Damian Frackowiak

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Faculty of Mechanical Engineering

Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

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tel. 61 224 4514

Faculty of Mechanical Engineering

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### Prerequisites

KNOWLEDGE: Knowledge of the basics of machine design, fluid mechanics, automation and electrical engineering basics.

SKILLS: Ability to solve problems in the field of fluid mechanics and base of machines design.

SOCIAL COMPETENCIES: Understanding the need to expand their competence, willingness to work together as a team.

### Course objective

Understanding the structure and principles of hydraulics and pneumatics. Familiarizing yourself with the



basic propulsion systems and controls. Getting to know the basics of design for hydraulic and pneumatic systems.

### Course-related learning outcomes

#### Knowledge

Has basic knowledge of the construction and operation of hydraulic and pneumatic drives and systems.

Has a basic knowledge of standardized rules of writing symbols and graphic elements of hydraulic and pneumatic drives and controls.

He is familiar with the latest trends in the construction of fluid drives, i.e. automation, mechatronization of fluid systems.

#### Skills

Is able to use learned mathematical theories to create simple mathematical models of elements and hydraulic and pneumatic systems.

Can create a layout diagram, select elements and perform basic calculations.

Can hand-draw standardized symbols and diagrams of hydraulic and pneumatic components and systems.

#### Social competences

Understands the need and knows the possibilities of lifelong learning.

Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions.

Is aware of the importance of behavior in a professional manner, compliance with the rules of professional ethics and respect for cultural diversity.

Has a sense of responsibility for one's own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam of the course. Assessment of laboratory exercises based on assessments of the reports and short entrance tests.

### Programme content

Structure, principle of operation and properties of hydraulic and pneumatic drives. Application. Hydraulic fluids. Basics of calculations of hydraulic and pneumatic systems. Elements of hydraulic and pneumatic systems: pumps, compressors, power installations, valves, motors, actuators, auxiliary elements. Basic hydraulic and pneumatic systems. Hydrostatic transmissions. Circuits implemented in proportional and servo techniques. Application programs for computer aided analysis of hydraulic and pneumatic systems. As part of the laboratory: learning about the construction, principles of operation of



hydraulic and pneumatic elements and systems, determining the characteristics of basic elements, testing selected drive systems.

### Teaching methods

1. Lecture with multimedia presentation.
2. Laboratory classes.

### Bibliography

#### Basic

1. Osiecki A.: Hydrostatyczny napęd maszyn. WNT, Warszawa , 2004.
2. Stryczek St.: Napęd hydrostatyczny elementy. WNT, Warszawa, 2003.
3. Stryczek St.: Napęd hydrostatyczny układy . WNT, Warszawa, 2003.
4. Szenajch W.: Napęd i sterowanie pneumatyczne. WNT, Warszawa, 2003.

#### Additional

1. Szydelski Z.: Pojazdy samochodowe napęd i sterowanie hydrauliczne. WKŁ, W-wa,1999.
2. Pr. zb. pod red. J. Świdra: Sterowanie i automatyzacja procesów technologicznych i układów mechatronicznych. Wyd. Politechniki Śląskiej, Gliwice, 2002.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	55	2,0

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