



Силабус освітнього компонента Програма навчальної дисципліни



"Technological Equipment of Machine-assembling Shops

Шифр та назва спеціальності
131 - Applied mechanics

Освітня програма
Applied mechanics

Рівень освіти
Bachelor

Семестр
7

Інститут
NNI of Mechanical Engineering and Transport

Кафедра
Mechanical engineering technology and metal cutting machines (146)

Тип дисципліни
Special (professional) training, selective

Мова викладання
English

Викладачі, розробники



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Associate Professor, Candidate of Technical Sciences, Associate Professor of the department "Technology of mechanical engineering and metal-cutting lathes" KhPI. Work experience - 30years. Author of more than 70 scientific and educational and methodological works. Leading lecturer in the disciplines: "BASICS OF TECHNOLOGICAL FORECASTING "," Technological processes of folding machines and machines ", "TECHNOLOGICAL EQUIPMENT"

[Детальніше про викладача на сайті кафедри](#)

Загальна інформація

Анотація

The discipline is aimed at mastering the theoretical foundations and systematized knowledge of the use of technological equipment in metalworking production. The main areas of use of technological equipment are considered. The peculiarities of individual ones are considered methods, and their capabilities and limitations in ensuring the accuracy and quality of processing in devices are discussed.

Мета та цілі дисципліни

Develop the student's theoretical ideas and practical skills for future activities related to the use of modern technologies

devices during mechanical processing to solve specific technological problems in mechanical engineering.

Формат занять

Lectures, practical classes. Laboratory classes, final control, calculation, and graphic work - exam.

Компетентності

ZK1. The ability to think abstractly.

ZK2. Ability to apply knowledge in practical situations.

ZK4. Ability to search, process and analyze information from various sources.

ZK5. Ability to generate new ideas (creativity).

ZK6. The ability to conduct research at a certain level.

ZK8. The ability to act socially responsibly and consciously.

ZK10. Skills in using information and communication technologies.

ZK11. Ability to work in a team.

ZK12. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.

FK1. Ability to apply typical analytical methods and computer software tools for solving engineering problems of industrial mechanical engineering, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate computer software for solving engineering problems of industrial mechanical engineering.

FC2. The ability to apply fundamental scientific facts, concepts, theories, principles to solve professional problems and practical problems of industrial mechanical engineering.

Program competencies according to the educational program.

FK4. The ability to implement engineering developments in industrial mechanical engineering, taking into account technical, organizational, legal, economic and environmental aspects throughout the life cycle of the machine: from design, construction, operation, maintenance, diagnostics and disposal.

FC5. Ability to use computerized design systems and specialized application software to solve engineering tasks in the field of mechanical engineering.

FC6. The ability to evaluate the technical and economic efficiency of typical systems and their components based on the application of analytical methods, analysis of analogues and the use of available data.

FC7. The ability to make effective decisions regarding the selection of construction materials, equipment, processes and to combine theory and practice to solve an engineering task.

FC8. The ability to realize creative and innovative potential in project development in the field of mechanical engineering.

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Результати навчання

PH4. Carry out engineering calculations to solve complex problems and practical problems in industrial mechanical engineering.

PH5. Analyze engineering objects, processes and methods.

PH7. Prepare production and operate products using automatic life cycle support systems.

PH9. Choose and apply the necessary equipment, tools and methods.

PH10. To understand the problems of labor protection and legal aspects of engineering activity in industrial mechanical engineering, the skills of forecasting the social and environmental consequences of the implementation of technical tasks.

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Обсяг дисципліни

The total volume of the discipline is 180 hours: lectures - 48 hours, practical classes - 16 hours, laboratory classes - 16 hours, independent work - 100 hours

Передумови вивчення дисципліни (пререквізити)

«Обладнання та транспорт механообробних цехів» «Технологічні основи машинобудування»,
«Робочі процеси сучасних виробництв».

Особливості дисципліни, методи та технології навчання

Teaching methods:

- the educational project, which conceptually consists of "learning through activity" is used mainly in practical work (rarely in lectures). Application of the method involves providing students with a wide enough set of projects to realize the possibility of a real choice. It should be noted that projects can be both individual and collective. The latter, among other things, contribute to the student's mastering of collective work methods. In order to master the project method of work, the student is provided with instructions on working on the project (methodological instructions). Each educational project involves obtaining a final result using improvised material on the topic of work, the results of which become a reference for obtaining a final assessment. Collective discussion of difficult moments in solving the given task forms the terrain of collective work and is a positive experience for both the student and the teacher.
 - The project method is mainly focused on mastering the methods of working with DHW. An obligatory component of the learning process is control, or verification of learning results. The essence of checking the learning results is to identify the level of knowledge acquisition by students, which must meet the educational standard of the academic discipline.
 - Explanatory and illustrative method, which involves the use of visual lecture material in the form of tables, posters, presentations made in the MS Power Point environment.
 - Reproductive method used in performing practical work and solving typical tasks.
 - The method of stimulating and motivating learning is applicable when encouraging students to independently study the materials of the discipline (the possibility of receiving motivational additional points for active work in classes, when preparing reports or completing a calculation task in advance).
 - Methods of control and self-control, which involve checking current knowledge with instant surveys or short-term tests at the beginning of the lesson, as well as planned modular controls.
- Mastering the discipline involves constant contact between the teacher and the student through a conversation, lecture, story, shows, demonstrations, self-study, independent work, generalization and classification of the information received, etc

Програма навчальної дисципліни

Теми лекційних занять

Lecture 1

Technological aspects of equipment use. Appointment of technological equipment in machine-building production. Machine tools and their place in the technological process. Classification machine tools.

Lecture 2

Elements of device efficiency. Cost reduction processing and increasing labor productivity. Increase accuracy of processing. Ease of working conditions and achievements of safety

Lecture 3

Technical and organizational analyses. Determining the performance of the device when performing a technological operation. Determination of manufacturability of the structure and ensuring performance.

Lecture 4

Economic analysis in the design of machine tools. compared cost as a criterion for evaluating the designs of special devices. Determination of the comparative cost when using devices in

personal and serial production.

Lecture 5

Economic analysis when changing operations of the technological process. Consideration options

Basing parts in machine tools. Substantive provisions.

Normative base. Classification of bases.

Lecture 6

Peculiarities of basing on machines with CNC

Lecture 7

Peculiarities of basing when installing the part in the machine tool devices Base selection methodology.

Examples of basing on milling machines

Lecture 8

Basing prismatic parts. Basing cylindrical parts.

Basing on conical surfaces. Full and partial basing.

Combined basing.

Lecture 9

Installation elements. Designs of installation elements. Permanent and auxiliary supports. Their application.

Calculation of errors based on machines with CNC

Analysis of structures of auxiliary supports.

Lecture 10

Determination of installation errors during the installation of the part machine tool. Basing errors and their elimination.

Basing errors when installing prismatic parts.

Lecture 11

Basing errors of cylindrical parts. Definition

an error of basing when processing parts on metal cutting machines

machines Determining baseline errors

Errors in basing the workpiece on CNC machines

Lecture 12

Pinning errors. Determination of fixing errors and their elimination. Determining deformations when fixing the part.

Analysis of the constructions of the fixing mechanisms of the machines with CNC and VM.

Lecture 13

Device errors. Errors in the manufacture and wear of machine tools devices Basing devices on machines

Lecture 14

Determining device positioning errors on the milling table

the machine Determination of installation errors during processing on CNC machine tools.

Lecture 15

The use of technological equipment in machine-building production

Lecture 16

Auxiliary devices. Terms. Auxiliary devices
drilling machines. Auxiliary devices of milling machines
Automated KVP

Lecture 17

Auxiliary devices of lathes. Auxiliary devices
PC machines. Auxiliary devices Milling and drilling -
machine tool boring machine.
An auxiliary tool for CNC machine tools and machine tool modules

Lecture 18

Control and measuring devices. Classification of control and measuring devices. Basics of the KVP scheme.
Systems of automated design of technological equipment.

Lecture 19

Designs of control and measuring devices. KVP with
movable elements. KVP with electric contact
converters. KVP with pneumatic converters
An auxiliary tool for CNC machine tools and machine tool modules

Lecture 20

Calculation of the accuracy of KVP. Examples of control and measurement
devices and their calculation.
control and measuring devices for verification
gears

Lecture 21

Assembly devices. Terms. Universal joint ventures. Special joint ventures.
Examples of SP application
Automated assembly devices

Lecture 22

Devices of aggregate machines. Features of constructions of AV devices Normative documents of AV
equipment.

Lecture 23

Design devices for aggregate machines. Features
constructions Unification of units and parts of AV devices
Features of the designs of the devices of different aggregate machines
layouts

Lecture 24

Universal and specialized adjustable devices
Universally assembled devices. Unified
reconfigurable technological equipment

Теми практичних занять

P1. Analysis of the working area of the machine during surface forming
details

P2. Application of devices in serial conditions
production

P3. Analysis of the design of the machine tool.

P4. Development of an automated calculation program
cost of using devices

P5

Technological equipment in conditions of flexible production
Regulatory documents on basing.

- P6. Peculiarities of basing on machines with CNC
- P7. Examples of basing on milling machines
- P 8. Calculation of errors based on machines with CNC
- P9. Analysis of structures of auxiliary supports
- P10. Basing errors when installing prismatic parts.
- P11. Automated KVP
- P12. An auxiliary tool for CNC machine tools and machine tool modules
- P13. Systems of automated design of technological equipment.
- P14. An auxiliary tool for CNC machines and machine modules
- P15. Control and measuring devices for verification gears
- P16. Automated assembly devices
- P17. Normative documents of equipment AV.
- P18. Features of the designs of the devices of different aggregate machine layouts
- P19. Development of devices using USP and SRP kits

Теми лабораторних робіт

Самостійна робота

. The course involves the performance of an individual task on the analysis of a specific problem in industrial mechanical engineering. All results of individual developments are drawn up in a written report (abstract). Additional materials (videos, articles) for independent study and analysis are also recommended to those seeking education

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Література та навчальні матеріали

1. L. I. Bozhko Technology of mechanical engineering. Design of technological equipment. Lviv. Edition "World", 2015.
- 2 Technological equipment of mechanical assembly production: textbook / A.I. Borovik. - K.: Condor, 2008. - 726 p.
3. Mechanical engineering technology: Handbook for the performance of qualification works: education manual / I.I. Yurchyshyn, Y.M. Lytvynyak, I.E. Hrytsai and others; under the editorship I.I. Yurchyshyn - Lviv : edition of Lviv Polytechnic University, 2009. – 527 p.
4. Rudenko P.O. Design of technological processes in mechanical engineering / P.O. Rudenko. – K.: Vyshcha shk., 2003. – 420 p.
5. Watchman B.D. Technological basics of mechanical engineering / B.D. Storozh, M.L. Mazur. - Iv. Frankivsk, Khmelnytskyi: TUP, 2003. – 153 p..

«Додаткова література»

1. 1. Kopsakov V.S. Basics of designing applications. M.: Mashinobuduvannya, 2106. 277p.
2. Mykytyansky V.V. Accuracy of devices in mechanical engineering M.: 2014. 128 p.
3. Integrative generative technologies: учеб. allowance [for study high academic institution] / A.I. Hrabchenko, Y.N. Vnukov, V.L. Dobroskok, L.I. Pupan, V.A. Fadeev; edited A.I. Hrabchenko. - Kharkiv: NTU "Khpy", 2011. - 416 p.

Система оцінювання

Критерії оцінювання успішності студента та розподіл балів

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

Current evaluation: 2 tests (12% and 10%) and an individual calculation task (10%), an active position when discussing issues at lectures and practical classes (5%), successful performance of practical work (10%), preparation of an individual illustrated report on given topic (3%).

Exam: written assignment (2 questions from theory + solution of a practical problem) and oral conversation

Шкала оцінювання

Сума балів	Національна оцінка	ECTS
90–100	Відмінно	A
82–89	Добре	B
75–81	Добре	C
64–74	Задовільно	D
60–63	Задовільно	E
35–59	Незадовільно (потрібне додаткове вивчення)	FX
1–34	Незадовільно (потрібне повторне вивчення)	F

Норми академічної етики і політика курсу

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/>

Погодження

Syllabus agreed



Завідувач кафедри
Oleksandr PERMYAKOV

Гарант ОП