



## Syllabus of the educational component

Program of educational discipline

### Automation of foundry production

**Specialty**

131 – Applied mechanics

**Educational program**

Applied mechanics. Computerized foundry production. Artistic and jewelry Lithuania

**Level of education**

Master's degree

**Semester**

1

**Institute**

NNI of Mechanical Engineering and Transport

**Department**

Foundry production (142)

**Course type**

Special (professional), selective

**Language of instruction**

Ukrainian, English

### Lecturers and course developers

**Pavlo Serhiyovych Penzev**

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Senior lecturer of the foundry department of NTU "KhPI"

Work experience - 7 years. Author of more than 20 scientific and educational and methodological works. Courses: "Automation of foundry production", "CAD/CAM/CAE systems in foundry production", "Automation tools in foundry production".

[Learn more about the teacher on the department's website](#)

### General information

**Summary**

The course "Automation of foundry production" is aimed at familiarization students with modern methods of mechanization and automation, principles of work, work processes, designs and calculations of technological machines used in the production of castings in sand molds.

**Course objectives and goals**

The purpose of studying the academic discipline is to acquire knowledge in the field of automation of foundry production equipment, rational selection of basic schemes of automation of production processes, principles of operation of devices and equipment and creation of automated systems based on them.

**Format of classes**

Lectures, laboratory classes, practical classes, independent work, consultations. Individual task - term paper. Final control - credit.

## Competencies

GC1. Ability to identify, pose and solve engineering and technical and scientific and applied problems.  
GC2. Ability to make informed decisions. GC3. Ability to use information and communication technologies. GC4. Ability to generate new ideas (creativity).  
GC5. Ability to develop and manage projects.  
GC8. Ability to learn and master modern knowledge.  
FC3. Application of appropriate methods and resources of modern engineering based on information technologies to solve a wide range of engineering problems using the latest approaches, forecasting methods with awareness of the invariance of solutions.  
FC4. The ability to critically

## Learning outcomes

LR3 Apply automation systems for research, design and construction work, technological preparation and engineering analysis in mechanical engineering.  
LR4 Use modern methods of optimizing the parameters of technical systems by means of system analysis, mathematical and computer modeling, in particular under the conditions of incomplete and contradictory information.  
LR10 Search for necessary information in scientific and technical literature, electronic databases and other sources, assimilate, evaluate and analyze this information.  
LR17 Demonstrate knowledge of the organization, functioning, technical and software support of information and measurement computerized systems in scientific research of mechanical systems and processes.

## Student workload

The total scope of the discipline is 180 hours. (6 ECTS credits): lectures – 48 hours, laboratory work – 16 hours, practical work – 16 hours, independent work – 100 hours.

## Course prerequisites

To successfully complete the course, you must have knowledge and practical skills from the following disciplines: "CAD/CAM/SAE systems in foundry production", "Technology and equipment of special types of casting", "Heat exchange in a foundry mold", "Theory of the formation of castings".

## Features of the course, teaching and learning methods, and technologies

Lectures are conducted interactively using multimedia technologies. In the laboratory classes use a project approach to learning, game methods, focus on application of information technologies. Study materials are available to students through OneNote Class Notebook..

## Program of the course

### Topics of the lectures

Topic 1. Control of technological parameters in foundry production  
Topic 2. Metrological characteristics of measuring devices. Construction of control schemes of technological parameters, accuracy and reliability of control means  
Topic 3. Construction of schemes of measuring devices and selection of elements of measuring schemes  
Topic 4. Technology of installation of measuring devices and means of control of technological parameters  
Topic 5. Technical means of managing technological processes in foundry production  
Topic 6. Automation tools in the control schemes of foundry equipment drives.  
Topic 7. Schemes, constructions, technical characteristics, calculation of the main elements of control schemes Ability to build control schemes  
Topic 8. Automation tools in technological control schemes. Construction of technological control schemes

Topic 9. Local automation schemes. The main principles of developing schemes for remote and automatic control of technological equipment

Topic 10. Principles of installation of electrical, pneumatic and hydraulic drive schemes. Installation of electrical, pneumatic and hydraulic drive circuits

Topic 11. Basics of operation of equipment with means of automation

### Topics of the workshops

Topic 1. Classification of elements of automatic systems by purpose. Classification of sensors

Topic 2. Contact and non-contact logical elements

Topic 3. Automation of the distribution of the molding mixture by bunkers

Topic 4. Automation of knocking out castings from molds

### Topics of the laboratory classes

Topic 1. Verification of automatic bridges

Topic 2. Graduation of thermocouples

Topic 3. Analysis of operation and adjustment of the universal regulator ru 4-16a

Topic 4. Analysis of the design and setting of the software control device

Topic 4. Logical elements

### Self-study

The program of the course "Automation of foundry production" provides for course work. Students are also recommended additional materials for independent study and analysis.

## Course materials and recommended reading

### Basic literature

1 Dyomin D.O. Technical means of automation in foundry production. Electronic lecture notes, 2000

2 Logical elements. Methodical instructions for performing laboratory work in the discipline "Automation of foundry production", KhPI, 1986

### Assessment and grading

#### Criteria for assessment of student performance, and the final score structure

100% of the final grade consists of assessment results in the form of credit (40%) and current assessment (60%).

*Test:* written assignment (2 questions from theories) and an oral report.

*Current assessment:* 2 modular control and calculation task (20% each).

#### Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

### Norms of academic integrity and course policy

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

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

## Approval

Approved by

22.08.2023

Date, signature



Head of Department  
Oleg AKIMOV

22.08.2023

Date, signature



Guarantor of the educational  
program

Oleksandr SHELKOVY