



Syllabus Course Program

Design of foundry workshops and districts

Specialty

131 – Applied mechanics

Educational program

Applied mechanics. Computerized foundry production. Artistic and jewelry Lithuania

Educational level

Master's degree

Semester

2

Institute

NNI of Mechanical Engineering and Transport

Department

Foundry production (142)

Course type

Special (professional), Elective

Language of instruction

Ukrainian, English

Lecturers and course developers



Tatiana Viktorivna Berlizieva

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Candidate of Technical Sciences, Associate Professor of the Department of Foundry Production of NTU "KhPI"

Work experience - 10 years. Author and co-author of more than 60 scientific and methodical publications. Courses: "Design of foundry workshops and sites", "Finishing operations in the production of castings", "Alloys for artistic and jewelry casting", "Finishing of cast artistic products", "Furnaces of foundry workshops".

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

General information

Summary

The course "Design of foundry shops and sites" develops knowledge of technological means of obtaining castings and the type of equipment used to perform basic and auxiliary operations, calculation methods and the sequence of design for each department. Allows you to be able to critically evaluate various means of obtaining castings, to make the optimal decision when choosing a technological process, calculating equipment, shop area, as well as when planning the main departments of a foundry shop.

Course objectives and goals

Studying the basics of designing foundry shops, getting to know the stages of design and the procedure for developing technological documentation of projects, standards and requirements for designing the main and auxiliary departments of a foundry shop .

Format of classes

Lectures, practical classes, independent work, consultations. Individual calculation task. Final control - credit.

Competencies

- GC1. Ability to identify, pose and solve engineering and technical and scientific and applied problems
- GC3. Ability to use information and communication technologies.
- GC 5. Ability to develop and manage projects
- GC7. Ability to communicate in a foreign language
- 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.
- FC5. The ability to set a problem and determine ways to solve a problem by means of applied mechanics and related subject areas, knowledge of methods of finding the optimal solution under conditions of incomplete information and conflicting requirements..
- FC7. The ability to describe, classify and model a wide range of technical objects and processes, which is based on a deep knowledge and understanding of mechanical theories and practices, as well as basic knowledge of related sciences.
- FC8. The ability to generate new ideas and the ability to substantiate new innovative projects and promote them on the market.
- FC10. The ability to clearly and unambiguously convey one's own conclusions, knowledge and explanations to specialists and non-specialists, in particular, in the process of teaching. Ability to understand the work of others, give and receive clear instructions.

Learning outcomes

- LR1 Apply specialized conceptual knowledge of the latest methods and techniques of design, analysis and research of structures, machines and/or processes in the field of mechanical engineering and related fields of knowledge.
- LR5 Independently set and solve problems of an innovative nature, argue and defend the obtained results and decisions.
- LR8 Master modern knowledge, technologies, tools and methods, in particular through independent study of specialized literature, participation in scientific, technical and educational events.
- LR10 Search for necessary information in scientific and technical literature, electronic databases and other sources, assimilate, evaluate and analyze this information
- LR16 Demonstrate knowledge and understanding of the basics of production process organization

Student workload

The total volume of the discipline is 120 hours. (4 credits ECTS): lectures – 32 hours, practical classes – 16 hours, independent work – 72 hours.

Course prerequisites

To successfully complete the course, you must have knowledge and practical skills from the following disciplines: "Fundamentals of scientific research", "Modern technologies in applied mechanics", "Automation of foundry production", "Resource-saving technologies and melting of alloys with special properties" .

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

Lectures are conducted interactively using multimedia technologies. On practical ones classes use a project approach to learning, game methods, focus on application of information technologies in the design of foundry workshops and sites. Study materials are available to students through OneNote Class Notebook. .

Program of the course

Topics of lectures

Topic 1. Introduction

The state and prospects for the development of foundry production. Content and organization of project works. Tasks, scope and content of shop design

Topic 2. Classification and structure of foundries

The concept of a production program and the main provisions on which design is based

Topic 3. Mode of operation of the foundry shop and working time fund

Basic terms and definitions. Concept of productivity of foundry equipment. The instability of the production process. Coherence of the work of the departments of the foundry shop. Basics of calculating the amount of foundry equipment

Topic 4. Designing production departments of a foundry shop. Melting department of the foundry

Analysis of alloys used for the production of cast parts. Compilation of the metal balance by alloy grades. The choice of the technological process of alloy melting. Selection and calculation of technological equipment

Topic 5. Design of production departments of a foundry shop. Calculation of molding, pouring and punching departments

Classification of foundry molds and features of their manufacturing technologies. Determination of the volume of production of forms. Selection of the technological process of manufacturing, strengthening and assembly of molds, filling them with metal and cooling and knocking out castings. Selection of the main technological equipment for formation and determination of its quantity

Topic 6. Designing production departments of a foundry. Selection of equipment and calculation of core divisions

Classification of rods. Determination of production volumes of rods of each technological group. Selection of technological processes for the production of rods. Selection of the main technological equipment and determination of its quantity. Auxiliary departments and warehouses in the core department. Selection and organization of transport in the core department

Topic 7. Designing production departments of a foundry. The mixture preparation department of the foundry shop. Cleaning departments of foundries

Modern classification and formulations of molding and core mixtures. Determining the volume of costs of molding and core mixtures for the implementation of the design program. The choice of technological processes for the preparation of molding and core mixtures. Determination of the number of mixers. Design solutions of mixing departments. Measures for labor and environmental protection in the mixing department

Topic 8. Designing production departments of a foundry. Auxiliary departments of foundries

Molding materials. Bulk materials. Determination of material consumption. Location of warehouses, equipment and their mechanization. Precinct for the preparation of molding materials. Site for preparation of bulk materials. Calculation of warehouse areas. Compositions of equipment, rods and castings. Auxiliary services of the foundry shop. Layout of foundry warehouses. Selection of type, types of equipment and calculation of foundry warehouses. Internal transport of foundries

Topics of the workshops

Topic 1. Calculation of the shop's production program

Topic 2. Calculation of the melting department of the foundry shop

Topic 3. Calculation of departments of the foundry shop. Development of the layout of departments

Topic 4. Development of the core compartment layout and equipment calculation

Topic 5. Development of the cleaning department of the foundry shop

Topic 6. Selection of equipment and calculation of areas of auxiliary departments of foundries.

Consideration of types of foundry layouts

Topics of the laboratory classes

Laboratory works within the discipline are not provided .

Self-study

The course involves the implementation of an individual calculation task based on the calculation of various departments of the foundry shop according to the given description of production. The result of calculations is drawn up in a written report.

Students are also recommended additional materials for independent study and analysis .

Course materials and recommended reading

Basic literature

1. Design of foundry workshops / G.E. Fedorov, M.M. Yamshinskyi, V.G. Mogylatenko, I.M. Guriya, I.O. Shynskyi. - K.: NTUU "KPI", 2011. -Part 1. - 588 p.
2. Design of foundry shops / G.E. Fedorov, M.M. Yamshinskyi, V.G. Mogylatenko, I.M. Guriya, I.O. Shynskyi. - K.: NTUU "KPI", 2011. - Part 2. - 316 p.
3. Sumtsov V.P. Foundry shop equipment. - K.: Vipol, 1993. - 552p.

Additional literature

1. Makarevych O.P. Production of castings from special steels / O.P. Makarevych, G.E. Fedorov, E.O. Platonov. - K.: Publishing House of NTUU "KPI", 2005. - 712 p.
2. DSTU 3008-95. Documentation. Reports in the field of science and technology. Structure and design rules
Tumansky B.F. Designing foundries. - K: UMKVO, 1992. - 192 p.

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%).

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

Current evaluation : 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



Head of Department
Oleg AKIMOV

22.08.2023



Guarantor of the educational
program
Olexander SHELKOVIY