

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**

**NATIONAL METALLURGICAL ACADEMY OF UKRAINE**

**Educational and professional programME**

**““Technology of Mechanical Engineering””**

**for first (bachelor) level of higher education**

**on a specialty 131 “Applied Mechanics”**

**in the field of knowledge 13 “Mechanical Engineering”**

APPROVED BY THE SCIENTIFIC COUNCIL

Chairman of the Scientific Council

/signature/ O. G. Velychko

(Minutes No. 4 from May 04, 2017)

**SEAL:**/Ministry of Education and Science of Ukraine. National Metallurgical Academy of Ukraine. 02070766./

The educational programme is to be implemented on

05.05.2017

Rector /signature/ O. G. Velychko

**SEAL:**/Ministry of Education and Science of Ukraine. National Metallurgical Academy of Ukraine. 02070766./

**Dnipro, 2017**

**Educational and professional programme “Mechanical Engineering Technology” for first (bachelor) level of higher education on a specialty 131 “Applied Mechanics” in the field of knowledge 13 “Mechanical Engineering”**

1. Introduced by academic and methodological commission of NMetAU on a specialty 131 “Applied Mechanics” (minutes No. 6 from 14.02.2017)
2. Introduced for the first time

Developers of the educational and professional program:

*Gryshyn Volodymyr Sergiyovych*, Candidate of Engineering Sciences, associate professor, Head of Mechanical Engineering Technology Department in NMetAU

*Negrub Svitlana Leonidivna*, Candidate of Engineering Sciences, associate professor of Mechanical Engineering Technology Department in NMetAU

*Marunych Viacheslav Oleksiyovych*, Candidate of Engineering Sciences, associate professor of Mechanical Engineering Technology Department in NMetAU

Agreed by:

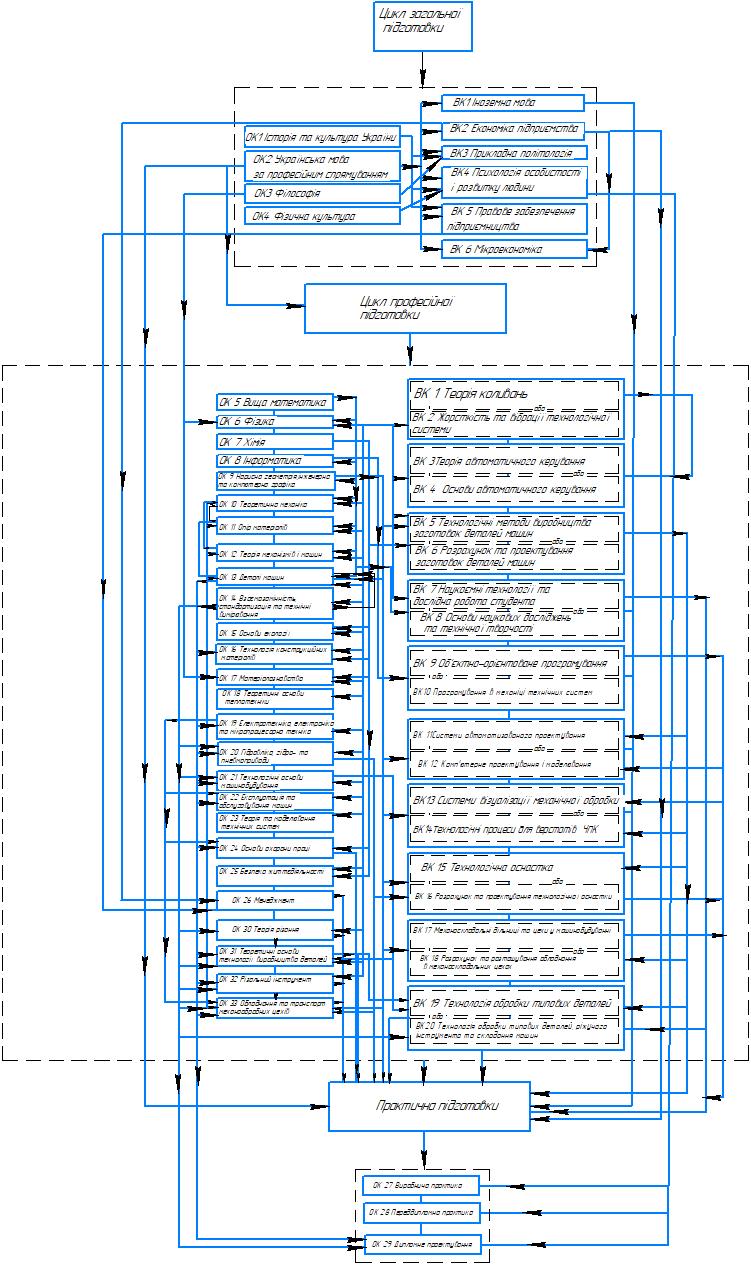
First vice-rector of NMetAU

Doctor of Engineering Sciences, prof. /signature/ V. P. Ivashchenko

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| --- | --- | --- | --- |
| Type of diploma and extent of the program | | Single degree. Program length – 3 years 10 months. | |
| Higher educational institution | | National Metallurgical Academy of Ukraine (NMetAU) | |
| License | | Series АЕ No. 636828 from 19.06.2015 р. | |
| Accreditation | | Certificate НД-ІV No. 044 from May 26, 2010  Period of validity July 1, 2020 | |
| Level of the program | | First (bachelor) level of higher education | |
| Field of knowledge | | 13 Mechanical Engineering | |
| Specialty | | 131 Applied Mechanics | |
| Limitations concerning the modes of study | | without limitations | |
| Educational qualification | | Bachelor in Applied Mechanics | |
| **А** | **Purpose of the program** | | |
|  | Training of the specialists with modern (innovative, advanced) engineering thinking, theoretical knowledge and practical skills necessary for solution of the problems in the subject matter of the activity with using contemporary information technologies, computer simulation, analysis and forecasting. Facilitate student acquirement of the competences necessary to continue education and professional activity. | | |
| **В** | **Description of the program** | | |
| 1 | Subject matter, field | * Object of study: formation of the specialist’ personality competent to solve multi-pronged problems in the area of professional activity, which provide for fundamental rethinking of available and creation of new complete knowledge and professional practice. * Learning goals: training of the specialists with modern (innovative, advanced) engineering thinking, theoretical knowledge and practical skills necessary for solution of the problems in the subject matter of the activity. * Theoretical content of the subject: concepts, categories, conceptions, principles of engineering sciences and technological activity. * Methods, methodologies and technologies: general scientific methods of obtaining knowledge, mathematical, statistical and qualitative analysis methods, mathematical simulation, forecasting, coding, information and communication technologies, methods of exploratory activity and presentation of the results. * Tools and equipment: present-day information and communication equipment, information systems and software products, which are used in technological activity. | |
| 2 | Focus of the programme: general/ special | General programme: “Applied Mechanics”.  Area of study: “Mechanical Engineering Technology”.  **The program is focused on the formation of competencies that provide the opportunity to solve professional problems arising in the field of mechanical engineering technology using computer-aided design and modeling methods.** | |
| 3 | Orientation of the programme | Educational and professional program; focuses on modern achievements in the field of technical disciplines, design of technological processes for the manufacture of parts and development of control programs for equipment. | |
| 4 | Special aspects of the programme | **Educational and professional program; focuses on modern achievements in the field of technical disciplines, design of technological processes for the manufacture of parts and development of control programs for equipment.** | |
| **С** | **Employment and eligibility for further study** | | |
| 1 | Employment | Jobs: on state and private enterprises irrespective of the form of ownership. | |
| 2 | Continuation of education | Opportunity to continue education on the other (master’s) level of higher education, and also improve qualification and obtain additional postgraduate education. | |
| **D** | **Style of teaching** | | |
| 1 | Approaches to teaching and study | Student-centered, problem-oriented study, initiative self-study. Elements of distance (on-line, electronic) learning.  Lectures, laboratory practicals, individual studies, self-guided work with learning support materials on disciplines and initiative self-guided work, performance of course papers and individual works. Consultations. Practical field experience of students. Academic advising, support and consultation during preparation of qualifying paper. | |
| 2 | Assessment system | Continuous assessment; modular control; semester (final); state attestation of the graduating students. The main forms of control: oral and written examinations, pas-fail tests, defense of звіту on practice, defense of course projects, public defense of graduation paper. | |
| **E** | **Program competences** | | |
| 1 | Integral | | IC. Competence to solve complicated tasks and problems in mechanical engineering technology, which involves using the acquired professional knowledge, competences and skills, implementation of innovative form of work and conducting researches in the area of mechanical engineering technology. |
| 2 | General | | GC1. Competence to use information and communication technologies.  GC2. Competence to use knowledge in real world situations.  GC3. Competence to study and master contemporary knowledge.  GC4. Competence to work independently and as a part of a team.  GC5. Competence to search, process and analyze information from different sources.  GC6. Competence to speak official professional language both in speaking and writing.  GC7. Competence to make grounded decisions.  GC8. Competence to work with foreign engineering documents and speak foreign language. |
| 2 | Regulatory and professional | | RPC1. Competence to use typical analytical methods and hardware and software to solve engineering problems of applied mechanics.  RPC2. Competence to use knowledge and concepts of fundamental scientific facts, conceptions, theories, principles.  RPC3. Competence to implement engineering designs to obtain practical outcomes.  RPC4. Competence to understand the tasks of the contemporary production, intended to satisfy the needs of consumers.  RPC5. Competence to define technical and economical efficiency of the typical systems and their components based on using the analytical methods.  RPC6. Competence to understand and take into consideration legal, social, ecological, ethical, economical, engineering and commercial limitations and risks while implementing engineering solutions.  RPC7. Competence to use creative and innovative potential in project designs.  RPC8. Competence to use knowledge on the principles of commercial and economical activity.  RPC9. Competence to design plans and projects, intended to achieve the set goal and oriented towards available resources.  RPC10. Competence to use regulatory requirements of the branch standards.  RPC11. Competence to use knowledge in solution of tasks on improvement and management of the products’ quality.  RPC12. Competence to use knowledge to choose engineering materials, facilities, processes.  RPC13. Competence to use engineering knowledge in different branches.  RPC14. Competence to perform control of the tools which are used and optimize usage of engineering and mechanical parameters.  RPC15. Competence to define, analyze and solve problems in professional sphere. |
| 3 | Additional professional | | APC1. Competence to use the system of practical competences and skills, which allow to preserve health, development and improvement of psychophysical abilities to achieve life and professional goal.  APC2. Competence to use principles of engineering, servicing and repair of hydraulic and pneumatic drives in applied mechanics.  APC3. Competence to use acquired knowledge during engineering, servicing and repair of the industrial equipment.  APC4. Competence to use professionally profiled knowledge and practical skills to solve typical problems of the specialty;  APC5. Competence to implement new projects into production, especially with purpose to improve their efficiency.  APC6. Competence to use knowledge and understand engineering support of production to assess potential of the enterprises.  APC7. Competence to engineer systems of support for production.  APC8. Competence to arrange, plan, control and manage the processes, technologies on enterprise. |
| **F** | **Learning outcomes of the program** | | |
| 1 | **LO1. Demonstration of understanding cause-and-effect link in the historical events of the past.**  **LO2. Competence to identify the phenomena of culture for their historical value, national affiliation and style distinctive features**  **LO3. Demonstration of working knowledge on standards of modern Ukrainian literature language**  **LO4.** Knowledge of the main historical and philosophical conception; spiritual and practical means to solve the worldview and methodological problems in the history of humankind; main philosophical problems of human existence.  **LO5. Sufficient level of physical training to perform professional duties.**  **LO6.** Competence to work with main sources of engineering information, especially foreign language.  **LO7.** Competence to successfully communicate with engineering community.  **LO8. Competence to assess and calculate economic efficiency from implementation of innovative engineering solutions.**  **LO9. Competence to analyze international** political processes, geopolitical environment, problems concerning place and status of Ukraine in contemporary world.  **LO10.** Competence to establish level of appropriateness of personal individual and typological particular qualities, aspects of personality, interests, abilities, beliefs and values to available requirements to professional and household activity.  **LO11. Knowledge of the current legislation system** and other regulatory act, which allow making management solutions.  **LO12. Competence to assess and calculate economic efficiency from implementation of innovative engineering solutions.**  **LO13. Competence to use fundamental knowledge on linear and vector algebra, differential and integral calculus, functions of many variables, functional series, differential equations for function of one and many variables, operational calculus, theory of functions of a complex variable, theory of probability and mathematical statistics, theory of random processes to the extent necessary for using mathematical apparatus and methods in the area of automation and tool engineering.**  **LO14. Demonstration of knowledge and understanding of the main physical phenomena on the level necessary to achieve other results of the educational program and solution of typical problems of applied mechanics.**  **LO15. Demonstration of knowledge and understanding of the main chemical phenomena on the level necessary to achieve other results of the educational program and solution of typical problems of applied mechanics.**  **LO16. Competence to use the main software products to solve problems and problems of applied mechanics.**  **LO17.** Competence to perform sketches and working drawings on components of assembly drawing and general arrangement drawing, interpret drawings, perform drawing by means of computer-aided engineering systems.  **LO18.** Competence to use knowledge and understanding of principles of fundamental and engineering sciences, which are the essence of applied mechanics.  **LO19.** Competence to compile the mathematical models of the material objects, solve problems associated with studying motion and balance of these or those material bodies under the action of forces applied to them by means of using computer technologies.  **LO20.** Knowledge of steps, sequence of estimates and conditions of strength, hardness and resistance of structural components and machine parts.  **LO21.** Competence to compile and analyze kinematics of mechanisms and machines, perform structural, kinematical and force analysis and synthesis of mechanisms, compile mathematical models of machines, compile and solve equations of motion under the action of the forces applied to them by means of using computer technologies.  **LO22.** Competence to use knowledge in mechanics and mechanical engineering and define perspective of their development.  **LO23. Competence to engineer** components and nodal points of general purpose; perform checking engineering calculations on strength of components and nodal points of general purpose; conduct comparative assessment of components and nodal points of general purpose under working capacity criteria.  **LO24.** Knowledge of operational system of adjustments and allowances, principles of its building and methodology of usage; contemporary methods of calculated and skillful argumentation of requirements to accuracy of joints on the principles of servicing purpose and interchangeability;  **LO25. Competence to perform calculations** of the environmental condition indicators and present and argument for the choice of the equipment to purify industrial waste concerning applied mechanics.  **LO26.** Competence to choose the material to manufacture components and products; choose the most efficient methods of half-finished product preparing; plan the most efficient short-cuts of processing materials by cutting and processing schemes.  **LO27.** Knowledge on the properties of machine steels and nonferrous metals after different types of treatments: deformation, thermal and thermochemical treatments.  **LO28. Competence to perform calculations of thermal engineering facilities.**  **LO29. Competence to compile thermobalance of process units and define specific fuel consumption**  **LO30. Demonstration of knowledge and understanding of principal laws of electrical engineering on the level necessary to achieve other results of the educational program and solution of typical tasks and problems of automation.**  **LO31.** Competence to use knowledge and understanding of microprocessor engineering, systems for automatic control of objects and processes of applied mechanics.  **LO32.** Knowledge on composition of hydraulic and pneumatic systems in metal-cutting equipment.  **LO33.** Competence to perform calculations of elements of hydraulic and pneumatic drive in metal-cutting equipment.  **LO34. Competence to design applied mechanics components manufacturing route technology.**  **LO35.** Competence to engineer, prepare production and use products by applying service life systems.  **LO36.** Competence to define frequency, duration and manpower effort on repairs. Knowledge of principles of servicing and repair of metallurgical equipment in accordance with engineering maintenance and repair; content of engineering maintenance.  **LO37.** Competence to compile the mathematical models of the material objects, solve problems associated with studying motion and balance of these or those material bodies under the action of forces applied to them by means of using computer technologies**.**  **LO38.** Competence to understand the necessity of self-study in the course of a lifetime.  **LO39.** Competence to understand the problems of labor protection and legal problems and predict social and ecological consequences on implementation of engineering challenges.  **LO40.** Competence to implement knowledge in designing engineering projects, assess risks, predict possible limitations and their influence on the end result.  **LO41.** Competence to understand structure and purpose of applied mechanics enterprises’ services структуру. | | |
|  | **Selective block on mechanical engineering technology** | | |
| 1 | **LO42. Knowledge on essentials of fundamental branches of mathematics to the extent necessary to master mathematical apparatus of system sciences, competence to use mathematical models in mechanical engineering technology.**  **LO43. Competence to use** the advanced structures, production technologies, products manufacturing technologies, cutting and measuring tool and so on and so forth.  **LO44. Competence to use** main methods and approaches for arrangement, planning, management and control of engineering works, designs, after engineering support and servicing the machines of general purpose.  **LO45. Competence to use** contemporary methods of designing and optimization of half-finished products, appliances and typical technological processes.  **LO46. Competence to use** methods of detection, formulation, specification, analysis of typical machines and machines (lathes).  **LO47. Competence to use** typical technologies of manufacturing the machines typical components.  **LO48.** Knowledge and competence to use methods, methodologies of control and testing of technological processes during preparation of the new products release; control quality of performing technological operations.  **LO49. Competence to provide and arrange work of** subordinate personnel, rationally arrange the workers on the working places.  **LO50. Competence to establish and in a timely manner bring the production orders to the teams and particular workers in accordance with the approved plans and schedules of the production and arrange work on** the production department.  **LO51. Competence to formalize supporting primary documents on record of working time, output, salary, down times in a timely manner.**  **LO52.** Competence to formalize the reporting documents on the department and efficiently use documents of the department.  **LO53. Competence to design** technological processes and production schedules on simple types of products or its elements.  **LO54. Competence to choose** the ways of cutting the metals.  **LO55. Competence to construct** the pieces of the equipment, perform detailing of the pieces and low-end products, sketches of the details and pieces from life.  **LO56. Competence to choose the optimal type of mechanical equipment and calculate its parameters along with using the computer.**  **LO57. Competence to choose** engineering materials in accordance to their purpose and conditions of work.  **LO58.** Competence to compile kinematics of mechanisms and models of structures.  **LO59.** **Competence to use** during performing the tasks documents on typical projects and design solutions, unified assemblies and products, including by means of using the computer.  **LO60. Competence to** coordinate the accepted project and design solutions with parameters of the other sections of project design.  **LO61. Competence to define engineering level of the projected object on engineering and technology, design technical assignment on engineering the facilities and special tool, provided by the developed technology.**  **LO62. Competence to control compliance with the rules of servicing the equipment, facilities, fittings, buildings.**  **LO63. Competence to define the reason of defects on the products, prepare offers concerning their prevention and liquidation.**  **LO64. Competence to participate in development of technically based standards of time, standards for take-off of the materials, calculate economical efficiency of engineering processes designed.**  **LO65. Competence to conduct economical analysis on the department’ activity outcomes.**  **LO66. Competence to forecast department’ activity outcomes.**  **LO67. Competence to perform economical and ecological analysis of events (innovations).**  **LO68. Competence to make choice on all the methods of half-finished products preparing, the most optimal method in the available conditions of production and machining of the specific component.**  **LO69. Competence to calculate the cutting modes and engineering and economical indicators for processing the surfaces on metal cutting machine tools.**  **LO70. Competence to use contemporary methods of calculating the components of structures, buildings and facilities on strength, hardness, resistance and oscillations under the action of static and dynamic loads with purpose to engineer reliable and long-life constructions.**  **LO71. Competence to use knowledge and understanding mechanical engineering on basic level to solve practical problems.**  **LO72. Competence to engineer technological process of machining the machines components along with using knowledge on contemporary equipment, tool, facilities and computer systems.**  **LO73. Competence to engineer technological process of assembling machine components along with using knowledge on contemporary equipment, tool, facilities and computer systems.**  **LO74. Competence to generalize engineering methods on improvement of quality, endurance and service life of mechanical engineering products.**  **LO75. Competence to rationalize the choice of the construction for the engineering facilities for the components machining.**  **LO76. Competence to establish optimal technical and economical indicators of engineering process on machining the machine components.**  **LO77. Competence to demonstrate своє володіння сучасними прийомами проектування технологічних процесів.**  **LO78. Competence to engineer and design the efficient the cutting tool, machine tool or propose improvement of metal-cutting machine tool for machining.** | | |
| **G** | **Академічна мобільність** | | |
| 1 | *Міжнародна кредитна мобільність* | | На основі двосторонніх договорів між НМетАУ та вищими навчальними закладами зарубіжних країн-партнерів.  Індивідуальна академічна мобільність можлива за рахунок участі у програмах проекту Еrasmus+ і Tempus. |
| 2 | *Навчання іноземних здобувачів вищої освіти* | | Навчання іноземних студентів проводиться на загальних умовах та засвоєнні дисциплін, передбачених навчальним планом. Методика викладання українською (російською) мовою. |

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| **Основні компоненти освітньо-професійної програми** | | | | | | |
| Код  н/д | | Компоненти освітньо-професійної програми (навчальні дисципліни, курсові проекти (роботи), практики, кваліфікаційна робота) | | Кількість кредитів | Форма підсумкового контролю | |
| 1 | | 2 | | 3 | 4 | |
| **Обов’язкові компоненти** | | | | | | |
| **1. Цикл загальної підготовки** | | | | | | |
| ОК 1 | | Iсторiя та культура України | | 6 | екзамен | |
| ОК 2 | | Українська мова за професійним спрямуванням | | 3 | екзамен | |
| ОК 3 | | Філософія | | 3 | екзамен | |
| ОК 4 | | Фізична культура | | 8 | екзамен | |
| ОК 5 | | Вища математика | | 17 | екзамен | |
| ОК 6 | | Фізика | | 9 | екзамен | |
| ОК 7 | | Хімія | | 3 | екзамен | |
| ОК 8 | | Інформатика | | 4 | екзамен | |
| ОК 9 | | Нарисна геометрія, інженерна та комп’ютерна графіка | | 6 | екзамен | |
| ОК 10 | | Теоретична механіка | | 10 | екзамен | |
| ОК 11 | | Опір матеріалів | | 10 | екзамен | |
| ОК 12 | | Теорія механізмів і машин | | 6 | екзамен | |
|  | | Курсовий проект з ОК 12. | | 1 | курсовий проект | |
| ОК 13 | | Деталі машин | | 8 | екзамен | |
|  | | Курсовий проект з ОК 13. | | 1 | курсовий проект | |
| ОК 14 | | Взаємозамінність, стандартизація та технічні вимірювання | | 4 | екзамен | |
| ОК 15 | | Основи екології | | 3 | екзамен | |
| ОК 16 | | Технологія конструкційних матеріалів | | 3 | екзамен | |
| ОК 17 | | Матеріалознавство | | 3 | екзамен | |
| **2. Цикл професійної підготовки** | | | | | | |
| ОК 18 | | Теоретичні основи теплотехніки | | 3 | екзамен | |
| ОК 19 | | Електротехніка, електроніка та мікропроцесорна техніка | | 5 | екзамен | |
| ОК 20 | | Гідравліка, гідро- та пневмоприводи | | 5 | екзамен | |
| ОК 21 | | Технологічні основи машинобудування | | 4 | екзамен | |
| ОК 22 | | Експлуатація та обслуговування машин | | 3 | екзамен | |
| ОК 23 | | Теорія та моделювання технічних систем | | 4 | екзамен | |
| ОК 24 | | Основи охорони праці | | 3 | екзамен | |
| ОК 25 | | Безпека життєдіяльності | | 3 | екзамен | |
| ОК 26 | | Менеджмент | | 3 | екзамен | |
| ОК 27 | | Виробнича практика | | 3 | залік | |
| ОК 28 | | Переддипломна практика | | 3 | залік | |
| ОК 29 | | Випускна кваліфікаційна робота | | 12 | випускна кваліфікаційна робота | |
| **2. Цикл професійної підготовки – обов’язковий блок технологія машинобудування** | | | | | | |
| ОК30 | | Теорія різання | | 5 | екзамен | |
| ОК31 | | Теоретичні основи технології виробництва деталей | | 5 | екзамен | |
| ОК32 | | Різальний інструмент | | 4 | екзамен | |
|  | | Курсова робота з ОК 32. | | 1 | курсова робота | |
| ОК33 | | Обладнання та транспорт механообробних цехiв | | 4 | екзамен | |
|  | | Курсова робота з ОК 33. | | 1 | курсова робота | |
| **Загальний обсяг обов’язкових компонент** | | | | **179** |  | |
| **Вибіркові компоненти\*** | | | | | | |
| **1. Цикл загальної підготовки** | | | | | | |
| ВК 1 | | Іноземна мова | | 6 | екзамен | |
| ВК 2 | | Економіка підприємства | | 3 | екзамен | |
| ВК 3 | | Прикладна політологія | | 3 | екзамен | |
| ВК 4 | | Психологія особистості і розвитку людини | | 3 | екзамен | |
| ВК 5 | | Правове забезпечення підприємництва | | 3 | екзамен | |
| ВК 6 | | Мікроекономіка | | 3 | екзамен | |
| **2. Цикл професійної підготовки – вибірковий блок** | | | | | | |
| ВК 7 | | Теорія коливань | | 3 | екзамен | |
| ВК 8 | | Жорсткість та вібрації технологічної системи | | 3 | екзамен | |
| ВК 9 | | Теорія автоматичного керування | | 4 | екзамен | |
| ВК 10 | | Основи автоматичного керування | | 4 | екзамен | |
| ВК 11 | | Технологічні методи виробництва заготовок деталей машин | | 4 | екзамен | |
| ВК 12 | | Розрахунок та проектування заготовок деталей машин | | 4 | екзамен | |
| ВК 13 | | Наукоємні технології та дослідна робота студента | | 3 | екзамен | |
| ВК 14 | | Основи наукових досліджень та технічної творчості | | 3 | екзамен | |
| ВК 15 | | Об'єктно-орієнтоване програмування | | 7 | екзамен | |
| ВК 16 | | Програмування в механіці технічних систем | | 7 | екзамен | |
| ВК 17 | | Системи автоматизованого проектування | | 7 | екзамен | |
| ВК 18 | | Комп’ютерне проектування і моделювання | | 7 | екзамен | |
| ВК 19 | | Системи візуалізації механічної обробки | | 7 | екзамен | |
| ВК 20 | | Технологічні процеси для верстатів ЧПК | | 7 | екзамен | |
| ВК 21 | | Технологічна оснастка | | 4 | екзамен | |
| ВК 22 | | Розрахунок та проектування технологічної оснастки | | 4 | екзамен | |
| ВК 23 | | Механоскладальні дільниці та цехи у машинобудуванні | | 3 | екзамен | |
| ВК 24 | | Розрахунок та розташування обладнання в механоскладальних цехах | | 3 | екзамен | |
| ВК 25 | | Технологія обробки типових деталей | | 6 | екзамен | |
|  | | Курсова робота з ВК 26 . | | 1 | курсова робота | |
| ВК 26 | | Технологія обробки типових деталей, ріжучого інструмента та складання машин | | 6 | екзамен | |
|  | | Курсова робота з ВК 26 . | | 1 | курсова робота | |
| **Загальний обсяг вибіркових компонент** | | | | **61** |  | |
| **ЗАГАЛЬНИЙ ОБСЯГ ОСВІТНЬО-ПРОФЕСІЙНОЇ ПРОГРАМИ** | | | | **240** |  | |
| \* – Згідно із законом України «Про вищу освіту» особи, які навчаються у закладах вищої освіти, мають право на “вибір навчальних дисциплін у межах, передбачених відповідною освітньою програмою та навчальним планом, в обсязі, що становить не менш як 25 відсотків загальної кількості кредитів ЄКТС, передбачених для даного рівня вищої освіти. При цьому здобувачі певного рівня вищої освіти мають право вибирати навчальні дисципліни, що пропонуються для інших рівнів вищої освіти, за погодженням з керівником відповідного факультету чи підрозділу”. | | | | | | |
| **І** | **Атестація випускників** | | | | |
| 1 | *Форма атестації* | | Атестація здійснюється у формі публічного захисту випускної кваліфікаційної роботи. | | |
| 2 | *Вимоги* | | Випускна кваліфікаційна робота має бути самостійним технологічним процесом виготовлення деталі, з дотриманням усіх актуальних вимог, які висуваються до металорізального обладнання, технологічної оснастки, різального інструмента, впровадження якого у виробництво дозволить зменшити собівартість виготовлення продукції у порівнянні з базовим підприємством. Вона повинна містити отримані бакалавром обґрунтовані теоретичні та експериментальні результати, характеризуватися єдністю змісту і свідчити про особистий внесок бакалавра у розв’язок певної проблеми. Основний текст роботи повинен бути оформлений відповідно до вимог, установлених НМетАУ. | | |

**Структурно-логічна схема ОПП**



**Матриця зв’язку між навчальними дисциплінами, результатами навчання та компетентностями в освітній програмі**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Результати навчання за навчальними дисциплінами | Компетентності | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | |
| Загальні | | | | | | | | | Фахові нормативні | | | | | | | | | | | | | | | Фахові додаткові | | | | | | | | |  | |
| ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Історія та культура України | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН1** |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН2** |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Українська мова за професійним спрямуванням** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН3** |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Філософія** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН4** |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Фізична культура** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | |  | |
| **Іноземна мова** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН6** |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН7** |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Економіка підприємства** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН8** |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Прикладна політологія** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Психологія особистості і розвитку людини | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН10** |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Правове забезпечення підприємництва | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН11** |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Мікроекономіка | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН12** |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Вища математика | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН13** |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Фізика | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН14** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Хімія | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН15** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Інформатика | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН16** |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Нарисна геометрія, інженерна та комп’ютерна графіка** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН17** |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Теоретична механіка** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН18** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН19** |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Опір матеріалів** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН20** |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Теорія механізмів і машин** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН21** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Деталі машин** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН22** |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН23** |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Взаємозамінність, стандартизація та технічні вимірювання** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН24** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Основи екології | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН25** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Технологія конструкційних матеріалів | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН26** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Матеріалознавство | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Теоретичні основи теплотехніки | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН28 |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН29 |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Електротехніка, електроніка та мікропроцесорна техніка | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН30 |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН31 |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Гідравліка, гідро- та пневмоприводи | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН32 |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН33 |  |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | |  | |
| Технологічні основи машинобудування | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН34** |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + | + | + |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Експлуатація та обслуговування машин | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН35 |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН36 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  | |  | |
| Теорія та моделювання технічних систем | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН37 |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН38 |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Основи охорони праці | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН39** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Безпека життєдіяльності | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН40** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Менеджмент | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН41 |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Теорія різання** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН42 | + |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + |  | + | + |  | |  | |
| РН54 | + |  |  | + |  | + |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН69 | + | + | + |  |  | + |  |  |  |  | + | + | + | + |  |  |  | + |  | + | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **Теоретичні основи технології виробництва деталей** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН53 | + |  |  |  | + | + |  | + |  |  |  |  |  |  | + |  | + | + | + |  |  |  | + | + |  |  |  |  |  | + |  | + | |  | |
| РН63 | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  | + |  |  |  |  |  |  | + |  |  | |  | |
| РН64 | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + | |  | |
| РН76 | + |  |  |  | + | + |  | + |  |  |  |  |  |  | + |  | + | + | + |  |  |  | + | + |  |  |  |  |  | + |  | + | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| **Різальний інструмент** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН43** | + |  | + | + | + |  |  | + | + |  |  | + | + | + |  | + | + |  | + | + |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| **РН57** | + |  | + | + | + |  |  | + | + |  |  | + | + | + |  | + | + |  | + | + |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| **РН59** | + |  | + | + | + |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН60** | + |  | + | + | + |  |  | + | + |  |  |  | + |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + | + | |  | |
| **РН61** | + |  | + | + | + |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + | |  | |
| **РН78** | + |  | + | + | + |  |  | + | + |  |  | + |  | + |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  | + | + | |  | |
| **Обладнання та транспорт механообробних цехiв** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН21** | + |  | + | + |  |  |  | + |  | + |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН42** | + |  | + | + |  |  |  | + |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН56** | + |  | + | + |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + |  | + |  | |  | |
| **РН58** | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН59** | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН60** | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  | + |  | |  | |
| **РН61** | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Теорія коливань | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН42** | + |  | + |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН48 | + |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН70 | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| Жорсткість та вібрації технологічної системи | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН42** | + |  | + |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН48 | + |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН70 | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| Теорiя автоматичного керування | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН42** | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| **РН44** | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| **РН48** | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| Основи автоматичного керування | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| **РН42** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| **РН44** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| **РН48** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  | + | + | |  | |
| **Технологічні методи виробництва заготовок деталей машин** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН42** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН45** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  | |  | |
| **РН68** | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Розрахунок та проектування заготовок деталей машин | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН42** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН45** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  | |  | |
| **РН68** | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Наукоємні технології та дослідна робота студента | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН43** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| **РН44** | + |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН48** | + |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
| **РН74** | + |  | + | + |  |  |  |  | + |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  | + |  |  |  | + | |  | |
| Основи наукових досліджень та технічної творчості | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН43** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| **РН44** | + |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН48** | + |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
| **РН74** | + |  | + | + |  |  |  |  | + |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  | + |  |  |  | + | |  | |
| Об'єктно-орiєнтоване програмування | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН16** | + |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Програмування в механіці технічних систем | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН16** | + |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Системи автоматизованого проектування | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН55** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Комп’ютерне проектування і моделювання | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН55** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
| Системи візуалізації механічної обробки | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН55** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
| Технологічні процеси для верстатів ЧПК | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  | |  | |
| **РН48** | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН55** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + | |  | |
| Технологiчна оснастка | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  | + |  | + |  |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН45** | + |  |  | + |  | + |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН70** | + |  |  | + |  | + |  | + |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН75** | + |  | + |  |  | + |  | + |  |  |  |  |  | + |  |  |  |  | + |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| Розрахунок та проектування технологiчної оснастки | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН44** | + |  | + |  |  | + |  | + |  | + |  |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН45** | + |  |  | + |  | + |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН70** | + |  |  | + |  | + |  | + |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН75** | + |  | + |  |  | + |  | + |  |  |  |  |  | + |  |  |  |  | + |  | + |  |  |  |  |  |  |  |  |  | + |  | |  | |
| Механоскладальнi дiльницi та цехи у машинобудуваннi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН49** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН50** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН52** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | |  | |
| **РН56** | + |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН65** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН66** | + |  |  | + |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Розрахунок та розташування обладнання в механоскладальних цехах | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН49** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН50** | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН52** | + |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | |  | |
| **РН56** | + |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН65** | + |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН66** | + |  |  | + |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| Технологія обробки типових деталей | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН43** | + |  | + |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН45** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН46** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН47** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН51** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| **РН59** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН61** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН72** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН73** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | |  | |
| Технологія обробки типових деталей, ріжучого інструмента та складання машин | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **РН43** | + |  | + |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН45** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| **РН46** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  | |  | |
| **РН47** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  | |  | |
| **РН51** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + | |  | |
| **РН59** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН61** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН72** | + |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  | |  | |
| **РН73** | + |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | |  | |
| Виробнича практика | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |
| РН77 | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  | + | + | |  | |
| Результати навчання за навчальними дисциплінами | ІК | ЗК1 | ЗК2 | ЗК3 | ЗК4 | ЗК5 | ЗК6 | ЗК7 | ЗК8 | ФКН1 | ФКН2 | ФКН3 | ФКН4 | ФКН5 | ФКН6 | ФКН7 | ФКН8 | ФКН9 | ФКН10 | ФКН11 | ФКН12 | ФКН13 | ФКН14 | ФКН15 | ФКД1 | ФКД2 | ФКД3 | ФКД4 | ФКД5 | ФКД6 | ФКД7 | ФКД8 | |  | |
| Переддипломна практика | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| РН44 | + |  | + | + |  |  |  | + |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| РН47 | + |  |  | + |  |  |  | + |  |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| РН48 | + |  | + |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| РН53 | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  | |  | |
| РН60 | + |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  | |  | |
| РН61 | + |  | + | + |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН72 | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН77 | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  | + | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| Випускна кваліфікаційна робота | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| РН44 | + |  | + | + |  |  |  | + |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| РН47 | + |  |  | + |  |  |  | + |  |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  |  | + |  |  |  |  | |  | |
| РН48 | + |  | + |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  | + |  |  |  | |  | |
| РН53 | + |  |  | + |  |  |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  | |  | |
| РН60 | + |  | + |  |  |  |  | + |  |  |  |  |  | + |  |  |  |  | + |  |  |  |  | + |  |  |  |  |  |  |  | + | |  | |
| РН61 | + |  | + | + |  |  |  | + |  |  |  |  |  |  | + |  |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН72 | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  | + |  |  | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |
| РН77 | + |  | + | + |  |  |  | + |  |  |  |  |  |  |  |  | + | + | + |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |

