**REPUBLIC OF UZBEKISTAN**
**MINISTRY OF HIGHER AND SECONDARY SPECIALIZED EDUCATION**

**ANDIJAN MACHINE-BUILDING INSTITUTE**

**Registered:**
No. 916
24 08 2022nd year

**"I CONFIRMED"**
Vice-rector for academic affairs
_____ S.R.Aliyev
24 08 2022nd year

# "ENGINE TECHNOLOGY"

science

## EMPLOYEE TRAINING PROGRAM

**Education field :** - 320000 – Engineering work

**Education direction :** - 5312500 – Energy engineering
( internal combustion engine )

| | | | |
|---|---|---|---|
| General education hours | | 96 hours | 6th semester |
| That's including : | | | |
| Lecture | – | 24 hours | 24 hours |
| Practical training | – | 24 hours | 24 hours |
| Laboratory exercises | – | - | - |
| Individual education hours | – | 48 hour | 48 hours |

**Andijan – 2022**

Science was reviewed and approved in the minutes of the meeting of the Scientific Council of the Andijan Machine-building Institute dated " ____ " _____, 2022 .

Subject has developed on the basis of the scientific program " Engine Technology " approved by the statement of the Council of the Andijan Machine-building Institute dated on 2022. "_____" "_____"

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## I. Relevance of educational science and its role in higher professional education

The general professional science of "engine engineering technology" is covered with the main topics sufficient to prepare a qualified specialist by theoretical and practical training at the level of modern requirements . These topics are included in the main, practical, experimental and independent work parts of science .

## II. The purpose and tasks of educational science i

**Purpose of teaching the subject is** to provide the level of knowledge required by the educational standard (qualification requirements) for the production of internal combustion engines.

**Tasks of science -** to get outlines of engine details; processing of flat surfaces and rotating surfaces; processing of screw surfaces of threads, splined joints and surfaces of cylindrical gear wheels; study of the effect of mechanical processing technology on the operational properties of products; technological processes of processing shafts; technology of making pistons and piston rings; production of cylindrical gear wheels; body detail processing; undergraduate students master the technological processes of assembly.

As part of the issues to be implemented in the process of mastering the study subject "Engine engineering technology" , the bachelor:

- main theoretical laws of science learned with using modern bench of equipments, giving details to the surface mechanic processing , to compose dimensions accuracy and surfaces quality technological processes routes to know need and productivity and to efficiency was options and comparison to be able to correctly choose the methods of technical service based on them.
- equipments and devices needed for the maintenance of student equipment sharp and control of tools in technology importance, processes mechanization and automation opportunitie. Obviouslee, imagination or decision to choose modern operations, security technique, surroundings environment protection to do and sanitation to the rules compliance without decisions design and perform skills _ _ need to be learnt.
- technical maintenance of student equipment, technological processes operations critical analysis by doing shortcoming find his productivity, efficiency count and another fertile and efficient option the project work exit to qualifications have to be need

Knowledge of students in the formation of scientific skills, control of technological processes and production, learning and assimilation of relevant

information from a scientific and practical point of view, as well as independent scientific investigation, includes knowledge and skills.

### III. The main theoretical part (lecture sessions)

In the main part, the topics of the science are presented in the correct sequence. The essence of each topic is revealed through key concepts and theses. In this, the knowledge and skills necessary to be delivered to students on the basis of GTS should be fully covered.

quality of the main part are the relevance of the topics, their compatibility with the demands of employers and the needs of production, the socio - political and democratic changes taking place in our country, the liberalization of the economy, the priority issues of reforms in the economic-legal and other fields, and science and It is recommended to take into account the latest advances in technology .

### III . The main theoretical part (lecture sessions)

| No | M lecture classes | Hours |
|---|---|---|
| 1 | Enter. The role and importance of "engine engineering technology" science in the training of bachelors. | 2 |
| 1.1 | Enter. The subject, purpose, tasks and concepts of science. History and perspective of science development. | |
| 2 | Materials used in engine construction. | 2 |
| 2.1 | Types and properties of structural materials for engine parts. | |
| 3 | Sketches for engine engineering. | 2 |
| 3.1 | Obtaining raw materials in bulk. | |
| 3.2 | Combined methods of getting sketches | |
| 4 | Technology of casting details. Tools and equipment for casting details. | 2 |
| 4.1 | Casting technological process. Casting quality control. | |
| 4.2 | Mechanical processing of castings. Final processing of casting details. | |
| 5 | Processing of flat and external surfaces of engines. | 2 |
| 5.1 | Control of the accuracy of processing the surfaces of details. | |
| 5.2 | Effect of surface roughness on detail operational characteristics. | |
| 6 | Methods of obtaining holes and processing the internal surfaces of details. | 2 |
| 6.1 | Processing of screw surfaces of the thread. | |
| 6.2 | Peculiarities of cutting the teeth of cylindrical gear wheels, machining splined joints. | |
| 7 | Quality indicators of industrial products. | 2 |
| 7.1 | Information about ISO 9001 certifications | |
| 7.2 | Performance indicators of manufactured products. | |
| 8 | Technological processes of processing shafts. | 2 |
| 8.1 | Characteristic features of shaft structures and the main requirements for the accuracy of their preparation. | |
| 8.2 | Exemplary technological processes of processing shafts. Processing of camshafts. | |
| 8.3 | Preparation of engine crankshafts. | |
| 9 | Technology of making pistons and piston rings. | 2 |
| 9.1 | Production of engine pistons. | |
| 9.2 | Development of car and tractor engine piston rings. | |
| 10 | Technology of making connecting rods and inlet and outlet valves. | 2 |
| 10.1 | Production of connecting rods of engines and operation process of intake and exhaust valves | |
| 10.2 | Technological processes of processing connecting rods and indicator diagram of intake and exhaust valves | |
| 11 | Features, materials and methods of obtaining outlines of gear wheels. | 2 |
| 11.1 | Gear wheels and materials for their manufacture. | |
| 11.2 | Methods of obtaining sketches for the manufacture of gear wheels. | |
| 11.3 | Basing gears. Basing gears. Exemplary technological process of processing single-veined gears. | |
| 11.4 | Machining multi-veined gears. Machining multi-veined gears. Gear control. | |
| 12 | Basic requirements for hull detailing and drafts. | 2 |
| 12.1 | Machining of engine cylinder blocks. Processing of cylinder heads. | |
| 12.2 | Machining of engine core bearing caps | |
| 12.3 | Body detailing on flexible automatic lines. | |
| 12.4 | Technological processes of assembly. Types of compounds and execution of collective operations. Organization of collective processes. Ways to improve the efficiency of collective processes. | |

| | | |
|---|---|---|
| | **Total** | **24** |

Lecture sessions are held in an auditorium equipped with multimedia installations for a stream of academic groups.

**IV . Instructions and recommendations for practical training**

| No | Topics | |
|---|---|---|
| 1 | Transmission -amplification mechanisms of equipment clamping devices | 2 |
| 2 | Technological devices duties and classification | 2 |
| 3 | Preparation of base in devices | 2 |
| 4 | Devices installation , fixing elements | 2 |
| 5 | In devices fasten forces | 2 |
| 6 | In devices installation error | 2 |
| 7 | Elements, bodies that determine the place and direction of processing of cutting tools in devices | 4 |
| 8 | Special devices design methodology | 2 |
| 9 | Devices proceedings | 2 |
| 10 | Lathe and circling benches devices . | 2 |
| 11 | Drilling and milling benches devices | 2 |
| | **Total** | **24** |

**V. Instructions and recommendations for laboratory exercises**

In the curriculum of this field of study, laboratory classes in this subject i not intended

**V I. Independent education and independent work**

| No | Independent education topics | Hour |
|---|---|---|
| 1 | Enter. The role and importance of "engine engineering technology" science in the training of bachelors. | 4 |
| 2 | Materials used in engine construction. | 4 |
| 3 | Sketches for engine engineering. | 4 |
| 4 | Technology of casting details. Tools and equipment for casting details. | 4 |
| 5 | Processing of flat and external surfaces of engines. | 4 |
| 6 | Methods of obtaining holes and processing the internal surfaces of details | 4 |
| 7 | Quality indicators of industrial products. | 4 |
| 8 | Technological processes of processing shafts. | 4 |
| 9 | Technology of making pistons and piston rings. | 4 |
| 10 | Technology of making connecting rods and inlet and outlet valves. | 4 |
| 11 | Features, materials and methods of obtaining outlines of gear wheels. | 4 |
| 12 | Basic requirements for hull detailing and drafts. | 4 |
| | **Total:** | **48** |

It is recommended to prepare abstracts and present them by students on subjects to be mastered independently.

**Coursework in this subject is not provided for in the curriculum of the field of study**

**VII. Criteria for monitoring and evaluating student knowledge in science**

| | |
|---|---|
| **Evaluation methods** | Oral survey , test , **interview** , control work, homework check, written work, presentations and other similar forms. |
| **B population criteria** | **5 - "Excellent" grade**<br>- The student makes independent conclusions and decisions;<br>- can think creatively;<br>- conducts independent observation;<br>- can apply the acquired knowledge in practice;<br>**of** science (topic) and when it is considered that he has an idea about science (topic) - he **is** evaluated with 5 ( excellent) grade.<br><br>**4 - "Good" grade**<br>- The student observes independently;<br>**the** acquired knowledge in practice ;<br>**of** science (topic) and when it is considered that he has an idea about science (topic) - he is evaluated with 4 (good) grade.<br>**3 - "Satisfactory" rating**<br>**the** acquired knowledge in practice ;<br>**of** science (topic) and when it is considered that he has an idea about science (topic) - he is evaluated with 3 (satisfactory) grade.<br>**2 - "Unsatisfactory" grade** |

| | | | |
|---|---|---|---|
| | - When it is considered that the student has not mastered the science program , does not understand the essence of the science (topic) and does not have an idea about the science (topic) - he is evaluated with a grade of 2 (unsatisfactory). | | |
| | **Get a rating types** | **Max score** | **Deadline** |
| | **Intermediate control**<br>Intermediate control (conducting the ON type and evaluating the student's knowledge according to this type of control is carried out by the professor- teacher who conducted the training in the subject ) .<br>during the semester after the completion of the relevant section of the work science program in order to assess the student 's knowledge and practical skills . Depending on the nature of the subject, the type of midterm examination can be conducted up to 2 times , and the form and duration of the examination are determined by the department based on the nature of the subject and the hours allocated to the subject. When evaluating a student according to the type of interim control , the grades he received during the training sessions are taken into account.<br>did not pass the intermediate control type and was evaluated with a "2" (unsatisfactory) grade for this control type will not be included in the final control type. | 5 | 9-16 week |
| | **Final control**<br>the final control type and evaluating the student's knowledge on this type of control is carried out by a professor-teacher who did not conduct the training .<br>final inspection is determined based on the nature of the subject, hours allocated to the subject . | **5** | 18-19 weeks |
| | Written work, oral , test, etc | 5 | |

## VIII. Basic and additional educational literature and information sources

### Main literatures


1. F.V. Gurin, V.D. Klepikov, V.V. Reyn “Avtomobilsozlik texnologiyasi”. 1-kitoblar. Q. Do’stmuhamedov tarjimasi. T.: TAYI, 2001. - 239 б.
2. F.V. Gurin, V.D. Klepikov, V.V. Reyn “Avtomobilsozlik texnologiyasi”. 2-kitoblar. Q. Do’stmuhamedov tarjimasi. T.: TAYI, 2001. - 247 б.
3. Ф.В. Гурин, П.Ф. Гурин “Технология автомобилестроения”. М.: Машиностроение, 1986. - 296 с.
4. A.Y.Omirov, A.X.Qayumov. Mashinasozlik texnologiyasi. Toshkent, O’zbekiston, 2003. - 380 б.
5. T.U.Holiqberdiyev. Mashinasozlik texnologiyasi asoslari. Toshkent, Noshir, 2012. - 416 б.
6. И.В.Шрубченко, Т.А.Дуюн, А.А.Погонин и др. “Основы технологии сборки в машиностроении”. М.: ИНФРА – М, 2019. – 235 с.
7. И.А.Булавинцева “Машиностроительное производство”. М.: Издательский центр “Академия”, 2010. - 176 с.


### Additional literatures.


1. Avtomobil dvigatellari: Darslik / V.M. Arxangelskiy, M.M. Vikhert, A.N. Voinov, Yu.A. Stepanov, V.I. Trusov, M.S. Qandaydir; Ed. XONIM. Qandaydir. - M .: Mashinostroenie, 1967. - 496 p.
2. Mashinasozlik texnologiyasi: Darslik / A.A.Matalin; L .: Mashinostroenie, 1985. - 496 p.
3. Avtomobil va traktor dvigatellarini hisoblash: Proc. mutaxassislik / A.I.Kolchin , V.P. Demidov; M., Oliy. maktab, 2971. - 344 p.
4. Bosch. Avtomobil qo'llanma. 5-nashr / Avtomobil qo'llanmasi. Per. ingliz tilidan. - 2-nashr, qayta ko'rib chiqilgan. va qo'shimcha - M .: YoAJ "KZHI g'ildirak orqasida", 2012. - 992 b.


### Internet Websites

1. https://www.gov.uz/uz - Government portal of the Republic of Uzbekistan.
2. https://lex.uz/uz/ - National database of information on legal documents of the Republic of Uzbekistan
3. www.Ziyo.net – Educational portal.
4. http://web.andmiedu.uz/en - the official website of the Andijan Mechanical Engineering Institute.
5. www.madi.ru - website of the Moscow Institute of Highways .