



## Silhouette of the educational component

Programme of the discipline



Навчально-науковий інститут  
механічної інженерії і транспорту

# Interface devices for mechatronic systems

### Code and name of the speciality

131 - Applied mechanics

### Institute

Educational and Research Institute of Mechanical Engineering and Transport (MIT)

### Educational programme

Applied mechanics

### Department

parts Machine hydraulic pneumatic systems (148)

### Level of education

Bachelor's degree

### Type of discipline

Selective

### Semester

8

### Language of instruction

Ukrainian

## Teachers, developers



### Mariana Stryzhak

[Mariana.Stryzhak@khp.edu.ua](mailto:Mariana.Stryzhak@khp.edu.ua)

D. in Engineering, Associate Professor, Associate Professor of the Department of Machine Parts and Hydropneumatic Systems of NTU "KhPI"

Author of more than 60 scientific and educational publications. Leading lecturer in the courses: "Theory of Automatic Control and Dynamics of Mechatronic Systems", "Modern Element Base of Mechatronic Systems", "Volumetric Hydraulic Machines", "Fundamentals of Calculation and Design of Electro-Hydraulic and Electro-Pneumatic Transducers", "Fundamentals of Scientific Research".

[More about the lecturer on the department's website](#)

## General information

### Abstracts.

The discipline "Interface Devices of Mechatronic Systems" is designed to help train automation specialists for various sectors of modern industry. During the study of this discipline, students will acquire knowledge that will help them apply modern developments in the field of analysis and synthesis of control systems in the design of automated technological processes used in the industrial sector of Ukraine.

### Purpose and objectives of the discipline

The quality and content of introduces students to the general principles of building automated systems that combine hydraulic or pneumatic power units and electronics as a means of controlling them.

### Class format

Lectures, practical classes, essay. The final control is a test.

### Competences

SC1. Ability to analyse materials, structures and processes based on the laws, theories and methods of mathematics, natural sciences and applied mechanics.

SC6. The ability to describe and classify technical objects and processes based on knowledge and understanding of basic mechanical theories and practices, as well as basic knowledge of related sciences.  
SC7. Ability to apply appropriate quantitative mathematical, technical methods and computer software to solve typical professional problems of applied mechanics.

### **Learning outcomes**

ELO2. Use knowledge of the theoretical foundations of electrical engineering, electronics and related sciences to solve professional problems;  
PO4. Use application software to perform technological calculations, process information and research results;  
PO6. Understand the principle of operation of automated control systems for technological equipment, in particular microprocessor-based, be able to select and use the best means of automation, automation of production processes.

### **Scope of the discipline**

The total volume of the discipline 120 hours (4 ECTS credits): lectures - 30 hours, practical classes - 20 hours, independent work - 70 hours.

### **Prerequisites for studying the discipline (prerequisites)**

To successfully complete the course, you must have knowledge and practical skills in the following areas disciplines: "Fundamentals of Informatics", "Higher Mathematics", "Fundamentals of Hydraulic Drive Theory", "Fundamentals of Pneumatic Drive Theory", "Automatic Control Theory and Dynamics of Hydraulic Pneumatic Systems".

### **Features of the discipline, teaching methods and technologies**

Lectures are delivered interactively with the use of multimedia technologies, and practical classes are held in a computer lab. Learning materials are available to students via Microsoft Teams.

### **Programme of the discipline**

#### **Topics of lecture classes**

Topic 1. Electromechanical converters.

2See. Single-stage (single-stage) power amplifiers of the nozzle-gate and jet tube types.

Topic 3: Single-stage power amplifiers of valve and spool type.

Topic 4. Two-stage power amplifiers. EHP as part of an electro-hydraulic tracking drive. The first stage of amplification. Pressure-controlled characteristic.

Topic 5. Nozzle-flapper bridge. Flow control characteristic. Transfer function of the bridge.

Topic 6. The second stage of the EGP amplification is the throttling spool.

Topic 7. Electromechanical transducer (EMF). Transfer function of the EMF.

Topic 8: Proportional power amplifiers.

#### **Topics of practical classes**

1.

#### **Topics of laboratory work**

#### **Independent work**

The course involves writing an essay based on an individual assignment. The result is a written report.

### **Literature and training materials**

1. Popovych M.G. Theory of automatic control / M.G. Popovych, O.V. Kovalchuk - K.: Lybid, 1997. 574 p.
2. Senko V. I., Trubitsyn K. V., Chibelis V. I.. Power conversion technology: a textbook. Kyiv, Igor Sikorsky Kyiv Polytechnic Institute, 2022, 241 p.
3. Elperin I.V. Automation of production processes. Textbook. - Lira-K, 2021, 378 p.

## Evaluation system

### Criteria for assessing student performance and distribution of points

100% of the final grade consists of assessment results in the form of a test (40%) and ongoing assessment (60%).

Assessment: written assignment (2 questions from theory + problem solving) and an oral presentation.  
Current assessment: calculation task (40% each).

### Rating scale

Total points	National assessment	ECTS
90-100	Excellent	A
82-89	Good.	B
75-81	Good.	C
64-74	Satisfactory	D
60-63	Satisfactory	E
35-59	Unsatisfactory (further study required)	FX
1-34	Unsatisfactory (re-study required)	F

## Standards of academic ethics and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, good manners, goodwill, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, they should be brought to the attention of the staff of the Institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

## Approval

Silabus has been approved

29.03.2023p.

Head of the Department  
Anatoliy Gaidamaka

Date of approval, signature

Guarantor of the OP  
Alexander PERMYAKOV