



# **COURSE ANALYSES REPORT**

**43922-TEMPUS-1-2013-1-SE-TEMPUS-JPCR  
Fergana Polytechnic Institute**



**WP1**

**Analysis and survey on existing courses in current engineering  
curricula**

**Fergana Polytechnic Institute  
TEMPUS PROJECT**

**Introduction of new Master program and Doctoral courses in  
Mechatronics in Uzbekistan  
43922-TEMPUS-1-2013-1-SE-TEMPUS-JPCR**

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**COURSE ANALYSES REPORT**

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Fergana Polytechnic Institute studied the needs of industries and accordingly selected the courses. The two industrial plants, JV “UZSUNGWOO” LLC and UAB "Eurasia TAPO-Disk", expressed the intention to collaborate with Fergana Polytechnic Institute in the frame of MACH project. Before defining the needs of these industries, the project team studied and analyzed the existing courses of Fergana Polytechnic Institute throughout all departments. In this process, the most proactive departments are:

**Master Program: 5A320201 – Engineering Technology and Equipment;**

**Bachelor Program:**

**5320200 – Technology mechanical engineering, automation of machine-building manufactures;**

**5310600 – Elevated transport systems and their operation;**

**5310200-Electrical energy;**

**5320300- Technological machinery and equipment**

The courses of these departments were analyzed and only the most mechatronics relevant courses were selected for developing Master (current courses) and PhD courses of Mechatronics.

The list of 62 selected courses is attached.

The name and the content of courses are given in English.

### I. Involved Master and Bachelor programs

№	Specialty	Subject
<b>Master Program</b>		
1.	<b>5A320201–Engineering Technology and Equipment</b>	Automated Manufacturing Technology
2.		Cutting tools in the design and production technology
3.		Engineering research
4.		The scientific basis of technological processes in machine design
5.		Technology of mechanical engineering (special course)
6.		Technology of mechanical science-based
7.		Technological processes, systems theory
<b>Bachelor Program</b>		
1.	<b>5320200 – Technology mechanical engineering, automation of machine-building manufactures</b>	Automatic production of technological equipment
2.		Fundamentals of Automated Manufacturing Technology
3.		Forging and stamping production technology
4.		Production Technologies'
5.		Cutting Theory and Tools
6.		The bulk preparation design and Production
7.		Designing and technological bases
8.		Fundamentals of design automation
9.		Fundamentals of Mechanical Technology
10.		Mechanical Engineering
11.		Fundamentals of mechatronics
12.		Device design and manufacturing
13.		Technical management
14.		Technology production and test equipment
15.		The mutual sharing, standardization and technical measurements
16.	<b>5310600 – Elevated transport systems and their operation</b>	Re-establishing the ability details of vehicle technologies
17.		Car service in fundamental science
18.		Fundamentals of automation of the design process
19.		Science and the theory of the structure of the vehicles
20.		Technological equipment and their operation'
21.		Fundamentals of Designing of transport network
22.		Engines of internal combustion
23.		Reliability theory and Fundamentals of diagnostics
24.		Logistics
25.		Materials, construction materials technology

26.		Operational materials used vehicle
27.		Equipment's of Electrical and electronic of Automobiles
28.	<b>5310200-Electrical energy</b>	Fundamentals of design automation
29.		Basics of electricity supply
30.		Power supply system, electricity networks
31.		Relay protection and automatics
32.		Electrical energy
33.		Lighting
34.		Energy, scientific and technical problems
35.		The reliability of the electricity supply
36.		Electric power transmission, distribution and consumption
37.		Controlling supply of electric energy
38.		Fundamentals of electrical safety
39.		The use of electrical equipment and the establishment of rules
40.		Electromechanical
41.		Canon electricity supply companies
42.		Basics of electricity supply
43.	<b>5320300- Technological machinery and equipment</b>	The technological basis of calculating machines and devices
44.		The automation of technological processes
45.		The main technological processes and devices
46.		The main technological processes and device
47.		Technological machinery and equipment heat and shall be substituted
48.		The production technology Complexes
49.		The chemical industry, machinery and equipment
50.		The chemical industry, machinery and equipment
51.		Technology machinery and transport equipment
52.		The technical basis for the creation of the park
53.		Oil and gas processing and Petrochemical Synthesis Technology
54.		The vibration of industrial processes and equipment
55.		Technological machinery and equipment repair and installation

II. English version

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
1	<p><b>5A320201-Engineering Technology and Equipment</b></p> <p>Automated Manufacturing Technology</p>	<p>in this master's program, "the automated production technology" in the process of teaching the future of engineering automation, automated production processes, methods and technical means of automation, the automation system is desired to learn methodology.</p> <p>Production engineering production process was designed to make the product range of plots, the methods and means of automation, process technology, product design and automation tools, along with the unit needs to provide the tools, ways of planning and operational management of the production process, the value of knowledge, science and history future trends in the development and results of the socio-economic reforms in the country coverage.</p> <p>The purpose of the teaching of science students receiving education in this direction, the fundamental principles and criteria to assess the economic efficiency of automation of technological processes in the production cycle is the management of information on</p>	<ol style="list-style-type: none"> <li>1. Automated manufacturing technology. The purpose of science and responsibilities.</li> <li>2. The role of automation in the production of goods.</li> <li>3. The necessity of automated production.</li> <li>4. The level of automation of production enterprises.</li> <li>5. Calculation and optimization of cutting. Flexible manufacturing systems fixed on the details of the unadjusted basis. The value of the objects.</li> <li>6. Flexible devices and software using basic accuracy of process control equipment and automated production.</li> <li>7. To check the accuracy of the automated processing equipment.</li> <li>8. automated equipment and diagnostic tools condition.</li> <li>9. Provision of technological processes for the production of automated instruments.</li> <li>10. The system of automated production equipment and cutting tools.</li> <li>11. The provision of the automated production equipment.</li> <li>12. The value of an automated flexible manufacturing systems, cutting tools and their system.</li> </ol>	<ol style="list-style-type: none"> <li>1. To determine the volume of warehouses.</li> <li>2. Shaft - type parts of the automated manufacturing process to create the conditions.</li> <li>3. Body type details of the automated manufacturing process to create the conditions.</li> <li>4. Complex form parts of the automated manufacturing process to create the conditions.</li> <li>5. The multi-purpose 2206BMΦ2 models of machine tools coordinate.</li> <li>6. Determine the type of equipment to transport parts.</li> <li>7. determine the number of parts while transporting equipment</li> <li>8. funded automated lines for processing of holes</li> <li>9. Steve-type analysis of the methods of collecting details</li> <li>10. Wall-type details spline automated processing.</li> <li>11. Multi-purpose 2206BMΦ2 models of machines to investigate the accuracy of NCM.</li> <li>12. Robots, mechanical processing technology to create complexes cyclic graphic.</li> <li>13. Multi-purpose 2206BMΦ2 coordinate management system</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>the technical means of automation and mechanization varied, the main means of automation and auxiliary equipment, and the installation of technological equipment and assembly processes automatic control devices and automatic classification of the line up of the structure, as the most general structure and management of functional and technological schemes, complex systems and industrial automatic control methods, educational standards required knowledge, skills and experience to provide the level. Application of modern technological equipment and technological processes of production systems, which are the basis of the technical tools and devices.</p>	<p>13. Equipment settings, automation of processes and replace them.  14. To provide automated equipment manufacturing enterprises in the role of management systems.  15. automated production technology.  16. The automated provision of auxiliary technological processes for the production.  17. Parts of automatic, semi-automatic processing.  18. Mode machine parts and automatic processing lines.  19. Flexible manufacturing systems NCM corps kinds of details processing equipment.  20. Flexible manufacturing systems NCM types of rotating equipment parts processing.</p>	<p>automatically adjusts half-stuff.  14. The analysis of the automated control system.  15. The flexible system is used in the production of new equipment characteristic Accounting.  16. Installation of an automated lathe machines database modules.  17. Study of the structure of a flexible production system.  18. The flexible production system using the information characteristic.  19. Automated production and economic problems.  20. Automated production and organizational problems.</p>	
	<b>80</b>		<b>40</b>	<b>40</b>	
2.	<p><b>5A320201- Engineering Technology and Equipment</b></p> <p>Cutting tools in the design and production technology</p>	<p>"The technology in the design and manufacture of cutting instruments," the purpose of teaching the design of cutting tools, methods and knowledge of the basic principles of slaving for them to be able to know every different production conditions punctuality, ability to learn and work are the issues of economic efficiency. Correct selection of cutting tools for the construction and</p>	<p>1. metal cutting tools Classification  2, the main components, structural elements and geometric parameters.  3. metal-cutting tools designed principle.  4. Modern materials are used in instrument scientific and Classification.  5. Traverse, and the types of application.  6. splitters in the design and</p>	<p>1. Details of the conditions on the selection of abrasive tool for processing characteristics.  2. Splitters kinematic and static parameters.  3. Lathes, splitters and selection of the main structural elements of the resolution.  4. refers to the type of processing equipment and multifaceted sharpening depending on the shape of the plate, and the method of</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>geometric parameters of this study, the mechanical treatment of details of the processes, principles and methods of calculation based on the theory of the formation of different types of cutting tools with modern instrumentation to study the properties of materials for optimum cutting will be necessary to learn to use. The main objectives of the academic study of the subject: cutting tools, design methodologies and students have a basic knowledge of principal Classification of metal cutting tools for the production of key parts and tools to the student's practical skills. Based on these tasks, "technology design and production of cutting instruments" in the process of developing a training course on issues carried out within the framework of master: metal cutting tools main service functions, their role in mechanical engineering; Classification of metal cutting tools; the main components, structural elements and an understanding of the geometric parameters; metal cutting tools, basic design principles;</p>	<p>preparation of special features  7. Processing devices for openings.  8. Holes in the processing devices, the volume of the appointment of the special features of the main types of design.  9. Milling, classification, application of scientific and special features.  10. Drilling and the distinctive signs of the design of the application.  11. The pitch of each of the instruments that make up different forms and the major structural elements.  12. the appointment of the gear wheels for cutting tools, and the flow of view, the main kinematic schemes, and their impact on the shape of the device.  13. With automated production and application of digital-controlled machine tools, and special features required for them.  14. Ways to improve the properties of cutting tools.  15. Fundamentals of Instrumentation Manufacturing Technology.</p>	<p>resolution of the Cabinet and cutting tools.  5, cutter method of resolution of the Cabinet and cutting tools.  6, designing form for the treatment of splitters  7, drill (helix), Corkscrew, Corkscrew, hard-alloy plates design pull broach (drilling), the application of Classification scientific, Slot worm mill construction development.  8, depending on the configuration of the components to calculate form of profiling traverse the edge of sizing and cutting.  9, rounded form splitters calculation parameters ECM.  10, cylindrical milling, classification, application of scientific development of components for cylindrical milling on the structure.  11. Equipped with hard-alloy plate drill (helix) drill design development.  12. To calculate the parameters of the round pull broach.  13. Detail cutting ram construction development.  14. To develop the design of milling pitch to open.  15. cutting tools, design ECM (electronic calculating machines) of the example of the fundamental principles of</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>modern materials are used in instrument volume and classification;</p> <p>Instrumentation know the basics of manufacturing technology and the knowledge to use them; traverse, application types, design features and special training;</p> <p>plate processing equipment, appointment, utilization volume, the special features of the main types of design;</p> <p>milling, classification, application volume, special features;</p> <p>pitch different forms and devices that make up the main structural elements;</p> <p>with automated production and application of digital-controlled machine tools, and special features on the skills required for them should be;</p> <p>must have experience on how to improve the properties of cutting tools;</p> <p>Reading tasks, such as lectures and oratory sessions, the students take an active part in the process, and the documentation is done by independent.</p>		designing cutting tools ECMI.	
	<b>60</b>		<b>30</b>	<b>30</b>	
3	<b>5A320201-Engineering Technology and Equipment</b>	"The research work on the machine," the science of production within the period specified under the program	<ol style="list-style-type: none"> <li>1. General information about the research work on the machine.</li> <li>2. Machine-mechanical processing errors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Three patrol standing flaw.</li> <li>2. Detail Design to ensure technologically.</li> <li>3. Technological calculation the</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
	Engineering research	<p>were required to spend a little quality or and material resources at the level of the machine and training in the analysis of the scientific study of the laws and mechanisms</p> <p>Only the basic processes in the production process: a mechanical processing machine rather than collecting them entering the types of processes: traffic control parts, cutting tools and objects such as processes.</p> <p>Engineering technology research and development items (issues) include the following: the impact of modern scientific and technological theories based on technological research system accuracy, productivity, machine settings, methods, processing capacity, and processing; selection of raw materials; Surface cleaning products; the accuracy of processing and left him shavings; polyfabricate database; flat, cylindrical forms and other complex surfaces, mechanical processing methods; Wal gear wheel and other forms of body parts manufacturing methods; collection procedures (collection of parts and components attach methods of mechanization and automation of processes); design objects.</p>	<p>3. To ensure the mechanical processing of precision in machine.</p> <p>4. Machine sourcing methods and analysis.</p> <p>5. The quality of the surface details of the machine in machine.</p> <p>6. Car details exploitation the quality of the surface properties of machine-Impact.</p> <p>7. Analysis of mechanical processing technologies in machine.</p> <p>8. Polyfabricate general description of the details and the accuracy of the summary combinations.</p> <p>9. And to ensure the precision required collecting details.</p> <p>10, Technological and design parameters and keeping them</p> <p>11. analysis of engineering products with mathematical accuracy of statistical methods</p> <p>12. To calculate the mechanical processing failures.</p> <p>13. The elastic deformation of the technological systems on error.</p> <p>14. Yielding cropping tool set size and eat bugs.</p> <p>15. machines geometric errors</p> <p>Figure 16 deformation heat and technological systems formed as a result of the dynamics of the formation process</p>	<p>size of the chain.</p> <p>4. Details acceptable treatment options.</p> <p>5. Operating the accuracy of the measurements required to calculate.</p> <p>6. To determine the size of the parts lathe processing group settings.</p> <p>7. Opposite and satellite cutter surfaces are clean.</p> <p>8. Val kinds of details lathe processing techniques to determine the time limit.</p> <p>9. Database schema development and analysis.</p> <p>10. The evaluation of technological operations with accurate statistical method.</p> <p>11. Machine bases and sourcing.</p> <p>12. Analysis of milling machines sturgeon.</p> <p>13. Turner analysis of the accuracy of the machines.</p> <p>14. Lathes Bikram analysis.</p> <p>15. Polyfabricate to study the effect of sturgeon processing.</p> <p>16, Cutter dimensional analysis and processing accuracy eat.</p> <p>17. Turner splitters connected by cutting heat deformation distance.</p> <p>18. Polyfabricate steadiness of Technology to investigate the effects of vibration durability of the system.</p> <p>19. Details gathered during the</p>	

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		Along with the development of the technological development of machine technology will be constantly updated and changed. Improving the technology - one of the most important prerequisites for the development of production equipment.	17. and the folding machine operation to improve the technological properties and phrases. 18. Machine and technological heredity. 19. The self-organization of technological systems. 20. New technologies and new processing machine scientific basis for technological development and perfecting technique.	analysis of mistakes. 20. Machine performance and analysis.	
	<b>80</b>		<b>40</b>	<b>40</b>	
4	<b>5A320201- Engineering and Technology Equipment</b>  The scientific basis of technological processes in machine design	The purpose of teaching science and the production of machine-building enterprises of the students used a typical manufacturing process and details of the types of mechanical processing and assembly operations, engineering methods and the scientific basis for the design of products to meet professional profile appropriate knowledge, skills, and professional formation. Details the structure of the evaluation of the role of science, mechanical processing routes, processing methods, materials, polyfabricate, metal-cutting machines, technological equipment, cutting tools, the right to choose to fill out and process documents and the accuracy of the measurement,	1. The basic concepts. 2. Process design. 3. Polyfabricate selection of the optimal methods of preparation. 4. The design features of technological processes. 5. Technological development operations. 6. For the management of physical and mechanical properties of materials, thermal processing methods. 7. The peak acceleration of the process areas 8. Abrasive modern methods. 9. The outer surface of the plastic deformation methods. 10. physical-chemical treatment methods. 11. Modern processing methods. 12. Automation of technological processes. 13. Standard design solutions		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		the surfaces are clean and in terms of technical and economic efficiency to teach the scientific basis for the preparation of high quality products.	process route. 14. Calculation mistakes in the process. 15. The design of the machine assembly technological processes.		
	<b>30</b>		<b>30</b>		
5	<p style="text-align: center;"><b>5A320201- Engineering Technology and Equipment</b></p> <p style="text-align: center;">Technology of mechanical engineering (special course)</p>	<p>Manufacturing engineering technology program within the time period specified in accordance with the level of quality required less or and material resources, machinery and mechanisms, the study of the laws of science, spent raw materials or finished product manufacturing process is performed for the finished product, all the processes (work) consists of the sum.</p> <p>Only the basic processes in the production process: a mechanical processing machine rather than collecting them entering the types of processes: traffic control parts, cutting tools and objects such as processes.</p> <p>In order to process materials and finished products or raw materials in their shape, size and characteristics of the changing technical requirements based on the series.</p> <p>'Technology' to two Greek words, Techno Art, Design, (a business intelligence and</p>	<p>1. The quality of the product. Quality indicators. The reliability of the product. Reliability indices</p> <p>2. Analyses of the General Product technologically design. Technological indicators and identify them.</p> <p>3. Detail processing and databases. Constant principles and joining the bases. Parts, equipment installation methods. A six-point rule.</p> <p>4. on the identification and understanding. The main factors which influence the accuracy of the processing. Production errors. Systematic and random errors. A variety of processing methods.</p> <p>5. Detail about the quality of the surface of consciousness. The importance of the quality of the surface details of the machine. Knotty-fearing indicators plane. Plane knotty-fearing evaluation methods.</p> <p>6. Preliminary data for the design of the technological process. Mechanical treatment plan.</p>	<p>1. The development of technological processes of processing details.</p> <p>2. The details technological analysis and quantitative indicators.</p> <p>3. The economic substantiation of the technological process.</p> <p>4. The analysis of the technological processes of processing of flat surfaces.</p> <p>5. The analysis of the technological processes of processing of external cylindrical surfaces.</p> <p>6. The analysis of the technological processes of the internal cylindrical surface processing.</p> <p>7. Pitch analysis of the technological processes of surface treatment.</p> <p>8. The worm wheel gear and worm processing analysis of the technological processes.</p> <p>9. Precision machine and how to improve them.</p> <p>10. The analysis of the database through a chain of full size details</p>	

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		<p>scientific knowledge (technical words), the raw material from the ashes and semi-manufactured products prepared using the necessary tools production work on the effective ways and methods of systematic scientific opinion. The effectiveness of the technological process of technical and economic indicators: production of raw, factories and energy consumption; The number and quality of the finished product; The level of or productivity; production costs; the cost of production.</p> <p>Engineering technology research and development items (issues) to include the following: processing; selection of raw materials; Surface cleaning products; the accuracy of processing and left him shavings; polyfabricate sourcing; flat, cylindrical forms and other complex surfaces, mechanical processing methods; Wal gear wheel and other forms of body parts manufacturing methods; collection procedures (collection of parts and components attach methods of mechanization and automation of processes); design objects.</p>	<p>Technological equipment, fixtures, cutting and control the selection of devices. Cutting level</p> <p>7. The flat surfaces of ferrous processing method, cutting tools and machines. Planing processing method on a flat surface, cutting tools and swiping machines on a flat surface processing methods, cutting tools and machines.</p> <p>8. Processing methods, cutting tools and equipments. External cylindrical surfaces slit processing methods, cutting tools and equipments. And external cylindrical surfaces grinding super finish processing methods.</p> <p>9. The inner cylindrical surface drilling, reamers zenker processing methods, cutting tools and equipments. Ichki cylindrical surfaces untouched and siding with the expansion of processing methods, cutting tools and machines. The inner cylindrical surfaces slits and lappers processing methods, cutting tools and machines.</p> <p>10. Using splitters and carving cutting. Tap and carving ferrous slits, cutting.</p> <p>11. Slot surfaces of ferrous processing. Slot surfaces slits, and</p>	<p>11. The creation of groups of technological processes.</p> <p>12. Installing the main index to calculate the gains.</p> <p>13. The calculation of basic indicators assembly line.</p> <p>14. Typical conscription process box-sized details on the process of designing technological processes.</p> <p>15. Typical conscription process Valta process of designing technological processes on the basis of.</p> <p>16. A typical conscription in designing technological processes of technological processes on the basis of Vinton processing.</p> <p>17. Typical conscription technological processes on the basis of processing technological process of designing plates.</p> <p>18. Turner machines construction and processing technological processes.</p> <p>19. Drilling machines construction and processing of technological processes.</p> <p>20. Milling machines construction and processing.</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>Along with the development of the technological development of machine technology will be constantly updated and changed. Improving the technology - one of the most important prerequisites for the development of production equipment.</p>	<p>swiping cutting planning processing. Pona Sitotroga processing.</p> <p>12. The gear wheel teeth and worm ferrous processing methods, cutting tools and machine tools; The gear wheel teeth rack-type tool and ram using processing methods, cutting tools. Gear wheel teeth beauty methods, cutting tools.</p> <p>13. General information about the electrical lines.</p> <p>Automatic lines for processing of raw materials and technological processes.</p> <p>14. General information. Automated technological project organization. On the design of the automated system of technological processes.</p> <p>15. Details the main types. Box-sized details service functions and technical requirements applicable to the preparation of materials and raw materials. Box-sized details of the sequence of mechanical processing and execution.</p> <p>The preparation of the body parts NCM equipment Control of body parts.</p> <p>16. Spindle machine maintenance tasks, technical requirements and materials used in the production of raw materials. The sequence of</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>mechanical machining process and execution Spindle control.</p> <p>17, hooks, elbows and service functions for the preparation of the technical requirements, the types of materials and raw materials used. Safety hooks to change the sequence of mechanical processing technological process and complete your order. Rotational articulation loop sequence of mechanical processing technological process and the implementation of the procedure. Loop control</p> <p>18, the gear wheels, the structure, the materials used for the preparation of the technical requirements and their raw materials. The sequence of mechanical processing technological process and the procedure to do it. Control gear wheels</p> <p>19, and assembly processes for the manufacture of machines and mechanisms</p> <p>20, the bearings waste deposits. Gear wheel folding compounds. Pitch combinations collection. The balance of rotating parts. Technical inspection and testing of the product collected. The finished product dyeing, drying and conservation.</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
80			40	40	
6	<p align="center"><b>5A320201-Engineering Technology and Equipment</b></p> <p align="center">Technology of mechanical science-based</p>	<p>"The scientific basis for engineering technology," the science of production within the period specified under the program were required to spend a little quality or and material resources at the level of the machine and training in the analysis of the scientific study of the laws and mechanisms</p> <p>Only the basic processes in the production process: a mechanical processing machine rather than collecting them entering the types of processes: traffic control parts, cutting tools and objects such as processes.</p> <p>In order to process materials and finished products or raw materials in their shape, size and characteristics of the changing technical requirements based on the series.</p> <p>'Technology' to two Greek words, Techno Art, Design , (a business intelligence and scientific knowledge tical words), the raw material from the ashes and semi - manufactured products prepared using the necessary tools production on the effective ways and methods of work consists of systematic scientific opinion. The effectiveness of technical and economic</p>	<ol style="list-style-type: none"> <li>1. Introduction. Production technological processes nation.</li> <li>2. The flexible machining accuracy in the production of pieces. -this Productivity in the production and processing to ensure accuracy. Progressive methods in the production of pieces.</li> <li>3. The amount of the performance and the production of a series of party details. Technological processes. A group of a group of processing operations.</li> <li>4. NCM tools principles. NCM machine design stages of technological processes of mechanical processing. NCM machine designing operations for the differences</li> <li>5. The flexible manufacturing systems (Michel) structure and its show oneself. Details of the process of technological training.</li> <li>6. The total gross production automation. Gross production performance. Gross special equipment and specialized production. The creation of high-performance equipment, modu method of decentralization.</li> <li>7. Gross (mass) production minus the main forms automatically. Automatic line structure.</li> </ol>	<ol style="list-style-type: none"> <li>1. The analysis of the laws of the accuracy of the process.</li> <li>2. Small series production details the technological processes of the body in the analysis project</li> <li>3. The cylindrical parts processing design analysis of the technological processes</li> <li>4. Gear wheels analysis of the process of designing technological processes.</li> <li>5. Typical technological processes on the basis of analysis of the technological process design methods.</li> <li>6. Analysis of machine-size chains</li> <li>7. Analysis of the options for the production of small series of technological routes.</li> <li>8. Many of the technological processes for the production of operations analysis.</li> <li>9. Valta processing analysis of the technological processes for the production of the series.</li> <li>10. The detection and analysis of machine-building</li> <li>11. The machine surfaces are clean and analysis.</li> <li>12. Analysis of milling machines sturgeon</li> <li>13. turner analysis of the accuracy of the machines</li> <li>14. The effect of the processing accuracy eaten cutter sizes</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>parameters of the technological process (product of raw, semi factories and energy consumption; number and quality of the finished products; the level of or productivity; production costs; the cost of the product) on the basis of a study of the scientific point of view it is important to increase productivity.</p> <p>Engineering technology research and development items (issues) include the following: the impact of modern scientific and technological theories based on technological research system accuracy, productivity, machine settings, methods, processing capacity, and processing; selection of raw materials; Surface cleaning products; the accuracy of processing and left him shavings; polyfabricate sourcing; flat, cylindrical forms and other complex surfaces, mechanical processing methods; Wal gear wheel and other forms of body parts manufacturing methods; collection procedures (collection of parts and components attach methods of mechanization and automation of processes); design objects. Along with the development of the technological development</p>	<p>Automatic lines for the differences in designing technological processes.</p> <p>8. Project technological process automation system, their structure. Mechanical processing technological process design procedure.</p> <p>9. Preparation machines and mechanisms, the role and size of the collection. Technological process design for the collection of primary data. To organize the collection of forms. Collection typical the process of technological development</p> <p>10. The collection, processing automation. Bring balance to assemble parts and components. Products ready to paint (color), drying and conservation.</p> <p>11. The scientific basis of technological preparation organization. Technological training methods.</p> <p>12. The automation of technological preparation of the production methods. The scientific basis for the preparation of the production process automation.</p> <p>13. Cutting the vibrations produced during. Trembles a variety of processing equipment. Technological dynamics of the system</p>	<p>15. customize Lathes machines</p> <p>16. splitters size eyilishii analysis and processing accuracy</p> <p>17. The analysis of the technological schemes on the basis of</p> <p>18. Accuracy of statistical methods in the process.</p> <p>19. Setting Drilling equipment</p> <p>20. ferrous machine configuration errors</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>of machine technology will be constantly updated and changed. Improving the technology - one of the most important prerequisites for the development of production equipment.</p>	<p>14. The machine life cycle and technological content of products. Functional tasks of engineering products</p> <p>15. The machine precision of modern concepts. Polyfabricate accuracy, installation mistakes, to identify and analyze elementary mistakes. Nanotechnology.</p> <p>16. The quality of the surface layers of the machine parameters of the theory of the link between processing conditions described. The quality of the surface layers of the machine parameters of the link with the processing conditions of the experimental setup.</p> <p>17. The details of the change in the quality of the surface layers of the operating period. Car parts and prefabricated block of operational technological properties. Automotive products, long technology.</p> <p>18. Technological products quality machine as the database of heredity. Technological laws of heredity. Car preparation of the technical details of heredity. Collection of automotive products and technological heredity.</p> <p>19. The remedy of self-organization systems. Polyfabricate materials and the</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>preparation phase of self-organization. Mechanical processing and self-organization of the collection system.</p> <p>20. The machine processing of new scientific basis for perfecting the technique. Processing machine parts and manufacturing process of a new scientific basis for technological development and perfecting the technique. Engineering science-based and competitive technology.</p>		
	<b>80</b>		<b>40</b>	<b>40</b>	
7	<p style="text-align: center;"><b>5A320201-Engineering Technology and Equipment</b></p> <p>Technological processes, systems theory</p>	<p>"The theoretical basis of the technological processes, systems," the science of the production of the required quality level within the time limit set under the program spent less or and material resources, machinery and mechanisms, which studies and scientific analysis of the laws of science, technology</p> <p>Only the basic processes in the production process: a mechanical processing machine rather than collecting them entering the types of processes: traffic control parts, cutting tools and objects such as processes. Technological process materials and finished products or raw materials in the production process in order to get their</p>	<ol style="list-style-type: none"> <li>1. Mechanical Technology problems. Industrial and technological processes.</li> <li>2. Many of the production. Serial number, current and current production</li> <li>3. General information about the technological preparation of the production. Technological preparation of the production systems of the overall structure.</li> <li>4. Technological processes, systems design principles. Technological processes, systems, indicators</li> <li>5. Technological processes, systems and technology solutions appearances.</li> <li>6. Technological process analytical systems and technological solutions. Forecasting technological</li> </ol>	<ol style="list-style-type: none"> <li>1. A detailed analysis of the technological processing.</li> <li>2. Detal designs and technological support.</li> <li>3. Technological calculate the size of the chain</li> <li>4. The details of the process to select the appropriate options.</li> <li>5. Operating the accuracy of the measurements required to calculate</li> <li>6. The resolution of the analysis of technological processes</li> <li>7. Small series of options and a lot of technological routes for the production of the series.</li> <li>8. Processing methods and sequence analysis of the surface.</li> <li>9. Small series, and the series Valta processing technological routes for the production of</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>shape, size and characteristics of the changing technical requirements based on the series.</p> <p>'Technology' to two Greek words, Techno Art, Design , (a business intelligence and scientific knowledge words), the raw material from the ashes and semi - manufactured products prepared using the necessary tools production on the effective ways and methods of work consists of systematic scientific opinion. The effectiveness of technical and economic parameters of the technological process (product of ' raw, semi factories and energy consumption; number and quality of the finished products; the level of or productivity; production costs; the cost of the product) on the basis of a study of the scientific point of view it is important to increase productivity.</p> <p>Research and development of technological processes in mechanical engineering disciplines (issues) include the following: processing; selection of raw materials; Surface cleaning products; the accuracy of processing and left him shavings; polyfabricate database; flat, cylindrical forms</p>	<p>processes, systems and technological solutions.</p> <p>7. Technological processes, systems and technological solutions criteria. Automation of technological processes, systems and technological solutions.</p> <p>8. Stages of development and technological processes on the basis of the initial analysis of the technical requirements stage. Scheme details of training conditions and to identify technological issues. To determine the type and method of production.</p> <p>9. Technologically the design of the product. The details of the car meet technical requirements. Design and documentation process control.</p> <p>10. Half-stuff selection sequence. Half-stuff methods of characteristics and production methods.</p> <p>11. Determine the separate parts processing direction. Half-stuff selection schemes. Preparation of detail to create direction. Warehouse equipment and forms of identification.</p> <p>12. Shavings methods. Shavings statistical method to determine the probability of the cast and limit and set Shavings</p> <p>13. The choice of machining operations to ensure the</p>	<p>many options.</p> <p>10. Technological development strategy for the selection process and its analysis.</p> <p>11. The development of technological processes and technological documents to fill</p> <p>12. The plan details the processing and analysis</p> <p>13. The analysis of the technological process and the choice of</p> <p>14. The effect of the processing accuracy eaten cutter sizes</p> <p>15. Process Measurement and analysis of the problem of the chain.</p> <p>16. Technological indication of the minimum cost of mechanical processing technological process for the analysis and selection of the optimal option.</p> <p>17. The development of technological processes for the production.</p> <p>18. Accuracy of statistical methods in the process.</p> <p>19. The main assembly line features detection and analysis.</p> <p>20. The analysis methods Polyfabricate</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>and other complex surfaces, mechanical processing methods; Wal gear wheel and other forms of body parts manufacturing methods; collection procedures (collection of parts and components attach methods of mechanization and automation of processes); design objects.</p>	<p>selection system limit. Technologically devices. Cutting better choice. The accuracy of the measurements to be taken account of.</p> <p>14. Series technological process. Technological processes for the production and processing group a flexible approach to the method of processing groups.</p> <p>15. NCM machining operations in the preparation of project details. NCM Transitions sequence in the preparation of counter parts. Coordinates systems and machines "zero point" button.</p> <p>16. Mode equipment peculiar features of the development of technological processes. Automatic lines for the development of technological processes and unique features. Automatic lines Half-stuff development of technological processes.</p> <p>17. The production process. Development of technological processes for the production of pieces.</p> <p>18. A general description of the design of the automated systems of technological processes. Technological processes and operations to identify structures. Technological development operations Half-</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>stuff optimization of processing parameters.</p> <p>19. Collect the starting point for the development of technological processes information. Typical collection of conscription in the development of technological processes</p> <p>20. The future of technological methods of production and development. The development of technological processes and the development of future solutions.</p>		
	<b>80</b>		<b>40</b>	<b>40</b>	
1.	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Automatic production of technological equipment</p>	<p>The purpose of science 5320200- "Technology of Technology mechanical engineering, automation of machine-building manufactures" the direction of the education system taught students to take academic degree of Bachelor of automated production equipment: DPM machines, flexible modes of production and robotic systems, complex, automated machining lines. The promotion of obtaining skills such as use of technological set and the teaching methods of this equipment.</p> <p>5320200- Technology mechanical engineering, automation of machine-building manufactures to the education system get in a bachelor's</p>	<p>1. Introduction. The role of automated production machinery and technological equipment. Concept of reading control. Metal cutting machines on the main concepts. Kinematics. Kinematic chains. Kinematic configuration. Main movement. Pushed. Kinematic chains equilibrium equations.</p> <p>2. Speeds and push types of boxes.</p> <p>3. Speed and push boxes graphic - analytical method of calculation.</p> <p>4. The main information of automated production technology. Scheme structure automated production technology and its main construction elements.</p> <p>Automated structural diagram</p>	<p>1. machines used linear samples</p> <p>2. Kinematic group's content system</p> <p>3. turner machine equipment pitch and configure the settings for cutting</p> <p>4. K-96 modular set Token-in machines</p> <p>5. 5M14 -model set of detail equipment</p> <p>6. 5E32 - calculation model detail milling machines kinematic</p> <p>7. 5A26 models set teeth machine equipment</p> <p>8. 587V - set detail slits equipment accounting model</p> <p>9. 1K62 machines, which is a step revenues = 1.75 metric sets the pitch for cutting Accounting</p>	<p>1. Turner screw-forty-acquainted with the structure and operation of the equipment. Adjust the machines to perform a specific job.</p> <p>2. The structure of the DPM lathe machines and equipment for processing settings</p> <p>3. The program is managed by a number of vertical-drilling machines for the structure and processing settings</p> <p>4. warheads to carry out a variety of work settings</p> <p>5. The program is managed by a number of ferrous equipment to make tools and concepts about the structure of the detail settings for processing</p> <p>6. Detail processing to study the structure of the new equipment, training and employment</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>academic degree in the curriculum for students of modern machinery to improve the efficiency of the modeling industry, and general industrial and technological methods, as well as is required a wide range of Automation. Development is given utilizing the software to increase the number of events (digital program management) Management tools, automatic lines, flexible manufacturing systems, training equipment and industrial robots for large-scale operations as well as teaching them to apply the application, to meet with constituents their process of technological tools to complete the job details to ensure the geometric dimensions and surface quality indicators to set the desired mode of operation assigned.</p>	<p>of the processing equipment and the production of the main structural elements (base and push the transmission details) .TECHNOLOGY equipment for the universality of the classical separation.</p> <p>5. Technological equipment and technical and economic indicators. Productivity; annual fund Waste of time. Universality, setting.</p> <p>6. Kinematics groups. Digital program management machines kinematic groups. Digital program management machine kinematic structure. Digital program management machines set kinematic principles.</p> <p>7. Tools for the detail processing. Tools caustic. Tools for muffle. Workshop module Warehouse modules. Warehouse modules of the system. High and low-level workshop modules. "Warehouse robot" arrangement. The modules. DPM bench lathe machine. Flexible manufacturing module. Machine system. ASK-10, ASV-type equipment system</p> <p>9. Many Acting Workshop operation. Console and the non-console horizontally digital program management rotation machines. Consoles and non-console digital program</p>		<p>settings</p> <p>7. Lathes check the accuracy of figures</p> <p>8. 1K62 lathe machines a step revenues equal to <math>t_p = 1.75</math> metric sets the pitch for cutting</p> <p>9. turner customize the tool to cut a lot of revenues pitch</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>management vertical rotation machines.</p> <p>Bench mailbox kinematic scheme of horizontal transmission digital program management of rotation milling samples.</p> <p>10. The longitudinal-milling machine. Surface - rotation milling machining spindle cap.</p> <p>11. Rotation milling machines longitudinal- rotation milling machines. Surface- rotation machining spindle cap. Rotation milling muffle. Hydraulic ado, which consists of rotation milling general manager mechanism. Pooling the movement of tools for use hydraulic equipment. The optical head. 6R13F3 module. Digital program management vertical rotation milling tools. MA655F3 console matrix. Bench vertical counter- rotation milling DPM</p> <p>Workshop carrying a lot of tools for carrying out the Horizontal operation.</p> <p>12. Drilling operation acting workshops. Perform many operations of drilling machine spindle.</p> <p>13. Hydraulic delay in the transmission unit acting mechanism. Many operation of rotation milling which works part-drilling machines steeples. Lathes</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>spindle perform the operation.</p> <p>14. Shop equipment changing device. Store tools and auto operation replaceable unit. Perform many operations 2262PMF-4 module. Workshop.</p> <p>15. Framework with a smile stone processing centers digital program management bench. Central processing methods; Central turn cycles leads the way with preparation rotation the movement of objects in the diagram. Slits in the center of the scheme. 3U71113 module. flat slits on the bench.</p> <p>Modular conventional separation equipment and arrangement. Types of group.</p> <p>20. Modular pieces of equipment unification. Complete modular machine functions. The power of the head and the desktop, the spindle head. Cap power capacity.</p> <p>21. The aggregate carrying out operations on the machine. AM279 module. aggregate machine. Unification of parts UM2253, UM4126, UM4136, UM4146 and UM4156, UM4126, UM4136, UM4146 and UM4156. Rotary automatic wrapping. Adapted equipment for the collection system to eliminate.</p> <p>22. The terminal phase and industrial systems classes.</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			Arrangement and design of industrial robots. Holding chargers. Management of industrial robots		
	80		44	18	18
2	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Fundamentals of Automated Manufacturing Technology</p>	<p>Science goal of teaching students the process of preparation of the details of the conditions of modern automated production machinery and technological knowledge to develop suitable methods for the safe use of intelligent route profile, the development of skills and qualifications.</p> <p>The task of science-automated production equipment used in the conditions of technological possibilities of the students and their specific features, optional automated: single production, and to prepare the conditions for mass production parts, automated assembly processes, operations and process coverage and technological approaches and teaching methods.</p>	<p>1. Automation production technology. Fanny Goals and Objectives</p> <p>2. the possibility of modern technical devices</p> <p>3. precision machinery manufacturing facilities notices</p> <p>4. details of the main methods of forming machine</p> <p>5. details the design of the mechanical processing of technological processes</p> <p>6. Preparation mechanical processing automation of technological processes</p> <p>7. the modular design of equipment and technological processes automated processing lines with details specific features</p> <p>8. detail processing technology with high productivity</p> <p>Examples of process design</p> <p>9, collection-technology machines</p> <p>10, mechanization and automation of the collection.</p>	<p>1. The creation of automated manufacturing complex structure.</p> <p>2, digital program management processing machine parts to select the optimal cutting modes</p> <p>3, the assembly of technological processes and technological structural construction.</p> <p>4. Industrial robots clamp design and calculation methods.</p> <p>5. automated technological complex technical and economic indicators.</p>	<p>1, Digital program management configuration and management of technological processes and equipment</p> <p>2, the design of the milling process digital program management processing equipment</p> <p>3, turner digital program management processing equipment design processes</p> <p>4, the design of many DPM machines and processing operations</p> <p>5, the structure of industrial robots in the process of collecting and processing. Establishment of industrial robots program.</p>
	40		20	10	10
3	<b>5320200- Technology mechanical engineering,</b>	The purpose of teaching science to students included in the list of	1. The aim of the teaching of science and responsibilities.		

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	<b>automation of machine-building manufactures</b>  Forging and stamping production technology	the main technological equipment machinery, forging and stamping machinery and equipment, training equipment for operations classification, structure and methods of forging a powerful reporting and pressure to keep them in the development of technological processes on the extent of the design and application of knowledge, skills. Fanny students the task of forging and stamping the influence of processing ferrous and non-ferrous Metals under pressure and force them to be general information about the physical and mechanical changes, forging and stamping machine and machines , efforts to form the basic equipment, key parts, matrix design stages and the calculation methods used for the calculation of this technique for the use of software and hardware tools need to have the necessary knowledge and skills.	2. Heating methods of Metal-plastic deformation method. 3Press stamping. 4. Horizontal-forging machine stamping. 5. Steel list pressing technological designing and production operations.		
	10		10		
4	<b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b>  Production Technologies'	The present stage of development of the society of scientific and technological achievements into production rapidly. The new technology used in the production of consumer goods companies.	1. The basic concepts. 2. The raw materials used in industry and the types of content. 3. engineering materials technology 4. Interchangeable,	1. machine learning schemes 2. Iron production. 3. Steel production 4. Metrological study of the structure and parameters of the tools. 5. Micrometer structure and use	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>"Production Technology" national training program in the appropriate place. The main purpose of science: the managers of the future production of all goods to be used in the production process of normative-technical documentation preparation, design, implementation and manufacturing expertise in the study of the requirements of the standard; certification, quality management, consumer and storage, transportation and technological processes carried out training.</p> <p>Modern technology applied in the production of "fillers", "preservatives", "paint", "antioxidant". Synthetic fillers, antioxidant and preservative used in the production of, and harm to human health and the environment. For consumer goods of international standard (ISO-14020, and b.), The production process to comply with them. Production technologies, the essence of science, the role of the national economy, technology and attention to the physical and chemical processes which occur. Their role in the formation of the quality of the goods.</p> <p>Work on the basis of theoretical</p>	<p>standardization and technical measurements</p> <ol style="list-style-type: none"> <li>5. Basics of Metal processing.</li> <li>6. Different surface treatment processes</li> <li>7. The composition of the technological process.</li> <li>8. Conformity of technical and economic indicators.</li> <li>9. optimization of production processes</li> <li>10. Fundamentals of Food Technology</li> <li>11. Grain and flour products, production technologies.</li> <li>12. The principles of non-food goods production technology.</li> <li>13. The production of textile goods</li> <li>14 production of polymers and plastics technology.</li> <li>15. Construction production technology.</li> </ol>	<p>it</p> <ol style="list-style-type: none"> <li>6. Indicator using longitudinal and correspondence strict control.</li> <li>7. Limited steady learn to find the information</li> <li>8. turner study of the structure of the machines</li> <li>9. Vertical drilling machines</li> <li>10. study of the structure of the radial drilling machines</li> <li>11. study the vertical structure of the ferrous equipment</li> <li>12. The horizontal structure of ferrous equipment</li> <li>13. study of the structure of the Framework slits equipment</li> <li>14. The structure of the planning machines</li> <li>15. The structure of the teeth boring machines i down.</li> <li>16. Most of the study of the structure of the target DPM machines</li> <li>17. Fundamentals of Food Technology</li> <li>18. Milk production technologies</li> <li>19. vegetables, fruits and other agricultural products processing technologies</li> <li>20. determine, depending on the quality of the external appearance of copra</li> <li>21. Normative technical documentation requirements and standard</li> <li>22. Furniture production</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>knowledge and practical skills in the use of modern technical means to carry out accounts to make sure.</p> <p>Science students with the knowledge, skills requirements:</p> <p>The theory of modern crop technologies processing, machinery equipment, machinery have enough knowledge in the fields of technology;</p> <p>technological know the standards of the time estimates are based on data obtained as a result of the operation;</p>		<p>technology</p> <p>23. Furniture production technology</p> <p>24. Pottery and ceramic products used in the manufacture of traditional technologies.</p> <p>25. The technology of production of textile goods</p> <p>26. Knitwear and ready-to-wear manufacturing technology.</p>	
	82		30	52	
5	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Cutting Theory and Tools</p>	<p>Cutting principles and tools aimed at teaching the theory of production-engineering technology to create a step-by-step training, the preparation of high-quality products that are competitive and have higher cut is based on raw materials.</p> <p>The task of science students acquainted with the car crossed the details of mechanical processing processes, the structure of the components, raw materials, Metal-cutting machine tools, cutting tools, the right to choose to fill out and process documents, and the accuracy of the measurement, surface cleaning and preparation of the technical</p>	<ol style="list-style-type: none"> <li>1. Cutting and sharply cutting part of the geometric parameters of the elements.</li> <li>2. Cutting forms of the layer.</li> <li>3. Instrumentation materials.</li> <li>4. be the process of forming sure.</li> <li>5. Terrified of the cutting process.</li> <li>6. The cutting process heat events.</li> <li>7. Cooling lubricants and metal cutting. Cooling-lubricating substances mechanism of action</li> <li>8. The main reasons for cutting tools.</li> <li>9. Edible species and measuring methods.</li> <li>10. Cutting forces.</li> <li>11. Cutting the power of the practical application of the formula.</li> </ol>	<ol style="list-style-type: none"> <li>1. Finalize the intersection of cutting elements.</li> <li>2. Calculate the optimal cutting finalize the intersection of analytical.</li> <li>3. The conditions given boring, lathe splitters constructive and geometrical parameters.</li> <li>4. Drilling selection process to finalize the crop.</li> <li>5. The calculation of the parameters of the spiral drill.</li> <li>6. The roller mill constructive and calculate the geometric parameters.</li> <li>7. roller for ferrous cutting modes</li> <li>8. Detail Kirk constructive and calculate the geometric parameters.</li> <li>9. The factors influencing the</li> </ol>	<ol style="list-style-type: none"> <li>1. The main types of splitters. Constructive elements and geometric parameters.</li> <li>2. The physical and mechanical properties of the material and the processing speed of the cutting surfaces on the type of impact that has formed.</li> <li>3. Cutting calorimetric method to determine the amount of heat in the process.</li> <li>4. Turner to determine the cutting forces.</li> <li>5. Check the description of the Wilderness splitters and wear during a recession.</li> <li>6. Cutting controls the deformation of the substrate.</li> <li>7. Constructive and geometric parameters of the classification</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>quality product in terms of economic efficiency to teach the theory of cutting. Cutting theory principles and tools for students to teach the subject "Fundamentals of Mechanical Technology", "Mutual changeable, standardization and technical measurements," Physics "," Mathematics "," machine-technological processes "must have a mastery of the subjects. Cutting devices and principles of the theory of science students after pursuing independent product cost, quality and productivity, taking into account the details of the car will have a working knowledge of the basics of cutting and preparing 5320200-Technology mechanical engineering, automation of machine-building manufactures direction will be the next development disciplines.</p>	<p>12. The dependence of the rate cut during a recession.  13. The processing method for determining easily and materials About cutting materials could be easily treated with understanding.  14. General constructive elements tool  15. Splitters.  16. Shaping traverse.  17. Plate processing equipment.  18. Plate processing equipment.</p>	<p>stagnancy different cutting instruments using EDM (more on solving the issues).</p>	<p>of drilling.  8. Drilling eat and check the period of stagnation.  9. ferrous geometric parameters</p>
	72		36	18	18
6	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>The bulk preparation design and production</p>	<p>"The bulk preparation design and production" as a general-professional science, taught 8th semester. Implementation of the program planned in the curriculum mathematics, information technology and the natural (higher mathematics, physics, theoretical mechanics),</p>	<p>1. To fill the indicators that affects the cost.  2. Block types and their preparation.  3. Bulk preparation production.  4. Bulk preparation design.  5. Model. (Template)  6. Effortlessly and technology to remain in the hands of the</p>	<p>1. Cast technological properties of materials.  2. Process to study the physical and chemical characteristics.  3 processes acting at the convector.  4. Injection systems and to determine the size and shape</p>	<p>1. Bulk drawing the shape of the design calculation of its size. To find the size of the model.  2. Model for the two dogmas of silica sand-clay technology.  3. To determine the size of the development of the scheme and root  4. Once the template is used to</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>general (machine parts, standardization and certification; materials; construction materials technology; and electrical Fundamentals of automation of production processes, etc.), and specialization (engineering of production processes) will be required to have sufficient knowledge and skills in the fields.</p>	<p>model. 7. Reported. (Refill) 8. The following accounting systems design. 9. technology to stay on the park 10. Bulk stellar- melting. 11. shape- sand cast iron in the technology. 12. Steel alloys. 13. Steel - of the cast. 14. Foundry work cast copper. 15. The casting of magnesium and titanium alloys. 16. Foundry work rear shortcomings methods to eliminate them. 17. Foundry work - modern methods. 18. Foundry work - modern methods.</p>	<p>of the design. 5. The blast-furnace iron to calculate the amount of energy used for heating and melting. 6. The power arm to calculate the energy consumption for heating and melting Metal in the oven. 7. The process of copper alloys. 8. Process of aluminum alloys. 9. In the case of processing liquid alloys.</p>	<p>manually key technology. 5. Preparation of the Root drying temperature mode selection and implementation of its technology. 6. The development of the technology of sand-cast molds clay. 7. Metal molds for casting production technology 8. Cupola furnace performance and learning technology. 9. Cupola furnace keeping the structure. Cupola furnace gray iron technology.</p>
	72		36	18	18
7	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Designing and technological bases</p>	<p>The main objective of the training of science: Direction of Education: 5320200- engineering technology, mechanical equipment and automation of the production of educational programs for students, "Design Technology Based on" theoretical knowledge to be able to provide. Accounts on the basis of theoretical knowledge and practical work on the implementation of the projects in the application of modern technical tools and skills to do to make sure.</p>	<p>1. Introduction. The aim of the science and mission 2. The General Principles of Development. 3. The technological basis for the development of technological processes to assemble the car 4. The car service to put standards and technical similarities between the demands of accuracy. 5. Credit technologic meeting. Components and parts for construction technologic. Spring compounds, cleaning methods and technological</p>	<p>1. Body type details the development of design and technical requirements 2. Cover the details of the design and development of technical requirements 3. Digital program management processing milling machines 4. Brackets detail the development of working drawings and technical requirements. 5. Shaft-type details, drawings design and development of technical requirements. 6. Details the development of</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>After training in science class filmstrips used electronic versions of texts. Corresponds to the requirements of science content knowledge in the field of DST</p>	<p>tools. The sequence of meeting the production requirements. 6. manufacture of automated preparation of body parts 7. Automated corps details will be processed technologic requirements. Design features technical requirements and building materials details. 8. Construction technologic. Features and details of the body to choose the technological base of the processing sequence. 9. Automated corps details of the production process.</p>	<p>design and technical requirements. 7. Rounded body type, details of robotic technology for complex processing. 8. The gear-type design and technical details of requirements for development. 9. Designing star details the project of design and technical requirements.</p>	
	36		18	18	
8	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Fundamentals of design automation</p>	<p>The purpose of teaching science to students of technical problems that occur in the early stages of the design process automation systems, design software, optimization methods, logical algebra and modern methods and principles addressed in accordance with the directions on the profile, the educational standard of the required knowledge, skills, and professional formation. Scientific-technical systems optimal projection students the task of using modern methods and methodologies computer automated design of optimal</p>	<p>1. Introduction. Engineering design concepts. The importance of design automation processes and Development areas. The purpose of science and responsibilities. 2. The technical design of the system's life cycle and its role in the process. 3. Development of an object and hierarchical aspects and stages in the process. 4. Planning to describe objects and processes. 5. Development typical sequence. 6. The automated design,</p>	<p>1. Automation acquainted with the technical support tools and learns to use them. 2. Optimal design differential method tackling issues related to the study. 3. Optimal design differential method tackling issues related to the study. 4. Linear Programming mathematical study of optimal resolving practical examples of the implementation of projects. 5. Linear Programming mathematical study of optimal resolving practical examples of the implementation of projects information.</p>	<p>1. The automated design methods to create the technical documentation process. (Editor of Word). 2. Exposure to learn to work on the mathematical relationship diagrams and tables in the. 3. Design automation software AutoCAD acquainted with the capabilities and user interface. 4. Design automation software to learn the basics of AutoCAD. 5. AutoCAD repetitive work with objects in the program. 6. AutoCAD car and details of the mechanism by means of the program charts. 7. design automation software</p>

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		<p>mathematical principles, types of automation design and project documents is to create an automated methods.</p>	<p>technical support, technical means.            7. The automated design software. Operating systems, applications, and their structure, characteristics, and general r about them.            8. The design of the automated linguistic supply.            9. The design of the automated information. Information database concepts.            10. The graphic design of automated systems, functions and components. Graphic modeling.            11. AutoCAD. The task of measuring units. Use interface. The following requirements to the computer. Graphs and editors.            12. KOMPAS. The task of measuring units. Use interface. The following requirements to the computer. Graphs and editors.            13. Development Principles of mathematical modeling and optimization of the automation of the process. Making optimal solution for modeling jobs.            14. The differentiated method of optimization.            15. Methods to optimize a number of factors.            16. The method of linear programming optimization. Variation optimization method.            17. Planning process</p>	<p>6. Handle graphic examples of the application of computer-aided design models.            7. Handle graphic examples of the application of computer-aided design models.            8. Login to do algebra, geometry model examples of the application of the solution.            9. Login to do algebra, geometry model examples of the application of the solution.</p>	<p>KOMPAS acquainted with the capabilities and user interface.            8. Linear Programming mathematical study of practical examples of design optimal solution            9. Handle graphic examples of the application of computer-aided design models.            10. Handle graphic examples of the application of computer-aided design models.            11. Development computerized mathematical modeling of the process of living and optimization tion.            12. Design automation software KOMPAS study skills.            13. Design automation software KOMPAS study skills.            14. Planning process automatically make a graph theory.            15. The implementation of KOMPAS program the machine and details of the mechanism by means of charts            16. Logical algebra solve geometric model examples of the application of learning experiences.            17. Logical algebra solve geometric model examples of the application of learning experiences.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			automatically make a graph theory. 18. The basis of the theory of graphic design automation process.		
	<b>88</b>		<b>36</b>	<b>18</b>	<b>34</b>
9	<b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b>  Fundamentals of Mechanical Technology	<p>The purpose of the teaching of science in mechanical engineering students at the enterprises of the production process and the types of operations used in the preparation of product processing and assembly of mechanical laws, issues, analysis, calculation errors and solutions, and design and fitting a profile of line with the fundamentals of knowledge, skills and development of skills.</p> <p>The task of science in engineering technology students the basic rules and the history of the development of production and technological processes meet the technological process of structural design and analysis of the basic laws and the implementation of the operations of the errors is a productive options and progressive technological processes are created, details of options to choose, raw materials, Metal-cutting machine tools, cutting tools, the right to choose to fill out and process</p>	<p>The purpose of the teaching of science in mechanical engineering students at the enterprises of the production process and the types of operations used in the preparation of product processing and assembly of mechanical laws, issues, analysis, calculation errors and solutions, and design and fitting a profile of line with the fundamentals of knowledge, skills and development of skills.</p> <p>The task of science in engineering technology students the basic rules and the history of the development of production and technological processes meet the technological process of structural design and analysis of the basic laws and the implementation of the operations of the errors is a productive options and progressive technological processes are created, details the of options to choose, raw materials, Metal-cutting machine tools, cutting tools, the right to choose to fill out and</p>	<ol style="list-style-type: none"> <li>To determine the type of production.</li> <li>The study of the structure of the technological process, the operation of the fill and technological development of the contents of the documents in the passage.</li> <li>Preparation schemes to create entries in the database.</li> <li>Size determination to create a database error.</li> <li>Preparation options on the basis of dimensional analysis.</li> <li>The process of technological operations and technical standards.</li> <li>Detailp structure process ability and analysis to determine the number of indicators.</li> <li>The calculation of the amount of mechanical processing.</li> <li>To create a group of complex technological process design details.</li> </ol>	<ol style="list-style-type: none"> <li>The installation of the mechanical processing of various preparation and fastening system.</li> <li>Group (party) to determine the size of the parts lathe processing settings.</li> <li>Three standing Patrol casting errors.</li> <li>The most appropriate means cylindrical prism preparation to determine the error shafted.</li> <li>Lathes dynamic study of the impact of the sturgeon processing error shafted.</li> <li>Installation failed to set a template for cutting tools impact on the size of the detail.</li> <li>The longitudinal pole lathe machines preparation lead processing errors.</li> <li>Support Limbo on the effect of cutting the size of the device settings Error Detail.</li> <li>Shaft determines the types of technical details lathe processing time limit.</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		documents and the accuracy of the measurement, the surfaces are clean and in terms of technical and economic efficiency is to produce a quality product.	process documents and the accuracy of the measurement, the surfaces are clean and in terms of technical and economic efficiency is to produce a quality product.		
	36			18	18
10	<b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b>  Mechanical Engineering	The purpose of teaching science and the production of machine-building enterprises of the students used a typical manufacturing process and details of the types of mechanical processing and assembly operations, engineering, production methods and design, fitting a profile of line with the fundamentals of knowledge, talent and skill formation. The task of science to assess the structure of the components, mechanical processing routes, processing methods, materials, preparation, Metal-cutting machines, technological equipment, cutting tools, the right to choose to fill out and process documents and the accuracy of the measurement, the surfaces are clean and in terms of technical and economic efficiency is to produce a quality product.	1. Introduction. The basic concepts. 2. Warehouse bench mechanical processing technological processes. 3. The details of mechanical processing technological processes of the body. 4. Step bench mechanical processing technological processes. 5. Warehouse spindle machining technological processes. 6. Full bench mechanical processing technological processes. 7. Tension and forks mechanical processing technological processes. 8. piston-rod mechanical technological processes. 9. Bushing mechanical technological processes. 10. Flange mechanical technological processes. 11. PISTONS mechanical technological processes. 12. Walking screws, mechanical technological processes. 13. The roller gear wheels and	1. The appointment of the processing accuracy of the shape of the surface detail. 2.. To achieve the required accuracy - profiler and plane processing sequence and method of selection. 3. The development of implant treatment process route. 4. Shaft processing technological process routes. 5. Richard processing technological process routes. 6. The development of the gear wheels processing technological process route. 7. Pitch combinations to determine the parameters of the collection. 8. piston-rod collection schemes and pitch combination gravitational forces. 9. The assembly process of technological development.	1. The net effect of processing part of the splitters size. Part 1. 2. The net effect of processing part of the splitters size. Part 2. 3. Turner splitters depend on the shafted of the heat deformation of the cutting drum. Part 1. 4. Turner splitters depend on the shafted of the heat deformation of the cutting drum. Part 2. 5. The opposite plane and satellite mill. 6. The balanced combination of static collection. 7. Vertical-ferrous machining spindle accumulation of heat deforming the shafted of the runtime dependencies. Part 1. 8. The vertical-ferrous machining spindle accumulation of heat deforming the shafted of the runtime dependencies. Part 2. 9. Gearboxes collection schemes.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			mechanical technological processes 14. The conical gear wheels of mechanical processing technological processes. 15. Worm wheels and mechanical technological processes. 16. The collection of processes of technological design. 17. The composition and details of a typical machine assembly. 18. The further development of engineering technology.		
	72		36	18	18
11	<b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b>  Fundamentals of mechatronics	This program "Mechatronics Fundamentals" in the process of teaching student's mechatronics base levels and activity of structural elements and the principles of mutual understanding mechatronics is able to take practical skills for analysis and synthesis of the objects. Production machinery to ensure production methods and tools to automate the process of preparing, planning and operational management of the production process, the shafted of the ways to know the history and the future trend of development of science and the results of socio-economic reform of the country coverage. This came out of the	1. General information about Mechatronics. The basic concepts and terms. 2. Mechatronics basic elements and principles of construction of systems 3. Mechatronics basic elements and principles of construction of systems 4. Mechatronics facilities management 5. Mechatronics systems devices 6. Information-measuring devices. 7. Information-computing devices 8. mathematical modeling of technical systems 9. Mechatronics automated design systems. 10. In the field of application objects Mechatronics	1. The precise movement of the hands. 2. Calculate the power to keep the robot. 3. The drive to build the scheme in principle pneumatic the air. 4. The calculation of pneumatic drive	1. The electric drive structure and principles of the steps 2. The structure of automated production lines and processing principles. 3. Mechatronics modules executive mechanisms. 4. Industrial Robot PR-5M device. 5. The structure of microprocessor devices and principles

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		<p>'Fundamentals of Mechatronics training within the framework of the tasks carried out during the development of science degree:</p> <p>students basic concepts, history and mechatronics familiar with the decisive factors of development;</p> <p>mechatronics systems modular building structure and the basic elements of the conceptual principles;</p> <p>    Mechatronics important factors prospects;</p> <p>    mechatronics modules and systems, structures, and the construction of the concept of learning;</p> <p>    mechatronics models for the study of the principles of the basic elements of movement;</p> <p>    mechatronics study of the laws of the modules to build capacity;</p> <p>    mechatronics modules, integrated and synergetic integration of modern approaches to the study of the structural elements;</p> <p>    mechatronics facilities to learn the methods of modern law and intellectual property management;</p> <p>    mechatronics systems, efficient use of spectrum;</p> <p>    mechatronics to learn the</p>	<p>11. Robots and robot technical complexes.</p> <p>12. Mechatronics and international engineering.</p> <p>13. The future of robots and robot technology.</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>basics of modern methods of modeling and designing systems; Management Theory, based on discrete mathematics and number of technical and economic methods and systems reasonably designed mechatronics must learn to apply practical skills acquired in the field.</p> <p>This training program 5320200- "Technology of mechanical engineering, automation of machine-building manufactures" in the direction of education developed due to state educational standards.</p>			
	44		26	8	10
12	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Device design and manufacturing</p>	<p>The teacher on the target machine create a step-by-step process to prepare the production, quality and high performance products with competitive machinery and control equipment for the study design and manufacturing method.</p> <p>Science students the task of mechanical processing machine, based on the objects in the collection and control of technological processes to learn how to select, design and manufacturing issues. As well as modern workshop and get acquainted with the principles of control structures and objects.</p>	<ol style="list-style-type: none"> <li>1. Introduction. The basic concepts of the technological functions and classification of objects.</li> <li>2. Preparation equipment basing/</li> <li>3. The Cabinet of mounting elements.</li> <li>4. The device forces the Cabinet.</li> <li>5. The mounting errors.</li> <li>6. Determine the direction of the cutting tools processing the surface of objects and elements of the body.</li> <li>7. objects lifting equipment to strengthen the transmission mechanisms.</li> <li>8. Special design methodology</li> </ol>	<ol style="list-style-type: none"> <li>1. Universal folding design and assembly of installations</li> <li>2. Preparation basing calculation mistakes.</li> <li>3. Special objects, keeping the power of the Cabinet.</li> <li>4. The calculation methods of the object,</li> <li>5. Turner equipment design.</li> <li>6. Milling equipment design.</li> <li>7. Drilling equipment design.</li> <li>8. Preparation mistakes basing</li> <li>9. The force of the air cylinder account and Design</li> </ol>	<ol style="list-style-type: none"> <li>1. Universal folding objects.</li> <li>2. Universal objects collection.</li> <li>3. Turner objects.</li> <li>4. Drilling objects.</li> <li>5. Ferrous objects.</li> <li>6. The design of the collection objects.</li> <li>7. Control device structure.</li> <li>8. objects vacuum, electromagnetic and magnetic drive.</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>Fundamentals of design and production of objects for the study of science students' Machinery, Materials, Descriptive geometry and engineering graphics, theoretical mechanics, construction materials technology, hydraulic design and hydro- pneumatic must be proficient in core subjects.</p> <p>Fundamentals of design and production of the objects after pursuing science students independently select the necessary machinery and control equipment and is capable of projecting 5320200-Technology mechanical engineering, automation of machine-building manufactures is prepared to develop in the direction of science education.</p>	<p>of the objects.</p> <p>9. Settings drive.</p> <p>10. Turner and circular slits machines options.</p> <p>11. Drilling machines options.</p> <p>12. Milling machines options.</p> <p>13. The control device.</p> <p>14. Collection objects.</p> <p>15 modern workshops and control devices.</p> <p>16. Warehouse production settings.</p> <p>17. Control the production and collection of objects.</p> <p>18. The flexible universal collection objects for the production of production.</p>		
	70		36	18	16
13	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Technical management</p>	<p>The purpose of science studying students receiving education in this direction, the industrial production of complex technical systems that automatically manage the basics of automation, including automatic control systems, static and dynamic calculations to meet the required standards of education based on knowledge, skills and experience level is to provide.</p> <p>Which is an integral part of the</p>	<ol style="list-style-type: none"> <li>1. Discipline goals and objectives. Management Systems Concepts.</li> <li>2. Automatic control systems for structural design. Technological processes management systems.</li> <li>3. Technical systems management processes. The basic principles of management.</li> <li>4. Set up automatic systems structural scheme</li> <li>5. The system automatically adjust the characteristics of the time.</li> </ol>	<ol style="list-style-type: none"> <li>1. The principle of automatic control systems, machinery and equipment, technology, construction schemes.</li> <li>2. Automatic control systems, functional and structured schemes.</li> <li>3. The functions of linear systems.</li> <li>4. Time characteristics of the discrete method.</li> <li>5. Open and closed contour to determine the function of the overall transmission system.</li> <li>6. Feedback to calculate the</li> </ol>	<ol style="list-style-type: none"> <li>1. Automatic analysis of the device accuracy task management system.</li> <li>2. 2206VMF2 models of machines set up and manage DPM</li> <li>3. DPM machines punched tape programs.</li> <li>4. Linear automatic analysis of the quality management systems.</li> <li>5. The structure of the step-automatic pulse frequency controlled drive, trying to learn the principles and characteristics</li> </ol>

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		<p>automation of manufacturing processes to the students the role of science in technical systems, automatic control theory, based on the structure and possibilities of automation of technological processes, technical systems, equipped with management devices, and mathematical methods to describe the structure and principles of work, created using mathematical models automatic calculation of static and dynamic management system to teach.</p>	<p>6. Typical dynamic line. Position, integrated, differentiated and peer delay. Frequency transfer functions.  7. Ideally, the amplifiers. Aperiodic insecure and their description.  8. Framework insecure, and their description.  9. Describe the automatic adjustment system using a dynamic link.  10. Automatic adjustment system advantage.  11. Automatically adjust the quality of the system.  12. The control system controls. Measuring devices. Management devices.  13. Control devices that affect the object. To adjust the objects and their properties.  14. Automatic control of technological processes. Digital program management systems. Robotized technological complexes and flexible manufacturing systems.  15. Optimizing management processes. Approach to the analysis and synthesis of modern management system.  16. The non-linear systems.  17. The non-linear systems.</p>	<p>rule of linear systems.  7. The automatic control system to calculate the characteristic technological equipment.</p>	<p>of the analysis.  6. Robotic synthesis of technical systems using MATLAB.</p>
	60		34	14	12

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14	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>Technology production and test equipment</p>	<p>Engineer engineering role and importance of science. Process equipment design, components methods to calculate basic knots and details of the construction and history and ways to improve the reliability. The results of the socio-economic reforms of the country in the field of mechanical engineering, regional issues and the science, technology and technology are the goals and objectives of the achievements of science.</p>	<ol style="list-style-type: none"> <li>1. Technological equipment, production and testing facilities. Technological equipment manufacturing and basic tests.</li> <li>2. The main requirements for the equipment, and technical and economic indicators of the criteria.</li> <li>3. Production equipment and technological training. Spindle functions and their requirements. Spindle materials. Spindle machining technology.</li> <li>4. Equipment manufacturing, and the details of the corps frame. Frame and body parts processing technology.</li> <li>5. The production of gear wheels. Terms of gear wheels and technical training. Gear wheels processing technology.</li> <li>6. Workshop to collect the details of the production and quality control. Equipment to check the quality of the components and mechanisms of preparation.</li> <li>7. Equipment geometric and kinematic accuracy and experience. The main types of testing machines. Switch machines and try to overload state campaigns. Equipment to check the accuracy of geometrical. Check the accuracy of machines kinematics. Equipment to determine the deformation of</li> </ol>		<ol style="list-style-type: none"> <li>1. Gear wheels.</li> <li>2. Gear wheel manufacturing equipment and technological process.</li> <li>3. Turner machines spindle manufacturing equipment.</li> <li>4. Turner machines spindle-making process for the preparation of the necessary equipment and technology.</li> <li>5. Equipment operational characteristics of testing criteria.</li> <li>6. The calculation of the foundation of the Metal equipment, check the installation of the machines.</li> <li>7. turner-cutting lathe specification and preparation of the technical documentation for a passport.</li> <li>8. turner-invasive methods of testing equipment.</li> <li>9. The installation of equipment and installation practices.</li> </ol>

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			<p>the heat.</p> <p>8. Testing machines resistant to vibration and noise. Trembles machines interference ability and test methods. Shortages of equipment testing methods. Machines operational characteristics valuing.</p> <p>9. Equipment installation. Check the machines and facilities. Finishing machines and commissioning. Machines aesthetic appearance. The level of preparation of quality. Equipment and technical and economic indicators.</p>		
	36		18		18
15	<p><b>5320200- Technology mechanical engineering, automation of machine-building manufactures</b></p> <p>The mutual sharing, standardization and technical measurements</p>	<p>"Interchangeable, standardization and technical measurements" objective science and the quality of the product management functions foundations and technical control, metrology, standardization is the main teaching position.</p> <p>The main task of the course of future professionals interchangeability, standardization and technical measurements, along with the full knowledge about the product quality and technical level of the implementation of the principles and methods of standardization and metrology, and management of production</p>	<p>1. Introduction. State Standards System (DST).</p> <p>2. Interchangeability, possessing the basic concepts and operations.</p> <p>3. Typical compounds possessing machine and transfer the principle of a single system.</p> <p>4. Main deviation.</p> <p>5. The machine Metal geometric forms and surfaces Interlace tangible. surface uneven criterion tools and methods for measurement and control them</p> <p>6. Details possessing such forms and settled on terms.</p> <p>7. metrology and technical measurements</p> <p>8. The principles of creation and control of the means of</p>	<p>1. Indicator shaft using longitudinal and correspondence strict control.</p> <p>2. 201 models profiler and surface detail to meet with gnarled - profiler. II.</p> <p>3. 201 models profiler and surface detail to meet with gnarled - profiler. Part II.</p> <p>4. The drive to identify and control patches of fighting teeth.</p> <p>5. Optimizer to measure the diameter of the structure and pattern-FUSES.</p>	<p>1. Calipers Metrological study of the structure of the index and tools.</p> <p>2. calipers structure and use it</p> <p>3. Do not parallel to the length of the closing meters.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		processes and learn to use to improve the quality of manufactured products.	measurement 9. The calculation of the selection. 10. The selection and calculation of the transition. 11. The smooth cylindrical-training devices to control each other. 12. The calculation of calibration executive proportions. 13. Conical unit possessing and transfer system. 14. Dimensional theory method to calculate the probability of the chain. 15. Dimensional theory method to calculate the probability of the chain. 16. Certification of engineering products.		
	48		32	10	6
1	<b>5310600 – Elevated transport systems and operations</b>  Re-establishing the ability details of vehicle technologies	Increasing the efficiency of the road transport business is one of the major sources of production and repair of automobiles and the organization of the work is to develop the technology further. The purpose of science specialists of the future of automobile transport details of the production and repair of motor vehicles on the basis of scientific knowledge and methods of the theory of knowledge, technology and skills is to practice. The main objectives of science: the production of means of transport,	Introduction. 2. indicators defined in detail and his ability to work. 3. Repairing Car 4. Sorting automobiles parts 5. Details washing-cleaning technology. 6. Determine the technical details to identify the defect condition. 7. Methods for identifying the defect details. 8. Description of the technological methods used to repair. 9. vehicle repair a resolution on the restoration of the details of		1. Repairing the sleeve of cylindrical. 2. Defecting of Fu tival. 3. Defecting piston-rod/ 4. Restoring piston-rod and basic repairs the size of their necks. 5. The position of the engine crankshaft milling techniques to determine the structural parameters. 6. Rotate the crankshaft repair size. 7. Synthetic materials for the details recovery. 8. Details by means of electric arc welding.

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	60	the knowledge and technology necessary for the repair of the details; auto repair show people the importance of agriculture, based on the use of scientific and technical progress achievements pave the way for further development of this technology; repair of road transport enterprises in the conditions of work for the establishment of the necessary knowledge and skills; is to solve the problems of the design process.	the technology 10. The details using plastic deformation to restore 11. The restoration of welding and bonding methods melt details 12. The details of welding technology 13. Enter the details of compensation methods 14. Enter the details to restore the spraying method 15. restore using galvanic coatings details		9. Gas welding and melt in the flames of the cost to restore control parts. 10. The details substituted by plastic deformation under pressure. 11. Details the method of recovery. 12. The method of installation with the details of repair parts recovery. 13. Vehicles weighing quality diagnostics. 14. The board diagnostics system is permanently installed and elementary. 15. The vehicle features brake diagnosis.
2.	<b>5310600 – Elevated transport systems and operations</b>  Car service in fundamental science	Construction aims of science management and technical services to provide care under the supervision of the operation of vehicles on the creation of knowledge and skills, to increase the efficiency of vehicles, to teach them how to save material and energy resource exploitation in the process. This science student's carmakers and car outlet of the Republic of Uzbekistan for the development of technical systems management, modern methods and technologies, and information supply, to accelerate the production of new	1. Introduction. Commercial Operations of importance. 2. Construction companies and their tariff. 3. Computers and documents specifying requirements for quality of services. 4. Accounting for the provision of technical and technological documentation. 5. Car service. 6. The method car company. 7. The preparation of the purchase of vehicles. 8. Commercial enterprises of the production process. 9. The procedure for the delivery of the service and the owner of		1. The establishment of the service providers of cars technology. 2. Construction of the production technology enterprises. 3. Construction of technological equipment of enterprises. 4. Business diagnostician equipment to enterprises. 5. Service vehicles. 6. Technical Services car registration. 7. Parking procedure for the return of their owners. 8. Construction companies, management about the basic concepts. 9. Construction companies, management structure.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		equipment and modern methods of management regulations acquainted with the technical systems based on the implementation of the concept of management of social life.	the parking. 10. Commercial production plots. 11. Auto production and technological equipment. 12. Sales of commercial and utility rooms. 13. Construction problems and advanced foreign experience. 14. The main problems of the auto. 15. Commercial enterprises, content and location of regions of the country, and technical documentation.		10. Commercial enterprises' technological documentation.
	50		30		20
3.	<b>5310600 – Elevated transport systems and operations</b>  Fundamentals of automation of the design process	The purpose of the study of science: the conditions of transport enterprises the main components of cars aggregates lost for the repair and restoration of the ability to work and his deep knowledge of vehicle repair and maintenance on the basis of design study of the processes and automation methods to meet with them. Science learning objectives: according to state standards of higher education consists of the following knowledge and skills formation: - Automotive business units and units lost the ability to teach the process of recovery methods and design processes and methods Studying discussed. This should be proficient in the	1. Introduction. Operations to automate design processes and functions. 2. The levels of design aspects and stages. 3. The pilot design issues, the need to design and automation of processes. 4. ALT software legality them. 5. ALT them, linguistic, practical software (AD) and ALT them, to provide information. 6. ALT dialogue in the organization; ALT's graphics systems. 7. AutoCAD general information about the system. 8. AutoCAD coordinate system; simple (primitive) properties; screen management; construction of facilities. 9. AutoCAD drawings formation		1. Development processes and their detection. 2. Planning process and determine its structure. 3. LJ general information about EXM and NM used in the study. 4. The parameters of the project objects. 5. given object (item) to develop the structure of the design process. 6. Technical facilities design routes. 7. The automated design system, the mathematical study of supply. 8. Legality both sides offering and linguistic software. 9. Both sides of practical software applications software (ADT). 10. Planning process in order to determine the ALT information supply.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
	54	<p>following subjects students studying science departments: "Higher Mathematics", "Informatics", "Physics", "Drawing geometry" "Theoretical Mechanics", "Strength of Materials", "and the theory of the structure and means of transport", "Electrical equipment and theory," "Heat" and "Technology of construction materials", "Materials Science", "internal combustion engines" and etc.</p>	teams.		<p>11. Development of a method to automate the process of selection of graphics systems.  12. Constructive design parameters for the implementation of processes and determination.  13. AutoCAD software installation.  14. The basic principle of the program AutoCAD.  15. Coordinates System; simple (primitive) properties; screen management; construction of facilities.  16. The program AutoCAD drawings forming teams.  17. Edit AutoCAD drawings in the program. Space and design combining.  18. AutoCAD software, the formation of three-dimensional objects.</p>
			18		36
4.	<p><b>5310600 – Elevated transport systems and operations</b></p> <p>Science and the theory of the structure of the vehicles</p>		<ol style="list-style-type: none"> <li>1. Operational features of vehicles.</li> <li>2. The balance of power in the cars.</li> <li>3. Auto General Dynamics.</li> <li>4. Auto stability.</li> <li>5. The brakes feature.</li> <li>6. The fuel efficiency of the vehicle.</li> <li>7. Car economic performance features.</li> <li>8. The controllability of the vehicle.</li> <li>9. The car's on fire.</li> </ol>	<ol style="list-style-type: none"> <li>1. The forces affecting the vehicle.</li> <li>2. The dynamics of gravity of the vehicle.</li> <li>3. The stability of the vehicle.</li> <li>4. The transverse stability of the vehicle.</li> <li>5. The fuel efficiency of the vehicle.</li> <li>6. Management of the vehicle.</li> <li>7. The vehicle.</li> <li>8. Smooth passage of the vehicle. Management the car alone.</li> </ol>	<ol style="list-style-type: none"> <li>1. The establishment of a technical description of the vehicle.</li> <li>2. Management to determine the angle of the wheels outputs.</li> <li>3. The determination of the transverse plane of the vehicle is static.</li> <li>4. Transmission and transmission of each level to determine the number of messages.</li> <li>5. Sailing center of the vehicle.</li> <li>6. Turns on the vicissitudes of the vehicle to determine the critical</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			10. Smooth walk to the car. 11. The forces affecting the vehicle. 12. Slipping burning tires. 13. Management gears vibration. 14. Road barriers lumen. 15. The car's vibrations. 16. Enhanced obstacles on the way. 17. articulated trucks and trailers. (4)		speed. 7. The longitudinal and transverse plane of the vehicle to determine the radius of the transition. 8. Turns critical to determine the speed of the collapse of the car. 9. Determine the critical friction and speed of the vehicle.
	68		34	16	18
5.	<b>5310600 – Elevated transport systems and operations</b>  Technological equipment and their operation'		1. Introduction. 2. The types of technological equipment. 3. Car Body IVA vessel maintenance and repair equipment used. 4. The gravity-economic feature of the car and the engine diagnostics, and maintenance for T equipment. 5. The vehicle security system and try to block diagnostics, maintenance and facilities for JT. 6. Part of the car to walk and transmission diagnostics, maintenance and facilities for JT. 7. Handling, care and elevate the standard equipment. 8. Service companies means creating the conditions for the comfort of the workers. 9. Service enterprises technical equipment standards and principles operational. 10. Technological equipment		1. Parking equipment used in the production of cleaning. 2. The engines used in the fuel system to provide maintenance and repair of equipment. 3. Auto brake features diagnosing items. 4. Handling, lifting equipment to look at. 5. The non-standard equipment, Booster, a manufacturer of equipment. 6. Labor conditions (and the rooms of the building lighting, ventilation, heating and cooling) equipment. 7. Hydraulic pneumatic and electromechanical drives equipped computer. 8. Lifter basic settings. 9. Curl configuration details, check the cheat and cut fracture cases. 10. The methods of technological equipment and maintenance t.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			maintenance, repair Vault to improve and update the system.		
	40		20		20
6.	<p><b>5310600– Elevated transport systems and operations</b></p> <p>Fundamentals of Designing of transport network</p>	<p>"Surface transportation systems and their operation," one of the special subjects in the preparation of bachelors on the "Fundamentals of Designing of a network of motor transport ". The goal of science, a comprehensive network of specialist transport companies made technological process and the design of scientific and practical knowledge on technological, transport enterprises (ATTK) the development of modern ways of teaching science and earned interest. the task of science According to state standards of higher education students:</p> <ul style="list-style-type: none"> <li>- An understanding of the following: ATTK processes in the development of production and technical base, as well as their technological design;</li> <li>- You must know; ATTK technological design, technical and economic evaluation;</li> <li>- Must have the following skills: calculating production program ATTK lullaby, workshops, regions, production planning and the history of the building.</li> </ul>	<ol style="list-style-type: none"> <li>1. Transport network projects subject of science objectives, the importance of staff training.</li> <li>2. The classification of the motor industry enterprises.</li> <li>3. Vehicle production base and network design procedure.</li> <li>4. The transport network of enterprises, technological design.</li> <li>5. The calculation of the technical service area.</li> <li>6. The calculation of this repair zone.</li> <li>7. Technological equipment needs identification, selection and maintenance and current repair technology to calculate the level of mechanization of the process. Technical service and repair parts, production workshops, warehouses, storage facilities and administrative everyday calculate the areas of rooms.</li> <li>8. Production areas and workshops in technological planning.</li> <li>9. The planning of the transportation enterprises.</li> <li>10. Project technical and economic evaluation.</li> <li>11. Transport infrastructure reconstruction and re-equipment</li> </ol>		<ol style="list-style-type: none"> <li>1. ATK and vehicle maintenance for the resource calculation of the frequency or the perfect way to repair your computer.</li> <li>2. ICT technical preparations for the computer to calculate the coefficient.</li> <li>3. ATK calculation of the number of vehicle maintenance cycle on the computer.</li> <li>4. ICT and JT maintenance work on the calculation of the annual I-ch computer program.</li> <li>5. ATXKS account maintenance and JT i ch-year program of work.</li> <li>6. The calculation of computer maintenance and JT regions.</li> <li>7. Maintenance and JT regional planning.</li> <li>8. ATK swears to identify the most suitable plans.</li> <li>9. ATK PA planning.</li> <li>10. The development of the ICT master plan.</li> <li>11. ICT projects TIB.</li> <li>12. (c) The calculation of the level of mechanization of the process of technological and JT.</li> <li>13. Planning ATXKS.</li> <li>14. Vehicles SXKM report and its FIRM computer technology planning.</li> <li>5. Vehicles SNF technological calculation and planning.</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			of production enterprises. 12. The transport sector enterprises and other types of technological design. 13. Car service centers. 14. PETROL filling stations. 15. Passenger transport stations, stations, freight stations. 16. Diagnostic centers and car storage facilities.		16. The passenger station technological calculation and planning. 17. The freight car station technological calculation and planning. 18. Diagnostic centers, technological calculation and planning.
	68		32		36
7.	<b>5310600 – Elevated transport systems and operations</b>  Engines of internal combustion	The teacher on internal combustion engines, which aims to work in the conditions of market economy of the future, along with experts from other disciplines to provide the necessary amount of knowledge on the basis of the requirements of the standard. This is science education for student's iodide design principles, theory, and will be calculated on the basis of thorough knowledge of the business process. According to state standards of higher education, bachelor of science in preparation of the following tasks: - The creation of the piston iodide and a brief history of the development of education; - On the use of concepts; - Fuel and energy resources and external information about the problems of environmental protection;	1. Iodide science functions and sources. Iodide and real thermodynamic cycles. 2. Working conditions and the gas exchange process. 3. The compression process. 4. The spark that fire, diesel and gas-diesel combustible mixture formation and combustion process. 5. Thermodynamic relationships in the process of combustion. 6. The process of enlargement. 7. Motor and its business cycle indicators, as well as its size. 8. Engine tensions in the external balance of heat and temperature. 9. Features and indicators dioramas' automobile engines. 10. The introduction of air under pressure and by means of improving the operation of the engine. 11. Testing of internal combustion engines and their characteristics.		1. Internal combustion engines, test equipment and instruments used. (4) 2. Description of the UT set the compound on the structure of an engine to ignite. (4) 3. Exacerbate shave the description of the progress on adjusting the angle of an engine. (4) 4. Description of the engine to ignite congestion. (4) 5. Description of the diesel engine speed. (2)

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<ul style="list-style-type: none"> <li>- Iodide on the types of concepts;</li> <li>- The workers' bodies and their features;</li> <li>Eyed real cycle (gas exchange, compression, mixture, combustion and expansion);</li> <li>- The technical, economic and environmental indicators of iodine;</li> <li>- Engine heat balance and heat stress;</li> <li>- Under pressure to enter the engine;</li> <li>- Fuel iodide apparatus and the number of orbits regulator;</li> <li>- Characteristics of the iodine;</li> <li>- Nazr's kinematic and dynamics;</li> <li>- Balancing engine;</li> <li>- Smooth operation of the engine;</li> <li>- Engine construction account;</li> <li>Valle torsion vibrations;</li> <li>gas distribution mechanism;</li> <li>- Cooling lubricants, fuel and air supply systems;</li> <li>- Further development of the iodide.</li> </ul>	<ul style="list-style-type: none"> <li>12. Internal combustion engines of environmental indicators.</li> <li>13. Spark to ignite the fire engines and fuels transmission equipment.</li> <li>14. Diesel and gas-diesel fuel transfer equipment.</li> <li>15. Fu adjust the orbital frequency automatic.</li> <li>16. Crank mechanism kinematics and dynamics.</li> <li>17. The balance of the internal combustion engine.</li> <li>18. Smooth operation of internal combustion engines.</li> </ul>		
	46		36		10
8.	<p style="text-align: center;"><b>5310600 – Elevated transport systems and operations</b></p> <p style="text-align: center;">Reliability theory and Fundamentals of diagnostics</p>	<p>Fan is a special network of expertise to determine the reliability of the machines, try to learn the methods of calculation and quantitative indicators. Quantitative indicators of reliability, widely used in networking equipment, spare parts to be determined. In addition to the quantitative</p>	<ul style="list-style-type: none"> <li>1. Reliability and diagnostic subject of science objectives and principles of the theory of sources</li> <li>2. The technical condition of the vehicle and the ability to work</li> <li>3. The details change during the operation and maintenance of state vehicles</li> <li>4. after eating the details of vehicles and components</li> </ul>		<ul style="list-style-type: none"> <li>1. Vehicles to collect information on the reliability of the system.</li> <li>2. Diastolic parameters to determine the characteristics.</li> <li>3. The conduct of the various types of vehicle diagnostic to determine compatibility.</li> <li>4. Darts qualities to determine the diagnostic parameters.</li> <li>5. The diagnostics tool: autotest.</li> </ul>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>indicators of reliability systems also detected. The task of science is that "EUTT" science students acquainted with the theory of the reliability of the machines, try to identify quantitative indicators of reliability of the machine and learn about the methods of reliability.</p> <p>Scientific methodological base of the previous semester Machinery, Tools is the theory of the structure and Sciences.</p>	<p>5. Trust properties and their indicators  6. violations of the laws of the distribution  7. The reliability of the factors studied  8. operating items in the process of reliability testing, collection and processing of information on  9. Self-operation in the process of collecting and processing information  10. Confidence indicators abuse application process  11. diagnostics functions and Tampering  12. The basic concept of putting diagnosis and eavesdropping  13. The external signs of diagnostics parameters and measure  14. Technical diagnostics and the means of transport before the job description  15. common processes and tools, diagnostics and technical requirements for diagnostic procedures,  16. vehicles moving about circuits and systems, diagnostic techniques and tools for safety  17. vehicles weighing quality diagnostic equipment  18. Technical efficiency and prospects of the development of diagnostics</p>		<p>6. The position of the engine crankshaft milling techniques to determine the structural parameters.  7. Determine the corners of the wheel deviation.  8. Built-in diagnostic. Balancing the wheels of cars.  9. Car engine piston cylindrical - group to determine the structural parameters.  10. Does the required account number and details leaving them (the case of tires).  11 the efficiency of the operation of the vehicle (complex) analysis of indicators.  12. Diagnostic permanent board installed elements of the system.  13. The brake diagnosis of the state of the vehicles.  14. Parking calculation the number and intensity of work.  At 15. The source of the completed tests of means of transport in the details EXM calculation.  16. Optimizing the service life of vehicles.  17. Machinery and eating.  18. Reliability mapping and using it to identify the most optimal model of the vehicle.</p>
	72		36		36

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
9.	<b>5310600 – Elevated transport systems and operations</b>  Logistics	The purpose of the teaching of science - economy, renewal and diagnostic environment for the product and the preservation of resources (ABZ TsBZ), their customer reach in time the necessary amount of essence and code basis, and students to develop theoretical and practical knowledge of the professional in the field. Raw materials economy and the role of science optimize the delivery process, ways to reduce the costs of transportation of cargo transportation Studying.	1. Economy logistics science subject content of the IVA. 2. The theoretical basis of the concept of logistics system 3. The materials management and logistics organization. 4. logistics strategy and planning, 5. Transport and logistics. 6. Economy of production and logistics. (1)	1. The materials management and logistics organization. 2. Logistics strategy and planning. 3. Economy of production and logistics. 4. Transport and logistics. 5. Logistics management system. 6. Logistics Information. 7. Economy logistics of purchase. (1)	
	<b>26</b>		12	<b>14</b>	
10.	<b>5310600 – Elevated transport systems and operations</b>  Materials, construction materials technology	The main objectives of science consists of the following: preparing and car parts manufacturing and processing technology study the technical and economic characteristics and methods of application; apparatus and equipment used in many ways to learn the principles of schemes; taking into account the motivations detail methods, which are suitable for processing preparing structure of the main ways of planning. The main objective of this science, and technological design of machinery and equipment, their components and the creation of mechanisms	1. Constructional structure and properties of materials. 2. To determine the hardness of metals Brunel method. 3. Ferrous metals metallurgy. 4. Steel production industry. 5. Do not stereotype casting of steel and steel quality. 6. Producing of non-ferrous metals industry. 7. Testing Cast my materials and tools. 8. Not steel and non-ferrous metal alloys. 9. The metal under pressure. 10. The metal. 11. The volume of cold stamping. 12. Electric arc welding. 13. The outlet and its		1. Drilling Machines half-stuff processing. 2. The preparation of the planning machine components. 3. Study the crystallization process. Thermal analysis method to build a lead impetus case diagram. 4. Iron-carbon case diagrams and analysis of the study. 5. Metal and alloys macroscopic examination. 6. Metals of microanalysis. 7. Microanalysis of cast-iron. 8. Carbon steel thermal processing. 9. Tempering steel.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		of technological processes, machines and mechanisms, physical and mechanical properties required for the preparation and selection of materials, change their mechanical properties, the required shape and size of various components, preparing production, the introduction of technological processes. Bringing all kinds of work, such as increasing the level of technical training for students.	characteristics welding, welding transformers. 14. Electric slag welding. 15. The metal gas welding. 16. Turning and planning machines preparing.		
	<b>50</b>		32		18
11.	<b>5310600– Elevated transport systems and operations</b>  Operational materials used vehicle		1. Introduction. 2. Oil processing information. 3. Methods of oil products and massages. 4. The total fuel properties and their impact on the performance of internal combustion engines. 5. engine the carburetor and fuel for their exploitation diet properties. 6. Gasoline their properties. 7. Diesel fuel for engines and in their operational characteristics. 8. The main features of diesel fuel. 9. The internal combustion engine-fixed gas and other types of fuel used. 10. Friction, wear and lubrication materials information. 11. Motor oils and their diet properties. 12. Transmission and other		1. Determination of the quality of gasoline. 2. In determining the quality of diesel oil.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			lubricating oil and their use. 13. The internal combustion engine for their oil. 14. auto-imposed plastic oils. 15. Lubricating oil of antifriction. 16. lubricating oil of conservation 17. Lubricating oil condensing. 18. Vehicles used in technical fluids and their chemistry.		
12.	40		36		4
13.	<b>5310600 – Elevated transport systems and operations</b>  Equipments of Electrical and electronic of Automobiles	The aim of this omission means of transport, electrical and electronic equipment and technical services to provide care under the supervision of the operation of vehicles for the organization of management knowledge and skills, to increase the efficiency of vehicles, to teach them how to save material and energy resource exploitation in the process. During the development of this science students carmakers and car-points of the new technical systems management, modern methods and technology, information, and accelerate the production of new equipment and get acquainted with the management based on modern methods of normative documents, the technical implementation of the concept of social management systems.	1. Introduction. 2. AC generator structure and operating principle. 3. AC generator designs. 4. Generator power to adjust the basic principle. 5. Batteries structure and the peculiarities of the structure of the battery. 6. Understand the structure and performance of the system principle. 7. The working principle of the structure of the vehicle starter. 8. The ignition system of the working process. 9. Contacts and electronic ignition systems. 10. Roll ignition energy accumulation time is controlled contactless ignition systems. 11. The ignition harness. 12. The ignition diagnostic systems of exploitation. 13. The control and auxiliary equipment and measuring instruments.		

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			14. The fuel tank measuring devices: electromagnetic, 15. Auto lighting system. 16. The car's electronic control systems: fuel and start transferring management; economizing electronic control switch. 17. The car's electronic control systems: fuel transfer and start management. 18. Switching equipment conductor wires and pressure.		
	36		36		
1.	<b>5310200- Electrical energy</b>  Fundamentals of design automation	The automated design systems created by the people is the most complex technical system. Such a selection of the design, programming, technical calculation to determine the architecture of the system operating environment, such as the analysis of the effectiveness of the system to solve the problem arises, the specific programming style complexes, such as the creation of a database and software library component includes its own problems to solve . The automated design systems and make the best use of only highly qualified engineering personnel when issues are being addressed properly. As a bachelor's automated design engineers use the system to work it out. Therefore, one of the most	1. "Development process automation framework," the science goals and objectives. 2. Development of hierarchical levels and aspects of the facilities. 3. The content and design methods. 4. The project is to determine the parameters of the objects. 5. The main indicators of electrical energy production. Standard design procedures. Methods of design, technical design object routes. 6. The calculation of the parameters of the project objects procedures. 7. The automated design systems, linguistic supply. Language processors. Translator structures 8. The design of the automated system of information supply.		1. The establishment of technological process selection algorithm. 2. Electric power generation, transmission and distribution to create space for design and complete explanation. 3. Technical select the areas of design trends 4. The choice of measuring instruments for the creation of the program. 5. Selected to create algorithms that can change the voltage. 6. The creation of a low-voltage network design algorithm. 7. "AutoCAD 2006" software system. 8. "Compass" software system. 9. "AutoCAD 2006" software system.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>important issues in higher education institutions that use automated design methods and tools the user is to produce students.</p> <p>"Development process automation basis of" objective science on the basis of theoretical knowledge 5310200-"EE" read the future bachelors in the direction of automated production environment with modern automated design systems skills.</p>	<p>9. The automated design software and technical supply systems.</p> <p>10. Technical mathematical models of objects.</p> <p>11. Analysis are the issues of the establishment and training.</p> <p>12. The calculation of electricity transmission networks.</p> <p>13. The design of the high-voltage network management.</p> <p>14. Synthesis, preparation and training issues.</p> <p>15. The automated design systems structures.</p> <p>16. Starting point nodes filled with comments Uploads</p> <p>17. The implementation of the development projects of medium voltage networks</p> <p>18. The automated design and development of the future working with the drawn</p>		
	54		36		18
2.	<p><b>5310200- Electrical energy</b></p> <p>Basics of electricity supply</p>	<p>This application was made on the basis of state educational standards. This science "electric energy" is one of the main subjects on the basis of the degree of preparation was founded. The purpose of science - the future is to establish the degree of knowledge in the field of power supply system.</p> <p>The task of science to examine the following: electrical appliances, devices and</p>	<p>1. Introduction. Electric load calculation. Electrical installations, graphs and indicators</p> <p>2. Added detection methods account</p> <p>3. The power supply system is needed to determine the load points.</p> <p>4. The district substations and power stations are used in voltage mode</p> <p>5. The electrical supply voltage</p>		<p>1. The establishment of technological process selection algorithm.</p> <p>2. Electrical power generation, transmission and distribution to create space for design and complete explanation.</p> <p>3. Technical select the areas of design trends</p> <p>4. The choice of measuring instruments for the creation of the program.</p> <p>5. selected to create algorithms</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>equipment, power supply systems; electricity networks system stationary mode of calculation; Reliability factor of electricity networks, taking into account technical and economic calculations on the basis of design and equipment selection; Computer equipment, electrical networks and systems design, calculation and others. The electricity supply system to provide consumers with electric power consumers to know the types of problems; The development of the electricity supply system, power supply system, power supply system in place, the transmission characteristics of the students.</p> <p>Science for the successful development of the "Theoretical Foundations of Electrical Engineering", "Information and communication technologies", "energy devices", the "power of mathematical problems", "industrial enterprises in the electricity supply," it is necessary to know the subjects. In addition, a parallel study "process" and "part of the electric power station and substation", "relay protection and automation" linked with science.</p> <p>Mastery of the</p>	<p>shall not be permitted to determine the value of the waste.</p> <p>6. mode voltage distribution network optimization.</p> <p>7. Technical-economic calculation method.</p> <p>8. The method of wires cross-section of economic intervals.</p> <p>9. The isolation of the low voltage cable and wire filling a short connection.</p> <p>10. agro-industrial enterprises and transformer substations. District substations.</p> <p>11. To calculate the number of districts, substations, transformers and power.</p> <p>12. Bearing in mind the requirements of the electricity distribution network design regime.</p> <p>13. The impact of the decline of the mains voltage electricity consumers</p> <p>14. quality of the electricity networks of electric power</p> <p>15. The reliability of the power supply requirements:</p> <p>16. Electrical energy economy</p> <p>17. improve the power factor</p> <p>18. Compensation devices.</p>		<p>that can change the voltage.</p> <p>6. The creation of a low-voltage network design algorithm.</p> <p>7. "AutoCAD 2006" software system.</p> <p>8. "КОМПАС" system software "Compass".</p> <p>9. "AutoCAD 2006" software system.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		knowledge gained in the study of science, science will serve as the foundation for the future.			
	<b>54</b>		36		18
<b>3.</b>	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>Power supply system, electricity networks</p>	<p>This science "electric energy" and "Vocational education (EE)" is one of the basic directions of preparation of bachelors and masters courses.</p> <p>The purpose of the study of science and electrical systems design is intended to provide information on the status and use.</p> <p>The main objectives of science: the electric train network parameters and settings; electricity networks and the development of methods of calculation and analysis of the status of the system; electrical systems design, development training; economic measures to improve the teaching of electricity networks.</p>	<ol style="list-style-type: none"> <li>1. Introduction. The elements of the structure of the electricity networks.</li> <li>2. air and cable lines, electricity networks</li> <li>3. The power transmission lines (PL) exchange schemes.</li> <li>4. Transformers and auto transformers exchange schemes and parameters</li> <li>5. Electric power network elements and energy losses.</li> <li>6. The calculation of the technical and economic feasibility study of the power network.</li> <li>7. Open to calculate the electrical networks modes</li> <li>8. Open providing electric mode processing sequence.</li> <li>9. The sequence of electric modes of computing, offering open.</li> <li>10. Closed calculate the electric modes</li> <li>11. Off the sequence of calculation of electrical networks</li> <li>12. Off the sequence of calculation of electrical networks</li> <li>13. The power and quality of energy supply.</li> </ol>	<ol style="list-style-type: none"> <li>1. The power to determine the balance of power networks.</li> <li>2. Electric connected to a network selection scheme. To determine the flow of electric power and energy.</li> <li>3. The selection of the nominal voltage. Cut surface of the wire selection and control.</li> <li>4. Select the number of voltage transformers and power. Determining the electrical power losses in the networks.</li> <li>5. Electrical networks, technical-economic substantiation of options.</li> <li>6. Determine the cut surface of the wire.</li> <li>7. Calculate the voltage of the regime.</li> <li>8. Determine the parameters of the overlay schemes.</li> <li>9. Adjust the voltage under load line.</li> </ol>	<ol style="list-style-type: none"> <li>1. The static characteristics of different customer research.</li> <li>2. The calculation of the profits of the means of ensuring electric reliability. Automatics used to improve the reliability of electrical performance of the development of simulators</li> <li>3. The power to choose the optimal means to increase the level of technical reliability. Point short of 10 kV line method to determine the distance learning model.</li> <li>4. condensers cell research with the help of the power factor</li> <li>5. The neutral networks are not connected to the ground line is connected to the ground, the development of energy-drag method to find customers</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			14. The power supply voltage to adjust the settings using the devices. 15. The power supply voltage to adjust the settings using the devices. 16. The power supply voltage to adjust the settings using the devices. 17. basic principles of design of electrical networks 18. electric power supply interruptions to consumers technical and economic losses.		
	<b>64</b>		36	18	10
<b>4.</b>	<b>5310200- Electrical energy</b>  Relay protection and automatics	The purpose of science is to cultivate students' knowledge in the field of relay protection and automation. The task of science, "relay protection and automation" devices to fulfill their schemes and the development of principles for the study of specific elements of the electrical network in the field of relay protection and automation devices, settings, collection and maintenance skills to create the independent exercise of their duties.	1. Introduction. Science objectives. A brief history of the development of relay protection and automation. 2. The role of measuring transformers, relay protection and automatic: Measuring converters 3. those who symmetric filters 4. elements of Semiconductors 5. microelectrode elements 6. Software Protection. 7. The operative outlet. 8. Suspended reserved. MTV and the start of the current schemes. 9. The current marking. Defense-oriented outlet. 10. Circuit protection. 11. The isolation of the neutral voltage electrical networks to protect cross-trainers. 12. Absolute selected	1. Line to P calculation. 2. Calculate the ED for MTV. 3. Generator current marking for the calculation. 4. The high-voltage Ed calculated for MTV. 5. Line to calculate the differential protection. 6. The calculation of longitudinal differential protection for the transformer. 7. The calculation of relay protection for short-circuits currents. 8. Transformers, protection relays. 9. The electric motor protection relays. 10. Relay protection of power transmission lines. 11. Automation devices. 12. Select the device for protection against	1. The electromagnetic relay testing. 2. The study of the structure of the current transformers constructive 3. The induction current relay test. 4. The study of the structure of power transformers constructive 5. Saver types and structures. 6. The principle types of automatic extinguisher and learn. 7. Time, and try to figure relief. 8. P business in the virtual laboratory for the principle of control 9. Automatic re-connects. 10. The device will automatically connect reservation. 11. To set the maximum current setting.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>PROTECTION:  The longitudinal differential current protection  13. The transverse differential current protection  14. spacers  15. Automation devices.  Automatic Linking:  16. Reserve will automatically connect to the source  17. voltage up to 1000 V electrical relay protection and automatics  18. Simultaneous generator relay protection and automatics.  19. Transformers, relay protection and automatics.  20. The transformer differential protection.  21. The relay hi-sensitive electric power (voltage up to 1000 V ED protection).  22. The electric motor protection relay (voltage higher than 1000 V ED protection).  23. Electrical equipment, relay protection and automatics.  24. The relay protection and automatics tires.  25. The microprocessor-based relay protection and automatic devices.  26. "Mechatronics" scientific and technical center multi-function BMPZ 04 type microprocessors buzzard block.  27. Space-800 (terminal) series</p>	<p>condensation.  13. The choice of protection for the electric arc furnace.  14. Parallel lines transverse differential protection for the calculation.</p>	<p>12. AZU control.  13. ETT RH computer management.  14. In line with the types of protective devices to meet INTERNET materials.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			microprocessor-based automation and protection devices. 28. Space 800.01 and BMPZ terminal block 04, the start of the current digital protection settings. 29. Quick microprocessor AZU device. 30. Remote working and working bodies of the principle of protection. 31. Distance bodies that affect the choice of sizes. 32. Distance protection schemes. 33. Remote Start protection size.		
	<b>122</b>		66	28	28
<b>5.</b>	<b>5310200- Electrical energy</b>  Electrical energy	The purpose of teaching science basics of modern power supply, teaches methods to optimize the performance of their schemes electricity consumers. The cities studied electrical supply schemes and electrical systems familiarization cities. Classification of cities. The electric power consumption. Cities electricity networks. Consumers of electric power supply system of the city, the base of electric equipment and substation, the city electric transport; electrical equipment; lights, lift equipment, conditioning equipment,	1. The importance of urban planning. 2. The electrical characteristics and the reliability of their power supply requirements of the consumers. 3. Electric grids loadings at the expense of the city. 4. Determine the population structure of the electricity load settlement. 5. Electrical load normality. Electric load calculation. 6. Lighting network load. 7. The principles of construction of the building electricity network schemes. 8. TP placement. 9. The calculation of the power	1. Local branches of power load calculation, accounting and forecasting of consumers. 2. Local network transformers in the most optimal regulatory reporting. 3. The City of electricity lines and transformers, load calculation. 4. The calculation of the electricity network in the city.	1. City electric load consumers of research. 2. Closed for the study of electrical networks and computing complex in the city. 3. City to study transforming the optimal mode and network selection. 4. DC power system research and optimization.

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		buildings, industrial buildings, hotels, business centers, department, sports and cultural complexes of the electrical load. Reactive power consumers in the cities.	network. Figure 10. The electric motor launch on the network. 11. The method of technical and economic calculations. 12. Transforming the technical and economic characteristics. 13. The City provides the general characteristics of 6-10 kV distribution networks of networks. 14. Off the main industrial consumers of the main features everyday - municipal building networks of companies. 15. Complex equipment. 16. Electric installation.		
	<b>48</b>		<b>32</b>	<b>8</b>	<b>8</b>
<b>6.</b>	<b>5310200- Electrical energy</b>  Lighting	This curriculum is based on state standards and standard applications in education. This science "electric energy" in the direction of one of the main subjects. The purpose of science is to formulate knowledge of electrical equipment and settings will be required to collect. To examine the role of science: the electricity supply system, electricity networks and services, set up collection and selection of equipment and devices; calculation of electric modes; technical-economic calculations based on the collection of electrical networks and equipment and settings;	1. The flow of energy and radiation. 2. Light sensitivity of the energy characteristics of integrated energy consumers. 3. The magnitude and light units: 4. Photometric body. 5. In light of the object properties. 6. Measuring devices. 7. The theory of thermal radiation. The effectiveness of the light. 8. Return layers burning lamps. 9. Metal greenhouse gases and the electrical charging process. Arm rate. 10. Fluorescent lamps connection scheme. 11. Lighting equipment, Lamps.	1. To determine the flow of light given on the basis of light power distribution lines 2. Principles of light to make sure that the power to determine the source of the light, 3. The light source in a story on the field 4. Shop in the area to determine the placement of fluorescent lamps and energy. 5. The choice of calculation methods, the power of light 6. Light power factor method 7. Light the power to determine the specific methods of power	1. coals measuring the brightness of the lamp and the lamp for the construction of the light distribution curves 2. fluorescent lamps, and the intake control equipment 3. fluorescent lamps with pulse power scheme 4. Two lamps supply scheme phase to check the effect of anti-stroboscopic 5. luminescent lamps resonance power scheme 6. The two-phase control palette anti stroboscopic effect 7. In the light of high pressure mercury lamps and filament connection scheme of the elements and characteristics of the lamps

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		networks and computing equipment, electrical systems design, calculation, configuration and management support.	12. The lighting system is set. The main types of lamps. 13. The main provisions of the lighting design of electrical equipment. 14. The light source, the lighting system, the lighting and the choice of replacement factor. 15. Lighting equipment, light equipment for the light source power coefficient calculation.		
	<b>58</b>		30	14	14
<b>7.</b>	<b>5310200- Electrical energy</b>  Energy, scientific and technical problems	The purpose of this science - the level of development of society and the state of its power to help the students with any level of welfare dependency. The task of science, science and technology development in developing countries the process of carrying out a very fast pace, to invent new types of energy, improve energy production and the need for efficient use of energy produced taught to students. For economic development and large-scale production of energy products to reduce the cost of production per capita national income of the population is the main task of the state to increase the share of all development.	1. Energy-present-day problems. The use of solar energy 2. In the field of energy and the environment 3. The law of the Republic of Uzbekistan on the rational use of electric energy. 4. The price to the growth of energy consumption and energy. 5. The effect of the oil price: requirements and recommendations. 6. Future Energy 7. Cost of Energy, the appraisal theory. 8. The need for energy audit 9. Energy balance of the enterprise. 10. The research and study methods: observation, experiment, and theoretical methods. Scientific ideas, the hypothesis of law. Knowledge of this system.	1. The types of energy sources 2. Protection of the environment. 3. Energy-saving issues. 4. The application of resonant power supply system of the events 5. Contacts breakers and control devices 6. The amount of reactive power management schemes automatically 7. Alternative energy status and future of the species. solar energy 8. The use of wind energy 9. Nuclear energy 10. The processing of the results of the experiment	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>11. Scientific research and anemia and "algorithm". Select the item and its importance to the national economy, the study is likely to perform certain period of time.</p> <p>12. Issues: analysis, synthesis, correction and recession. Not the object of knowledge, his work with the models. Examination results</p> <p>13. The essence of the matter - to be filed and determine the relationship between the variables to be taken. Problem-solving the system of equations. Experimental verification.</p> <p>14. Methods of informatics. Communication between human exposure. Information systems.</p> <p>15. In view of the database, and information resources. Information technology. Social network. Scientific publications and documents.</p> <p>16. The scientific and technical information, patents. The scientific literature with the producer organizations</p> <p>17. Mathematical methods. The mathematical model. One-dimensional, multi-dimensional schemes. Differential equations and methods of solving them.</p> <p>18. The choice of the experimental formulas.</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			Experimental research. 19. Experiment in a laboratory. Experiment in natural conditions. Model experiment. 20. Experimental research of metrological supply. Measuring instruments. 21. In the experiment will work. The processing of the results of the experiment. 22. The registration of the results of the scientific work, the preparation of official documents. Inventions. The patent claims		
	<b>64</b>		<b>44</b>	<b>20</b>	
<b>8.</b>	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>The reliability of the electricity supply</p>	<p>The goal of science, the study of the electrical supply system is to cultivate the students the information they need.</p> <p>The purpose of science - on the electricity supply network reconstruction and optimization of profiles is designed to help you take a deep theoretical knowledge.</p> <p>The task of science to provide electric power companies uploads the construction schedule optimization of the system, the electrical system to ensure the economic basis of calculation, the structure of the electricity networks, power distribution schemes, choice of methods to determine the transverse cross</p>	<ol style="list-style-type: none"> <li>1. Introduction. Power reliability problems. Objectives and content of science.</li> <li>2. The ability to work out elements work as a violation.</li> <li>3. Reliable indicators of the unit.</li> <li>4. Electrical energy devices in need of repair reliability of the parameters characterizing the properties (Scheduled preventive and restorative repair of damage indicators).</li> <li>5. Reliability of complex indicators.</li> <li>6. Transformers, electric transmission lines, switching devices, electric drives, relay protection and automation devices for work reasons and reliability indicators.</li> <li>7. Reliability, deterministic</li> </ol>	<ol style="list-style-type: none"> <li>1. The elements of the theory of probability and mathematical statistics</li> <li>2. The composition of the laws of probability events</li> <li>3. The elements are connected in parallel to calculate the reliability of the scheme</li> <li>4. The power supply system to determine the reliability of the parameters of the elements</li> <li>5. distribution reliability analysis binomial the application of the formula</li> <li>6. The reliability of calculation methods</li> <li>7. The calculation of the reliability of the elements of the planned off</li> <li>8. The composition of the reliability of the electrical</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>section of the wire and cable wires, TP Enterprises rights issues such as the structure of coverage.</p>	<p>methods of calculation.  8. Calculate the reliability of the system elements connected in series.  9. In each case, the regime parameters of selection scheme may be the case with the methodical analysis;  10. Advanced structural analysis of the scheme (the minimum and the minimum cross-cutting methods on the roads).  11. Consumers electrical energy devices for the consequences of failure.  12. Spent a formula taking into account loss of confidence.  13. The operation of the power supply reliability tools.</p>	<p>connections of the scheme calculate the probability of analytical methods  9. elements connected in series to calculate the reliability of the scheme</p>	
	<b>44</b>		26	18	
9.	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>Electric power transmission, distribution and consumption</p>	<p>The purpose of science is to formulate knowledge of electrical equipment and settings will be required to collect.  To examine the role of science: the electricity supply system, electricity networks and services, set up collection and selection of equipment and devices; calculation of electric modes; technical-economic calculations based on the collection of electrical networks and equipment and settings; networks and computing equipment, electrical systems</p>	<p>1. Introduction. The parameters of the power sharing schemes.  2. schemes and auto transformers and transformer replacement  3. schemes, and auto transformers and transformer replacement  4. due to the electrical signal path, the loading capacity  5. ensure power quality and energy  6. methods of adjusting the voltage  7. substations reduce the voltage adjust  8. Adjust the tension by</p>	<p>1. calculate the different voltage networks modes  2. calculate the electric load calculation  3. Switch final report on the</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		design, calculation, configuration and management support	changing the resistance of the network		
	<b>22</b>		16	6	
<b>10.</b>	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>Controlling supply of electric energy</p>	<p>The purpose of the training of science knowledge in the field of modern stations and substations forming the structure of the schemes of electric power stations and substations, electrical energy with the selection of equipment for the route profile, the educational standard of the required knowledge, skills and experience to provide the level.</p> <p>The task of science power stations and substations to choose the latter part of the structure and function of the high-voltage equipment grounding devices, structure and development of the students and their methods of calculation.</p>	<ol style="list-style-type: none"> <li>1. Introduction. The purpose of science and responsibilities.</li> <li>2. Auto transformers combined (mixed) cases.</li> <li>3. The voltage transformers (IT) power of choice.</li> <li>4. Electrical equipment, electric scheme.</li> <li>5. Distribution devices (TK) electric schemes.</li> <li>6. People type TK BBC simplified schemes.</li> <li>7. Thermal power, hydropower stations and substations to their needs.</li> <li>8. Substations needs of their systems.</li> <li>9. Station (substation), electric energy system to communicate with the technical and economic comparison of variants of the scheme.</li> <li>10. electric power stations on the basis of a systematic scheme of folding tires schemes</li> <li>11. Distribution equipment.</li> <li>12. The location of the area of the power station and substation distribution devices</li> </ol> <p>Location of the area of the power station and substation distribution devices.</p> <ol style="list-style-type: none"> <li>13. Station and substations</li> </ol>	<ol style="list-style-type: none"> <li>1. The choice of the CHP scheme</li> <li>2. The selection of the CHP scheme</li> <li>3. schemes of electric power stations on the basis of a systematic scheme of folding tires</li> <li>4. The electric power stations on the basis of a systematic scheme of folding tires schemes</li> <li>5. The voltage of 1000 V to calculate the distribution of equipment</li> <li>6. The choice of accumulator batteries and computing</li> <li>7. The two transformer substations and lightning protection</li> <li>8. calculate the land of neutrality resonance district substation connected to the device,</li> <li>9. Land of neutrality efficient district substation connected to the device.</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			measuring systems, controls, alarm and control. 14. Conditions. Alarm systems. 15. Station and substations operational shock. 16. Ground floor. 17. Stations, substations and lightning protection. 18. Substations atmosphere and the internal voltage protection.		
	<b>56</b>		<b>36</b>	<b>18</b>	
<b>11.</b>	<b>5310200- Electrical energy</b>  Fundamentals of electrical safety	The purpose of science is to cultivate students with the knowledge of the rules of safety equipment. The role of science in electrical equipment and electrical networks to create a safe workplace, the use of means of protection to prevent accidents and to try to acquire the knowledge, tools and equipment with safety rules is to formulate knowledge of working.	1. The goals and objectives of science. 2. Quick service and work 3. Organizational activities. 4. Technical measures. 5. The switching devices and complex equipment 6. batteries and cable lines of the security rules 7. gird lines of safety rules.	1. Voltage up to 1000 V under the protection of electrical equipment used in the main types of vehicles, the requirements for them. 2. under the 1000 V high-voltage electrical equipment used in the basic requirements and additional types of vehicles to protect them. 3. The requirements for pneumatic tools. They are working with safety rules 4. The rules of working electric nails and manhole. 5. Some types of steel they are working with safety rules	1. Electrical power supply and the injured persons received first aid methods 2. The types of safety equipment safety posters and signs, size, use 3. Security tests of electric vehicles. 4. Means of mechanical tests. 5. Ladder mechanical testing.
	<b>34</b>		<b>14</b>	<b>10</b>	<b>10</b>
<b>12.</b>	<b>5310200- Electrical energy</b>  The use of electrical equipment and the establishment of rules	The purpose of science is to formulate knowledge of electrical equipment and settings will be required to collect. To examine the role of science; power supply system, electricity networks and services, set up	1. Electrical equipment rules 2. The use of electrical supply equipment organizing events 3. The equipment of electric power stations and substations, electricity and cable networks, performing organizational activities	1. organization and personnel training in the use of electrical devices 2. To support and raise them 3. voltage current conducting parts and they work in close 4. Cable line works security measures	

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		collection and selection of equipment and devices; calculation of electric modes; technical-economic calculations based on the collection of electrical networks and equipment and settings; networks and computing equipment, electrical systems design, calculation, configuration and management support.	4. The use of electrical supply equipment and technical measures 5. The connector assembly of electrical equipment 6. Cable networks and safety rules 7. Air electricity transmission networks and safety rules 8. The installation of protective devices 9. Electrical equipment installation work safety rules.	5. The requirements of the fire safety warning on unsafe vehicles 6. under the power plants of 0.4 kV voltage equipment to fire off Firefighting and fire-fighting water supply 7. Fire extinguisher types and storage 8. studying electrical assembly and testing of engines 9. Cable to connect vessels to conduct research methods 10. Protection of electrical equipment used in the assembly of vehicles.	
	<b>38</b>		18	20	
<b>13.</b>	<b>5310200- Electrical energy</b>  Electromechanical	Electro mechanics science students the basic purpose and function of inductive energy converters to change the electromechanical power to change the principles, forms of electrical machines, transformers and autotransformer, frequency amplifiers, as well as a constant current, synchronous and asynchronous machines is to teach design and characteristics.	1. Introduction. The use of electric vehicles in the national economy, changes in electromechanical energy. 2. The power of electric machines Anchor filament power, torque equations. 3. The magnetic field generated electric vehicles Anchor filament. 4. The electric machine switching process and ways to improve it 5. The electric generator mode, the camera work, the connection diagram and the basic equations. 6. Electric generator characteristics, and connect them to work in parallel.	1. Introduction. Power transformers and voltage to determine the equation 2. Transformers to calculate the coefficient of useful work. 3. Asynchronous filament the machine to calculate the power of the electricity generated. 4. Induction machines to calculate power losses. 5. Simultaneous use of vehicles switches to study the Earth's magnetic field. 6. Simultaneous cars Jacob reactions to determine the magnitude of the magnetic field. 7. Calculation of anchored filament simulates machines. 8. Simultaneous anchor filament	1. Introduction. Electric vehicles constructive learning laboratory conditions imply structure. 2. Individual characteristics of a constant current generator to open the building. 3. Parallel to open the construction characteristics of a constant current generator. 4. The mixture causes a constant current DVI-open the Gamely learning methods in the laboratory. 5. Parallel to start electric motors to open. 6. The electric motor drives to open the series, the methods of control. 7. The coefficient of electric machines to determine the basis

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			7. The electric motor connection schemes, basic equations, methods causes in the past. 8. Methods of adjusting the speed of electric motors and mechanical characteristics. 9. The electric machinery industry standards. Specific types of electric machines.	the machine to calculate the power of the magnetic and electrical power undertakings. 9. Simultaneous calculation of losses and fluency rates cars.	of the mode switch. 8. Three-phase synchronous generator characteristics. 9. Three-phase synchronous generators like characteristics.
	<b>54</b>		18	18	18
<b>14</b>	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>Canon electricity supply companies</p>	<p>Bachelor "electric energy" in the field of education a part of their energy in many areas of education, covering the odds. Including:</p> <ul style="list-style-type: none"> <li>- The main consumers of electricity in various sectors of industry and consumer characteristics;</li> <li>- The use of modern blocks and complete electrical equipment and power supply companies as well as special workshops and system design;</li> <li>- Carry out technical-economic computations using a computer, as well as the basic elements of the electricity supply system and learn how to select the optimal parameters.</li> </ul>	<ol style="list-style-type: none"> <li>1. Introduction.</li> <li>2. The general information about the consumers of electric energy consumers and their stratification.</li> <li>3. The mining industry, electric motors electric energy consumers, and consumers.</li> <li>4. The engines of chemical and other industries of the EU and I s.</li> <li>5. Electronic Technology devices.</li> <li>6. Electrical load.</li> <li>7. Methods of calculation for determining the load.</li> <li>8. Calculate the load of single-phase electric energy consumers, and consumers. Downloads methods to help estimate.</li> <li>9. The power supply schemes the general principles of construction of industrial enterprises and construction of additions cartograms.</li> <li>10. The distribution of electric power in the territory of the enterprise schemes.</li> <li>11. Cable systems.</li> <li>12. Solid, flexible and complete</li> </ol>	<ol style="list-style-type: none"> <li>1. Downloads account for the calculation to determine the coefficients. Separate workshops for groups or calculation of the electrical load.</li> <li>2. Downloads build a center to identify and support cartograms report.</li> <li>3. The selection of the power supply system, power distribution.</li> <li>4. The selection of voltage transformers. , Lowering the head to select the substation transformers.</li> <li>5. The selection of the power supply scheme.</li> <li>6. The calculation of short circuit currents of electricity supply.</li> <li>7. The voltage of 1000 V, which is higher than the selection of power tools.</li> <li>8. Cable and the selection of the cut surface of the windings.</li> <li>9. Company (shop) to draw a master plan.</li> <li>10. Enterprise (shop) to draw a line of the power supply system of</li> </ol>	<ol style="list-style-type: none"> <li>1. The laboratory study of the structure of the device.</li> <li>2. Check daily figures.</li> <li>3. Transformer saving mode control.</li> <li>4. "Phase-zero" experience of the people.</li> <li>5. Voltage up to 1000 V conducted.</li> <li>6. Cable and learn how to build brands and wires.</li> <li>7. BPP rational restoration of the site.</li> <li>8. Asynchronous motors reactive power consumption experience.</li> <li>9. Adjust the power supply voltage in the system.</li> <li>10. The consumption of industrial power supply system, adding that the study of the influence of the rational choice of voltage.</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>electric wires.</p> <p>13. The choice of rated power substations and power grids.</p> <p>14. Home to select the substation transformers, reducing the number and capacity.</p> <p>15. The place of installation of substation transformers, reducing the selection. BPP distribution device combining and structure.</p> <p>16. BPP distribution scheme of the device and the sample solution.</p> <p>17. Reactive power compensation.</p> <p>18. Power compensation devices, installation location and automatically select the operating mode of management methods and principles.</p> <p>19. The distribution of electric energy under the voltage up to 1000 V.</p> <p>20. WORKSHOP electricity supply requirements.</p> <p>21. WORKSHOP elements and power supply schemes.</p> <p>22. Voltage up to 1000 V switching and protection devices and select them.</p> <p>23. Strings, select the cut surface of the exposed wires of the cars and the tires.</p> <p>24. Shop transformer substations.</p> <p>25. Electrical power quality issues.</p> <p>26. The power supply system no sinusoidal and symmetrical about the concept.</p>	<p>the scheme.</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			27. Electrical devices neutral mode, and the corrosion of the electrical ground connection. 28. The power supply systems, electrical measurement and management.		
	<b>96</b>		56	20	20
<b>15</b>	<p style="text-align: center;"><b>5310200- Electrical energy</b></p> <p>Basics of electricity supply</p>	<p>This application was made on the basis of state educational standards. This science "electric energy" is one of the main subjects on the basis of the degree of preparation was founded. The purpose of science - the future is to establish the degree of knowledge in the field of power supply system. The task of science to examine the following: electrical appliances, devices and equipment, power supply systems; calculate the electrical system in stationary mode; Reliability factor of electricity networks, taking into account technical and economic calculations on the basis of design and equipment selection; Computer equipment, electrical networks and systems design, calculation and others. The electricity supply system to provide consumers with electric power consumers to know the types of problems; The development of the electricity supply system, power supply</p>	<ol style="list-style-type: none"> <li>1. The power development.</li> <li>2. The quality of the electrical energy.</li> <li>3. Electric loading charts and indicators.</li> <li>4. The average electric load charts and indicators, medium-squared, the maximum load.</li> <li>5. The calculation methods to determine the load. Added methods of calculation.</li> <li>6. Added the main method of calculation.</li> <li>7. Voltage networks up to 1000 V shop schemes.</li> <li>8. Locate the main substations, reducing the installation of the enterprise.</li> <li>9. Recommendations for the selection of the power supply voltage.</li> </ol>	<ol style="list-style-type: none"> <li>1. To create a schedule for various consumers of electricity daily load.</li> <li>2. The daily chart graphs based on the annual load of construction.</li> <li>3. The calculation of the profits of the means of ensuring electric reliability.</li> <li>4. The static characteristics of consumers.</li> <li>5. With the help of the power factor capacitors battery research.</li> <li>6. The power to choose the optimal means to increase the level of technical reliability. Point short of 10 kV line method to determine the distance learning model.</li> <li>7. The neutral networks are not connected to the ground line is connected to the ground, the development of energy-drag method to find customers.</li> </ol>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		system, power supply system in place, the transmission characteristics of the students.			
	<b>32</b>		<b>18</b>	<b>14</b>	
<b>1</b>	<b>5320300- Technological machinery and equipment</b>  The technological basis of calculating machines and devices	-The Tables and hydro-heat transfer technology bachelors, Mechanical and Chemical processing machinery and equipment, carrying out the scoring calculation. The heat of the working program of technological machinery and equipment, material transfer, the exchange of heat and material conditions and the factors that cause it, the creation of heat and material exchange activities, and the trend of the development of the history of science, as well as the results of socio-economic reforms in the country and the future of the regional problems of heat and material exchange impact on the prospects of technological devices and equipment issues. Besides, this subject bachelor in science and procurement, the night belongs to the process forward, taking into account the constructive insight into the structure.	1. General concepts. And the selection of construction materials. Carbon, alloyed, RVA-metallic materials, non-ferrous metals 2. Workers and the temperature calculations. Constant voltage. Fix the rate. The nominal thickness of the additional expense. Thin and thick wall constructions calculation and design 3. roller housing, spherical and tapered computing and designing 4. Flange structures: elliptical, spherical, flat, tapered. 5. The roller covers and other types of structure 6. Holes to strengthen the structures and methods of calculation. 7. Separated parts LATCHING SEAMING support for consolidation. LATCHING SEAMING structures. 8. Flange compounds. Bolt and stud computer. Integral and free flange. 9. pitch compounds and compounds flange designs 10. bottom and calculation of structures and hatches. 11. To calculate the bars and	1. An example of the roller is smaller parts and resolve issues 2. The example of the different structures is bottom and resolve issues 3. flange example of compounds and solve issues 4. The heat transfer devices is the example and resolve issues related to 5. An example is the mass transfer devices and resolve issues 6. What is the hydro-mechanical equipment and devices and an example of the problems, 7. example of mechanical machinery and devices for carrying out the process and to resolve issues	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			projecting through the hole in the piping 12. The calculation of hydro-plant and machinery 13. The heat transfer devices for computing and designing 14. Convoys of mass transfer. ☞ Desired and plate designs. 15. Technological designing and calculation of their elements and the groove 16. Compensators types and designs. Gland compensator computing and designing 17. union and meter above structures. 18. building and designing the backbone of computing and machine 19. Increasing the machinery and plant equipment and construction 20. soldering, welding, and gluing methods for the formation of compound		
	<b>54</b>		40	14	
2	<b>5320300- Technological machinery and equipment</b>  The automation of technological processes	The purpose of the training of science students, which is the most important foundations of the economy, technological machinery equipment and mechanization of production processes in all sectors of the economy and the people Automatic to serve as a base material, the main stages of the automated technological systems:	1. The general concepts of automation and metrology 2. The definition and concepts. The nature and functions of science. The history of science development. Science topics and issues 3. .sensor. The concept of sensor types and characteristics. 4. 4. Parametric sensors.	1. Metrology elements of the study. 2. To meet with sensitive above principle. 3. measure the intensity and amount of substance. 4. The device functional schemes. 5. The learning process automation schemes. 6. Mechanical computer modeling of processes.	1. The work of the working temperature of the oven regulator. 2. To determine the consumption of the liquid extraction process. 3. The extraction process to determine the liquid tank. 4. Slag viscosity, studying the process of measuring the

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>forecasting, design, preparation and development of technological processes for the production stages of design and development stages constructive documents automatically, the production sequence and basis of calculation of certain schemes the creation of conditions in accordance with the methods, automated technological systems for the high scientific and technical level of process and methodologies to create the route profile appropriate knowledge, skills, and professional formation.</p> <p>The task of science to students in the creation of the modern automated technological systems maintenance tasks, technical design stages of methodological issues, to teach modern methods of automated design</p>	<p>Forcers. General information. Magnetic, electronic, semiconductor electrodes. Electric car amplifiers Relay. Relays, types and characteristics. Electronic and electromagnetic relay 5. automation and to compare the elements. General concepts. Electrical, electromechanical, hydraulic and pneumatic devices and compare the transfer. Analog, digital, and to compare devices Metrology, material control and measuring equipment, and physical parameters. Metrology and measurement equipment. Material, amount and level measurement. Control of physical parameters 6. 7. Set up automatic systems. Setting the wrong system. Scheme to adjust the incorrect block. The system automatically adjust the parameters 7. Analysis of the ARS, automation facilities and equipment set. Automatic features of the transition process and static</p>		<p>moisture content. 5. Drying drums automation. 6. The mixing process automation.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>objects as the characteristics of the definition raster groups Proportional differential sliders Positional sliders.</p> <p>8. Automatic systems design elements Task automation project and design Automation systems design stages The principles of automation schemes</p> <p>9. The set of objects. Set object properties. - His personal property. Astatic static objects and wrong. A lot of capacity and capacity of objects.</p> <p>10. means of automatic control of technological processes of their choice and cost-effectiveness of specific conditions</p> <p>The creation of conditional rules automation schemes. Shields and control.</p> <p>Select the parameters of the management and automation tools. The cost-effectiveness of automation</p> <p>11. The rules stipulated the creation of automation schemes. Shields and control.</p> <p>12. Select the parameters of the management and automation tools. The cost-effectiveness of automation each machinery and equipment automation. Typical Automation objects. Automatic (cost) to adjust the automation objects. Automation and</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			materials limitations. Automation of the mixing device.		
	52		24	12	12
3	<b>5320300- Technological machinery and equipment</b>  The main technological processes and devices	<p>The purpose of science students with the basic theory of processes and devices, processes, structure and processing machinery and equipment, carrying out the principles and methods of their calculation study. Production of building materials, mechanical and chemical processes, the Hydrodynamic fall in theory, the basics of hydraulics hydro-mechanical processes, the transfer of liquids and gases, filtration, cleaning, blending, and substance exchange processes of heat, drying and cooling processes, the structure of carrying out these processes, machinery and equipment, working conditions and the basis of their design and modeling to calculate and meet certain conditions, according to case selection methods on the line profile the skills, knowledge and development of skills.</p> <p>The main task of science: to teach students chemicals and construction materials, production processes and devices theory, structure and types of calculation and selection of appropriate conditions for the production of effective methods is to use them.</p>	<ol style="list-style-type: none"> <li>1. The purpose of subject and issues</li> <li>2. Comparisons of the theory. Technical principles of hydraulics.</li> <li>3. The crushing of materials.</li> <li>4. materials qualifying</li> <li>5. The transfer of liquids and gases.</li> <li>6. type centrifugal pumps</li> <li>7. The centrifugal-type machines.</li> <li>8. The piston pumps and special.</li> <li>9. Gas compression and transmission.</li> <li>10. Heterosexual allocation system.</li> <li>11. Centrifuges.</li> <li>12. Gas and dust cleaning.</li> <li>13. The heat transfer process and equipment.</li> <li>14. The heat transfer devices.</li> <li>15. Heat substitutes.</li> <li>16. Heat exchange equipment.</li> </ol>	<ol style="list-style-type: none"> <li>1. The calculation of process and procurement procedures.</li> <li>2. The units of measure the physical sizes</li> <li>3. The crushing hard materials.</li> <li>4. Friable materials qualifying.</li> <li>5. Basics Gyrostatic.</li> <li>6. Hydrodynamic Basics.</li> <li>7. The calculation of transfer liquid pumps.</li> <li>8. Calculation and Tech.</li> <li>9. The calculation of liquid mixing processes and devices.</li> <li>10. multi-matter calculation of the process liquid separation systems and equipment (deep (settle) pits).</li> <li>11. Small particles under the influence of the centrifugal force of the liquid separator calculation of centrifuges and separators.</li> <li>13. Covered by the force of gravity to calculate the cleaning process.</li> <li>14. The calculation of the filtering process of suspension</li> <li>15. Dusty gases to calculate the filtering process</li> <li>16. The calculation of the separation of heterosexual gas systems and equipment</li> <li>17. Abstract calculation of boiling processes and devices.</li> <li>18. The calculation of the heat</li> </ol>	<ol style="list-style-type: none"> <li>1. To determine the fluid flow regime.</li> <li>2. To determine the fluid flow regime.</li> <li>3. To determine the length of the liquid flow.</li> <li>4. The process of crushing materials.</li> <li>5. The process of crushing materials loose.</li> <li>6. Determine the characteristic of the mill vibration.</li> <li>7. By identifying characteristic.</li> <li>8. Centrifugal pump to determine the characteristic.</li> <li>9. The rotor of the mixing device structure and the process of learning.</li> <li>10. The rotor of the mixing device structure and the process of learning</li> <li>11. determine the characteristic of the centrifugal fan</li> <li>12. Gases, dust cleaner to determine the characteristic of the cyclone.</li> <li>13. Drum determine the characteristic heat substitute.</li> <li>14. Drum determine the characteristic heat substitute.</li> <li>15. Heat pipe heat transfer device in the piping determining factor.</li> <li>16. The heat pipe heat transfer device in the piping determining</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
				transfer processes. Calculation of heat transfer processes.	factor. 17. 'groove in the pipe to determine the heat transfer coefficient of heat transfer device 18. 'groove in the pipe to determine the heat transfer coefficient of heat transfer device
	104		32	36	<b>36</b>
4	<b>5320300- Technological machinery and equipment</b>  The main technological processes and device	The purpose of science to teach students the basic principles of industrial hydraulics, hydro, heat and material transfer, mechanical and cooling processes theory, the structure of carrying out these processes, machinery and equipment, The working principle and the basis of their design and modeling to calculate and meet certain conditions, according to case selection methods on the line profile the skills, knowledge and development of skills. The main task of science: the theory of basic production processes and products, structure and types of calculation and selection of appropriate conditions for the production of chemicals known to teach effective ways to use them.	1. The processes of evaporation 2. The evaporation equipment. 3. Heating, cooling and condensed. 4. The material basis. 5. The material basis. 6. Article exchanging processes 7. absorption 8. The process of absorption 9. Absorption and desorbs. 10. The expulsion of liquids 11. Rectification basis. 12. bases rectification 13. Liquids extraction. 14. extraction 15. adsorption 16. Drying 17. Drying equipment. 18. crystallization,	1. The process of heat transfer and keeping. 2. changer heat pipe technology (material, heat) Accounting. 3. Shell - tube heat exchange device Technology. 4. Abstract boiling layer hydrodynamic account. 5. The calculation of the processes of evaporation. 6. Three evaporates, triggering device technology Accounting. 7. Process and keeping the device cool off. 8. The absorption process, Accounting. 9. Keeping the absorbance. 10. The process of rectification Accounting. 11. Rectification plate convoy Technology. 12. The process of extraction Accounting. 13. In order to calculate the hydrodynamic extractor to produce. 14. The rotor disc extractor technological Accounting. 15. The process of adsorption	1. A device to determine the characteristic of evaporation. 2. To determine the evaporation of device characteristics. 3. To determine the cooling characteristic of structure. 4. Determine the cooling characteristic of structure. 5. Absorption hardware design and business process analysis. 6. Absorption hardware design and business process analysis. 7. Adsorption hardware (repayment of lime drums) to determine the characteristic. 8. Adsorption hardware (repayment of lime drums) to determine the characteristic. 9. Study the structure and process of pressing screws. 10. study the structure and process of pressing screws. 11. The extraction device and process research. 12. The extraction device and process research. 13. Zigzag -type device structure and the process of study. 14. Zigzag -type device structure

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
				Accounting. 16. Absorber technological Accounting. 17. keeping the drying process 18. Abstract boiling layer drier Technology.	and the process of study. 15. Extracted from the multi-stage borbotazh. to determine the characteristic 16. Extracted from the multi-stage borbotazh. to determine the characteristic 17. Drying apparatus design and process study 18. Drying apparatus design and process study
	108		36	36	<b>36</b>
5	<b>5320300- Technological machinery and equipment</b>  Technological machinery and equipment heat and shall be substituted	<p>The main purpose of science heat and material transfer equipment filing theory and practice of the students on the basic principles of heat insulation device funders and other processes skills.</p> <p>The main task of science - making processes of heat and material balances; assess the productivity of the processes of heat exchange and Article; heat transfer apparatus temperature heat transfer designs tainted proceedings, heat resistance, surface property (flat, fried), tainted by the regime to act to determine.</p>	<p>1. The basics of heat transfer processes "Technological machinery and equipment heat and metabolism," the content of science The concept of the general principles of heat transfer Thermal conductivity. Temperature and temperature gradient in the area. Heat balance.</p> <p>2. Thermal conductivity Thermal conductivity Foray law. The coefficient of thermal conductivity Thermal conductivity of differential equations and boundary conditions 3. thermal conductivity A layer of the wall thermal conductivity A layered cylindrical wall thermal conductivity A multi-layered cylindrical wall</p>	<p>1. The calculation of heat conductivity processes 2. The calculation of heat conductivity processes 3. Drum calculate the heat balance of the heat transfer device 4. shell-pipe calculation of heat transfer equipment 5. The calculation of evaporation processes and devices Article 6. The calculation of transfer processes and devices The rotor disc extractor calculationю 8. The calculation of the heat transfer process and equipment 9. The calculation of the heat transfer process and equipment 10. Drying machines heat exchange calculation</p>	<p>1. The pipes of the heat transfer apparatusю 2. To study the uneven surface heat transfer processio 3. "piping in the groove," the study of the work and structure of the heat surrogateю 4. The cylindrical tank determine the conditions of free convection heatio</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>thermal conductivity  Voluntary body in the form of thermal conductivity  4. heat transfer  Single layer and multi-layer heat transfer through the wall  Heat transfer through a wall layer and multi-layer cylinder  The diameter of the cylindrical wall, critical  Heat transfer  Spherical heat transfer through the wall  Heat transfer through the wall  Speeding up the transfer of heat  5. The convective heat transfer  Convective heat transfer general concepts every-  The causes of the flow of liquid  Fluid leakage and physical properties of the order  6 Convective heat transfer  Convective heat exchange system of differential equations representing: the heat transfer equation and the energy equation  Fluid movement differential equations  The length of the current differential equations  7 similarity theory  The value of the theory of similarity similar things  Similarity criteria, their physical  8 Theorems of the theory of similarity and its consequences</p>		

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			Similarity theory. (Convective heat transfer) Natural convection heat. Limited space heat Of forced convection heat Be isolated cases of heat 9 heat radiation The basic concepts of radiation heat lank. Basic laws of thermal radiation The exchange of heat between the solid-state light 10 . heat radiation Heat radiation protection screens radiation emissions Complex processes of heat exchange 11 replaced Article Article share common concepts every- Article proliferation of basic types: molecular diffusion Article 12 replaced Article Article exchanging of theoretical models Article share similar processes 13 the turbulent diffusion convective diffusion		
	54		26	20	8
6	<b>5320300- Technological machinery and equipment</b>  The production technology complexes	The purpose of the training of science students with a variety of complex construction work in various organizations and companies, firms and manufacturing plants used to produce a variety of materials	1. Introduction. The purpose of science and issues. 2. Cement production methods 3. The principles of the burning of cement clinker. 4. Cement clinker burning Basics 5. The structure of the main	1. The calculation of the main indicators of the oven turnover 2. Bars account of the refrigerator 3. oven to determine the main parameters of the mine 4. The calculation of fundamental parameters of the concrete	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>and technological complexes, The principles of operation and structure of machines and devices to meet the scale of their use on the basis and in accordance with the specific conditions of selection methods to calculate the route profile appropriate knowledge, skills formation and skills.</p> <p>The task of science students with a variety of materials used to produce the theory of technological complexes and processing machinery and equipment, and the structure and the types of Mahluf considerations for the selection of appropriate conditions for the effective use of teaching methods.</p>	<p>components of the rotary furnaces</p> <p>6. Expense of working the main indicator of the oven.</p> <p>7. The working parts of the oven to calculate the mechanical steady</p> <p>8. The rotary furnaces internal and external heat surrogate.</p> <p>9. Clinker cooler</p> <p>10. The lime used in the production schemes and equipment.</p> <p>11. The structure of the mine ovens.</p> <p>Lime burning furnaces basis of calculation.</p> <p>12. Gypsum production and technological schemes and equipment</p> <p>13. Continuous gypsum baked technology.</p> <p>15. Continuous gypsum baked technology.</p> <p>16. Reinforced concrete products producing technological complexes.</p> <p>17. The armature of steel.</p> <p>18. The methods and equipment to strengthen the steel armature.</p> <p>19. Reinforced concrete pipe molding machines.</p> <p>20. Concrete and masonry equipment carrier.</p> <p>21. producing asbestos cement products and technological equipment</p> <p>22. Asbestos-cement sheet of wax</p>	<p>5. The calculation of basic indicators of asbestos cement sheet molding machine</p>	

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			working principle of the structure and the main parts of the machine 23. The basis of calculation of Sheet molding machines 24. The basis of calculation of asbestos-cement, cast molding machines 25. Posters of technological methods of production of ceramic products. 26. The manner of ceramic products, plastic molding technological park. 27. silicate brick manufacturing industry 28. rubberoid production of technological complexes.		
	66		56	10	
7	<b>5320300- Technological machinery and equipment</b>  The chemical industry, machinery and equipment	The purpose of the teaching of science in chemical production is carried out in the sectors of mechanical, hydro-mechanical, thermal and material transfer processes in technological machinery and equipment based on the classification, construction, engineering accounts devices to give students theoretical knowledge, practical skills and professional qualification basis. The task of science, machinery and equipment, taking into account the uniqueness of the process leading to the passage of constructive insight into the structure of the accounts of	1. Introduction. A summary of science 2. machinery and equipment, general equipment types and characteristics 3. The process of hydromechanics 4. Hydrodynamic Basics 5. The transmission fluid 6. Gas transmission and compression 7. Heat exchange equipment 8. The shell-tube heat exchange apparatus (IAA) 9. The shell-tube heat exchange apparatus (IAA) 10. plate and spiral IAA 11. Other types of IAA 12. The heat exchange apparatus	1. The calculation of the main indicators of the movement of fluids, 2. The calculation of transfer liquid pumps 3. The calculation of the indicators and Tech 4. The calculation of liquid mixing processes and devices 5. The calculation of the process of heterosexual liquid separation systems and equipment (deep pits pretreated) 6. small particles under the influence of the centrifugal force of the liquid separator tsentrofuga calculation and filing 7. covered by the force of gravity	1. To determine the constancy of filtering 2. pipe and tube "heat exchange apparatus case study 3. Internal thin wall symmetric voltage to the study of the spread of the zone under pressure

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		engineering equipment and technological processes and equipment, teaching materials and methods to teach the basics of computer technology .	of technological and mechanical accounts 13. The heat exchange apparatus of technological and mechanical accounts 14. In the perspective of heat exchange equipment	to calculate the cleaning process 8. Change the filtering process to calculate the gas 9. The calculation of the heat transfer processes 10. Shell - cast devices account 11. The thin-walled vessels and equipment account	
	56		28	22	6
8	<b>5320300- Technological machinery and equipment</b>  The chemical industry, machinery and equipment	The purpose of the teaching of science in chemical production is carried out in the sectors of mechanical, hydro-mechanical, thermal and material transfer processes in technological machinery and equipment based on the classification, construction, engineering devices account for the theoretical knowledge and practical skills to students and vocational training basis. The task of science, machinery and equipment, taking into account the uniqueness of the process leading to the passage of constructive insight into the structure of the accounts of engineering equipment and technological processes and equipment, teaching materials and methods to teach the fundamentals of computer technology.	1. Switching devices 2. class and brush them constructions 3. MAA technological and mechanical accounts 4. Plates and flat trays (lids) 5. extract and process equipment 6. The apparatus for drying materials in Nam 7. a rock for the structural separation devices 8. sent figures and separators 9. Tower calculating devices 10. Dust cleaning devices 11. support and the lack of phones devices 12. Reaction apparatus 13. The thick-walled vessels and equipment 14. cracking and pyrolysis ovens	Article 1. Article exchange and heat balance account Article 2. Article exchange and heat balance account 3. Drying and driers calculation and selection process 4. Drying and driers calculation and selection process 5. Liquid phase filters for the calculation and selection 6. Liquid phase filters for the calculation and selection 7. reactionary technological and mechanical devices for thermal processes account 8. reactionary technological and mechanical devices for thermal processes account 9. Catalytic processes for reactor equipment and reactionary account 10. reactionary reactors and equipment account for the catalytic process	1. The cover various forms of stress research 2. Research Flanesli compounds, sealers 3. The cylindrical shell equilibrium research 4. The body of a two-layered hardware and thin wall voltage research
	56		28	20	8
9	<b>5320300- Technological machinery and equipment</b>	The purpose of teaching science, materials technology, the students work in various industrial and	1. The content and structure of science. Remedy machinery and transport	1. The conveyor belt width 2. The conveyor belt contour of the stress points are keeping force	1. stoppers the study of the structure and arrangement 2. Choose the winch and the

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
	Technology machinery and transport equipment	transportation enterprises, companies in various types of machinery and equipment and transport equipment, structure, scope of use, principles, and their basis of calculation in accordance with the specific conditions Select line profile in terms of knowledge, skills and development of skills. The task of science students to the theory of machinery and transport equipment, materials, construction and structure, as well as certain types of considerations for the selection of appropriate conditions for the effective use of teaching methods.	equipment and general industrial enterprises 2. Increasing the normal load 3. Increasing the load machines 4. hanging load hoisting machinery parts 5. Increasing the load machines, mechanisms 6. crane lifting a load 7. Tower cranes Accounting 8. Kuprin cranes Accounting.	3. To determine the capacity of the assembly line drives 4. screw conveyor productivity account 5. determine the screw conveyor electric power 6. Shipping cleaner size cutting 7. truck rolled electric power account 8. display the score of the mechanism of movement	study of the structure 3. study of the structure of the steel wire ropes 4. The study of the structure of the tower crane 5. The structure of the valves on a couch and work 6. Belt conveyor to determine the structure and fertility 7. cutting the study of the structure and operation of the assembly line 8. Kovshov silos to find work productivity 9. study the structure and the work of the conveyor screws
	50		16	16	<b>18</b>
10	<b>5320300- Technological machinery and equipment</b>  The technical basis for the creation of the park	The purpose of the training of science students in the country which is the most important foundations of the economy, technological machinery equipment and mechanization of production processes in all sectors of the national economy and Automatic creation of the new park to serve as a base material of the main stages: forecasting, design, production and achieved stages of designing new cars or preparation constructive documents the development stages, production sequence and their bases of calculation schemes, without specific	1. Introduction. The purpose of the mission and science. 2. The classification of machinery and basic stages of creating them. 3. The role and importance of the technological process of the machines. 4. Design documents in a single system. 5. Machines inventions, innovations and scientific-research activities 6. Design. 7. ergonomics and ecology 8. The creation of machines using ALT.	1. The analysis of the technological processes used cars 2. The calculation of the production and sale of a product 3. The establishment of the technical preparations for the production of 4. The calculation of the production capacity 5. cost of production, income and profitability calculation 6. The development of technology and economic efficiency of the organization of labor, scientific computing 7. Design the study and creation of documents 8. The creation of machines using	1. The methodological fundamentals of creating machines 2. The study of the methodological foundations for the machines constructing 3. The allocation of the structural components of the machine learning methods. 4. The proportion and proportional to learn 5. The mechanical processes using computer modeling 6. at work to learn and car color

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>conditions methods and new technology to create a high scientific-technical level of process and methodologies to create a line profile on the skills, knowledge and development of skills.</p> <p>The task of science to students the process of creating the new equipment maintenance tasks, the technical stages of the project methodological issues as well as the automated Design modern state and prospects of the art design, ergonomics and design, and the creation of new techniques to teach the basic principles and methods.</p>		the mental attack	
	44		16	16	<b>12</b>
11	<p><b>5320300- Technological machinery and equipment</b></p> <p>Oil and gas processing and Petrochemical Synthesis Technology</p>	<p>Teaching main purpose of science: "Oil and gas processing and petrochemical synthesis technology" in the process of developing a training course used in the oil refining industry and chemical technology on all major types of general and specialized machinery and equipment must be understood.</p> <p>The task of science is carried out within the framework of the issues the students will have the knowledge of the oil refining technology; with knowledge of the natural gas processing technology; oil, gas and petrochemical</p>	<ol style="list-style-type: none"> <li>1. The processing of gas condensate and oil industry equipment</li> <li>2. catalysts and catalytic reactions reforming process</li> <li>3. Catalytic reforming process industry equipment</li> <li>4. The process of hydro clean</li> <li>5. Hydro clean process industry equipment</li> <li>6. crude oil treatment and separation</li> <li>7. crude oil de maxing</li> <li>8. In order to improve the quality of oil products additive (more) production and use</li> <li>9. Commodity fuels. automobile and aviation fuel. Surkov oil trade.</li> </ol>	<ol style="list-style-type: none"> <li>1. Heat exchanger equipment Accounting</li> <li>2. The vertical pits Accounting</li> <li>3. serpentine heating surface keeping oven</li> <li>4. serpentine keeping the gas mixture from the oven</li> <li>5. Pyrolysis ovens the size of the regenerative and his main area of accounting</li> <li>6. Pyrolysis regenerative height of the firing zone and its accounting</li> <li>7. Pyrolysis ovens keeping the size of the reactor</li> <li>8. Pyrolysis gas from the combustion of carbon regeneration firing Accounting</li> <li>9. Pyrolysis regenerative firing zone</li> </ol>	<ol style="list-style-type: none"> <li>1. Lower-octane gasoline catalytic reformer</li> <li>2. The separation of oil fractions selected solvents and cleaning</li> <li>3. The process heavy crude oil coke</li> <li>4. pyrolysis oil and raw materials</li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
		<p>synthesis can perform calculations in practice; equipped with devices to create specific reactions for the synthesis of technological equipment, to manage them; oil and gas and chemical synthesis technologies, processes modeling on the initial information.</p>	<p>Plastic Surkov oils and their properties.            10. Cox processes            11. thermal cracking process            12. thermal cracking process industry equipment            13. The gas processing light hydrocarbon gases and their sources            14. The physical separation method with a mixture of gases.            15. The use of unsaturated gas plant.            16. common understanding on the composition of natural gas, gas processing. Natural gas wetting.</p>	<p>of the basic materials, keeping the balance            10. The catalyst zone keeping the volume of data            11. forwards keeping the temperature of the catalyst            12. The air distribution grid            Accounting</p>	
	64		32	24	8
12	<p><b>5320300- Technological machinery and equipment</b></p> <p>The vibration of industrial processes and equipment</p>	<p>The purpose of the training of science students of various organizations and enterprises in the implementation of the process of vibration applied to firms and manufacturing enterprises in different vibration machines, tools and equipment, structure, using the principle of the scope of work, calculated in accordance with the principles and specific conditions methods for the selection of the route profile appropriate knowledge, skills formation and skills. Science students duty- the structure of the vibration theory and performance of the machines and notified them to</p>	<p>1. Introduction. Vibration processes and equipment industry. Vibration processes are discussed.            2. The linear vibration systems. Vibration caused aspiring processes            3. Vibration machines. General mechanisms designed to use            4. The vibration of consolidation platforms. Speed up the process of physical devices            5. The vibration of consolidation platforms. Speed up the process of physical devices            6. Accelerate a chemical process equipment. Vibration protection</p>	<p>1. The calculation of the process of the formation of vibration            2. The types of vibration machines for productivity and efficiency of accounting            3. The calculation of the power of vibration machines.            4. The calculation of fundamental parameters of vibration working platforms.            5. The calculation of the performance of the vibration platforms and power.</p>	<p>1. Free vibration to determine the basic processes and parameters of the system.            2. Friction the study of the structure and the mechanism of formation of planetary types of vibration            3. Flexible mechanisms which have notified acquainted with the structure of the printing device and the operating principle of the depth.            4. SMM- vibrator construction and operation of ethanol.            5. scandalous shake the car working as a design study of the structure and operation of the            6. IV-19 vibrator the study of the structure and operation of the            7. vibration working platforms to</p>

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		select the appropriate conditions for the effective use of teaching methods.			meet with the design and operating principle 8. The process of formation of a high-frequency vibration mill vibration and the study of the mechanism
	38		12	10	16
13	<b>5320300- Technological machinery and equipment</b>  Technological machinery and equipment repair and installation	<p>The purpose teaching of science students is the most important foundation of the economy of the country in which the use of technological machinery and equipment, maintenance and repair of the organization, ways of processing them, detail and cut waste and in accordance with the specific conditions repair methods, new equipment for the high scientific and technical level of the repair process and methodologies line profile appropriate knowledge, skills formation and skills.</p> <p>Task of the subject- students the basics of technological machines and repair them, and the selection of officials who deserve the conditions for effective methods is to use them to repai</p>	<ol style="list-style-type: none"> <li>1. The theory of the machines wear</li> <li>2. Technology and machinery constructive and technological development.</li> <li>3. Tendencies of the technological reliability of the machines.</li> <li>4. Technological diagnostic system and its structure.</li> <li>5. Technical control methods and tools.</li> <li>6. Technological yams and car details.</li> <li>7. Val and arrows, their base and connections.</li> <li>8. The electric car technology, structural body's</li> <li>9. Technology and machinery body details and oval trouble.</li> <li>10. Gear wheels and discoid details to diagnose the fault.</li> <li>11. Production of machinery and electrical component failures diagnostic facilities.</li> <li>12. Technological diagnosed with machines drives.</li> <li>13. Technological machines for the working bodies of the troubleshooting techniques</li> </ol>	<ol style="list-style-type: none"> <li>1. technological tendencies of constructive and technological improvement of vehicles</li> <li>2. technology and machinery to calculate the long-factor</li> <li>3. To determine the technological cycle of the machine</li> <li>4. The use of technology in the production of cars</li> <li>5. Damages formed during the Electromotor</li> <li>6. The method of plastic deformation details repair</li> </ol>	<ol style="list-style-type: none"> <li>1. To set up equipment to measure the friction bearings slots.</li> <li>2. set up and maintenance of machinery and equipment hydro systems.</li> <li>3. Evaluation of the quality of production machinery and equipment in the oil.</li> <li>4. Plastic lubricants.</li> <li>5. Machines used Clay.</li> <li>6. Pipe mill and operated adjustment and correction of the body.</li> <li>7. Balls mill lubricants card scheme.</li> <li>8. Set the oven is operated and turnover fix.</li> <li>9. Cement mill components and separate collection.</li> <li>10. repair of technological development card.</li> <li>11. The metal coating methods to restore details.</li> <li>12. Elastic pavement repair substituting brush.</li> <li>13. Val details and mechanisms similar to a cold case with the correct method of interpretation of the recovery process.</li> <li>14. Card combing taro <math>\varnothing</math></li> </ol>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			<p>14. The heat exchanging Technology and machinery situation and diagnosis</p> <p>15. Manufacturing of building materials and control the performance of the machines.</p> <p>16. Technical diagnosis of the economic tendencies.</p> <p>17. Machinery and Repairs an overview of the machine to remedy details.</p> <p>18. Machinery compounds</p> <p>19. Well, bullets, bearings and assign MUFTAD.</p> <p>21. Overtime.</p> <p>22. Technological basic concepts about the installation and repair of vehicles.</p> <p>23. Technological machines.</p> <p>24. The provisions of the use of technology and machinery, documents and advertising.</p> <p>25. Machine parts and repair.</p> <p>26. Welding materials.</p> <p>27. Iron, non-ferrous metals and their alloys, welding.</p> <p>28. Machinery and metal structures welding repair method.</p> <p>29. The details of welding and runny coverage.</p> <p>30. welder's thermal effects and some technological methods to combat it.</p> <p>31. Repair of metal through the details.</p> <p>32. chromium and iron details</p> <p>33. The use of plastics and glues,</p>		<p>accounted for a solution to repair the car.</p> <p>15. Sharpening repair.</p> <p>16. Sharpening combing machine.</p> <p>17. Restore automatically covered vibration details.</p> <p>18. The accuracy of the details of preparing a group of Topps.</p> <p>19. to determine if mechanical processing errors. to study the impact of</p> <p>20. The details of the tooth wheel hydraulic pump defecating.</p> <p>21. SMTS eat-2 friction polishing machine.</p> <p>23. Eating the T-100 tractor with a roll coating method of bringing technological operations to restore production.</p> <p>24. Repairing mechanical hydro cylinders (repair).</p> <p>25. Design.</p> <p>26. Projecting specific accounting objects.</p> <p>27. Analyzing the errors of constructions.</p> <p>28. The initial determining the strength and power Creation.</p> <p>29. The apparatus of power accounting and searching gears.</p> <p>30. Procedures learning the classification of gears.</p>

No	Specialty and subject name, Total hours	Learning Outcomes	Main Content of the Course	Topics of Practical Works	Topics of Lab Works
			repair and welding details. 34. Crack and crevice of the machine parts, standard parts repair. 35. The cessation of machine learning. 36. The classification of eating machine. Decay and moral wear.		
	144		72	12	60