

Topic 1. Introduction to science. Basics of reliability theory. The purpose and tasks of science. Basic concepts and terms of reliability theory. The purpose and objectives of collecting and evaluating information on the reliability of oil and gas equipment. Working condition of machines and durability of details. Current state of equipment and future development and improvement. Corrosion, wear and tear of materials.

Topic 2. Basic reliability information. Continuity. Fault. Ability to work. Stop working. Product features. Working time. Don't quit. Long work. Limit state. Repairability. Retention. Faultless uptime. A parameter of the flow of failures. Intensity of layoffs.

Module 2. Absences and accuracy rates

Topic 3. Classification of dismissals. Accuracy indicators of non-repairable items. Accuracy indicators of repaired items.

Topic 4. Accuracy indicators of repaired items. Frequency of outages. Probability of working without leaving work. Gamma percentage resource. Average uptime to termination.

Topic 5. Determination of accuracy indicators according to test results. Types of information about resignations. Accounting for failures during the warranty period. Accounting for outages after the warranty period.

Module 3. Determination of factors affecting reliability and their indicators

Topic 6. Factors affecting reliability. Seasonality of layoffs. Verification method. Try for accuracy. Try not to quit. Resource tests. Determining the average resources of associations. Determination of accuracy indicators.

Topic 7. Determination of reliability indicators. Calculation of the optimal alarm replacement period of replaceable parts. Calculating the period of preventive care.

Topic 8. Calculation of the structure of the repair cycle. Inter-repair period. The inter-Kuric period. Maintenance and repair strategy. Preventive examinations.

Module 4. Standardization of reliability indicators and increase of efficiency of machines

Topic 9. Standardization of reliability indicators. Limited service life. Optimal service life. The term of moral obsolescence. Depreciation period. Unregister resource.

Topic 10. The influence of accuracy indicators on the economy of machines. Methods of increasing accuracy indicators. Constructive and technological methods of improving the accuracy of machines, methods of ensuring the necessary accuracy in operation.

2.4. Instructions and recommendations for practical training.

In practical training, the subjects of the lectures are calculated, tested and implemented. Practical skills are formed in students.

Recommended topics of practical training:

1. Fundamentals of analytical apparatus in the theory of reliability:

2.-Statistical development of information about the reliability of objects;

3. Calculation of reliability characteristics of the system in the distribution of disturbances by the exponential law;

4. Calculation formulas using nomograms and graphs, approximate calculation methods using correcting (correcting) coefficients;

5. Selection of normalized indicators of reliability for oil and gas production facilities;

6. Determination of reliability indicators by the law of distribution;

7. Clarifying the level of reliability indicators;

8. Engineer-technological analysis of object damage;

9. Reliability indicators of technological systems in slow - gradual breakdowns;

10. Reliability indicators of non-renewable technological systems.

2.5. Instructions and recommendations for laboratory training

Laboratory classes in science are not planned.

2.6. Course work (project) in science

Course work (project) in science is not planned.

2.7. Independent education and independent work

Suggested independent work topics.

1. Breakdowns of machines and their components and aggregates.

2. Reliability indicators.

3. Physical bases of reliability of oil and gas equipment.

4. Mathematical-analytical methods of reliability of oil and gas equipment.

5. Checking the consistency of monitoring results.

6. Static assessment of reliability indicators.

7. Determining the distribution laws of reliability indicators using graphoanalytical methods.

8. Increasing the accuracy of static assessment of reliability indicators.

9. Program for ensuring machine reliability.

10. Oil and gas equipment operating cycle.

11. Restoration of oil and gas equipment performance.

12. System of maintenance and repair of oil and gas equipment.

13. The purpose, tasks and main directions of predicting the reliability of oil and gas equipment.

14. Prediction of reliability and evaluation of their quality.

15. Duration of long-term operation of oil and gas equipment electrical equipment.

16. Methodology for determining the optimal duration of oil gas equipment.

17. Evaluation of reliability indicators of oil and gas equipment.

18. The role of technology in ensuring the reliability of oil and gas production and processing equipment.

	<p>19. Structure of reliability management activities in the enterprise.</p> <p>20. Reliability improvement programs and plans. Reliability processing, reliability testing.</p> <p>21. Reliability management at the stages of construction and design of oil and gas equipment.</p> <p>22. Control of materials, semi-finished products (semi-finished products), aggregates, finished products, technological equipment, technological processes.</p> <p>23. Calculation of reliability characteristics of the system in distribution with the exponential law of disturbances.</p> <p>24. Methods of using calculation formulas, nomograms and graphs.</p> <p>25. The main stages of calculation of technological systems.</p> <p>26. Collecting information about the reliability of objects.</p> <p>27. Calculation of reliability indicators of non-renewable technological systems.</p> <p>28. Selection of normalized indicators of reliability for objects of the oil and gas industry.</p> <p>29. Collecting information on recording equipment breakdowns, malfunctions, and wear and tear data.</p> <p>30. The main elements of high-reliability production, which are an important primary scientific and technical design stage.</p> <p>31. The main organizational and technical measures to increase reliability.</p> <p>32. Methods of reducing the intensity of damage.</p> <p>33. Technical diagnostic tasks.</p> <p>34. Ensuring the reliability of equipment.</p> <p>35. Effectiveness of optimizing the reliability of machines and equipment.</p> <p>36. Specifications for the use of large-capacity devices in the oil and gas industry.</p> <p>37. Object groups according to the specificity of the direction of violations.</p> <p>38. Types and classification of violations.</p> <p>39. Basic technological measures to increase reliability</p> <p>40. Purpose and methods of technical service.</p> <p>42. Stabilization and optimization of modes of use of equipment.</p>
3.	<p>Modern information and pedagogical technologies in teaching science.</p> <p>Innovative pedagogical technologies in teaching science, including the following:</p> <ul style="list-style-type: none"> - information and development technologies, aimed at forming, memorizing and using the knowledge system. Methods of organizing and reading lectures and conducting practical training, independent study of relevant literature and periodicals, application of modern information technologies for independent enrichment of knowledge, including the use of

	<p>Formation of students' imaginations in the study of science, determination of reliability indicators at the levels of schemes, constructions, calculations, design, effective use and service, diagnostics and repair, as well as quantitative assessment of quality indicators and technical levels of equipment; identifying specific ways to increase reliability; It is carried out by mastering the reliability documents about oil and gas organizations, conducting reliability tests and processing test results, organizing and conducting diagnostics, repair and service. .</p> <p>The task of science is to provide students with theoretical knowledge and practical skills to ensure reliable performance of oil and gas technological equipment for a long time without damage, to give students individual assignments for independent work, to study science diligently. is to teach winter and study assignment order and analysis.</p> <p>The requirements for the knowledge, skills and qualifications of the students are set. Student:</p> <p>studies the theoretical laws of the science "reliability of technological equipment of the oil and gas industry";</p> <ul style="list-style-type: none"> - enriches theoretical knowledge and practical skills with a process approach in practical activities and acquires the ability to apply them; - in the construction, repair, reconstruction and restoration of oil and gas wells; in oil and gas production, collection and preparation of well products; increases the ability to service and repair technological equipment used in transportation and storage of hydrocarbon raw materials, oil and gas processing; - devices create the ability to perform technical work in accordance with technological regulations. - The student must know the exact ways to increase reliability, have the ability to determine reliability indicators and quantitatively evaluate the quality indicators and technical levels of equipment, organize and conduct reliability tests, process test results to have an idea of providing, diagnosing, repairing and servicing equipment; - Technological processes in oil gas extraction and processing and the devices, machines, equipment, equipment used for their implementation, and the nodes and elements that make up them are considered as separate objects, ensuring their operation and reliability for a long period of time without breaking down. know how to accept the necessary solutions and be able to use them; - Collecting, analyzing and processing data on the reliability of student products; should have the skills to draw up reliability-determining and control testing methodology, regulatory and technical documents on reliability management in enterprises. <p>2.3 The main theoretical part (lecture sessions)</p> <p>Module 1. General concepts of "reliability of technological equipment of the oil and gas industry".</p>
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Science (module) code NGSTJI2305	Academic year 2022-2023	Semester 5	ECTS credit 5	
Science (module) type selection	Language of education Uzbek/Rus		Weekly lesson time 4	
	Name of subject	Audience training (hour)	Independent study (hour)	Total load (hour)
1.	Reliability of technological equipment of the oil and gas industry	60	90	150
2.	<p style="text-align: center;">The content of science</p> <p style="text-align: center;">2.1. Relevance of educational science and its role in higher professional education</p> <p>"Reliability of technological equipment of the oil and gas industry" subject 5320300 - "Technological machinery and equipment (machinery and equipment of the oil and gas industry)" bachelor's education course with the choice of students according to the curriculum of the main educational program is among the studied subjects. The science is based on the initial studies of such subjects as mathematics, physics, chemistry, mechanics, informatics and information technology, thermodynamics, hydraulics and oil and gas technology processes and devices. Basic conditions for mastering science: knowledge of the basic laws of physics and mathematics, ability to solve problems with a certain level of complexity and build models; such as having systematic knowledge formed in physical definitions in the field of creating and using technological equipment for oil and gas production and processing.</p> <p>5320300 - "Reliability of technological equipment of the oil and gas industry" is one of the main subjects for the undergraduate course "Technological machinery and equipment (machinery and equipment of the oil and gas industry)". During the study of science, the reliability of oil and gas technological equipment is considered as a separate object in the system of various technological machines and equipment of the industry.</p> <p>2.2. The purpose and tasks of educational science</p> <p>The main purpose of science training is to provide in-depth training of specialists for production, design-construction and scientific research activities in the fields of creation and use of technological equipment for oil and gas extraction and processing.</p>			

	<p>technical and electronic means of information, refer to Internet resources;</p> <p>- person-oriented educational technologies, which ensure consideration of various abilities of learners during the educational process, provide the necessary conditions for the development of their individual abilities, develop the activity of the learner during the educational process. Person-oriented educational technologies are implemented during individual prompt-request communication between the teacher and the student, during the completion of individual homework assignments, and during weekly consultations.</p> <p>The conditions that determine the quality of education related to the educational process are as follows: teaching at a high scientific and pedagogical level, teaching problem lectures, interesting organization of lessons in the form of questions and answers, use of advanced pedagogical technologies, including discussion -discussion, debating or debating, critical thinking, role playing, working in small groups, brainstorming, cluster, fish skeleton, jigsaw, FSMU, boomerang, scarab, cascade, Weyer, pinboard, "T-scheme.</p>
4.	<p style="text-align: center;">Requirements for obtaining a loan:</p> <p>Full mastery of theoretical and methodological concepts related to science, ability to correctly reflect the results of analysis, independent observation of the processes being studied, and completion of tasks and tasks given in the current and intermediate control forms, according to the final control pass the test.</p>
5.	<p style="text-align: center;">Basic and additional educational literature and information sources</p> <p style="text-align: center;">5.1. Basic literature</p> <ol style="list-style-type: none"> 1. Острейковский В.А. Теория надежности: учебник для вузов. – 2-е изд., испр. – М.: Высшая школа, 2008. – 464 с. 2. Кафаров В.В. Анализ и синтез химико-технологических систем. - М.: Химия, 1991. -43 с. 3. Шубин В.С., Рюмин Ю.А. Надёжность оборудования химических и нефтеперерабатывающих производств. - М.: Химия, Колос, 2008. – 359 с. 4. Кафаров В.В., Мешалкин В.П., Грун Г., Нойманн В. Обеспечение и метод оптимизации надёжности химических и нефтеперерабатывающих производств. -М.: Химия, 1987. -272 с. 5. Щипачев А.М. Технологическое обеспечение надежности нефтегазового оборудования. - Санкт-Петербург ; Москва ; Краснодар : Лань, 2018. - 65 с. <p style="text-align: center;">5.2. Additional literature</p> <ol style="list-style-type: none"> 1. Сугак Е.В., Василенко Н.В., Назаров Г.Г. и др. Надежность технических систем. под общ. ред. Е.В. Сугака и Н.В. Василенко. – Красноярск: НИИ СУВПТ, 2001. – 608 с. 2. Нурмухамедов Х.С., Абдуллаев А.Ш., Жуманиёзов М.Ж., Бабаев

	<p>З.К., Каримов К.Ф. Кимё ва нефть саноатлари қурилмаларини таъмирлаш ва монтаж қилиш. – Т.: Фан ва технологиялар, 2012.- 204 б.</p> <p>3. Фафуров К.Х., Шомуродов Т.Р., Бобоёров Р.О. Технологик машиналардан фойдаланиш ва таъмирлаш асослари. –Т.: “Сано-стандарт”, 2013.</p> <p>4. Юлдашев У., Машиналар ишончилиги ва таъмирлаш асослари. – Т.: 2010. - 320 б.</p> <p>5. ГОСТ 27.002 – 89 Надежность в технике. Термины и определения.</p> <p>6. Система технического обслуживания и ремонта оборудования предприятий химической промышленности: Справочник. – М.: Химия, 1983. – 352 с.</p> <p style="text-align: center;">5.3. Information sources</p> <p>1. http://www.lex.uz. O‘zbekiston Respublikasi qonun hujjatlari ma’lumotlari milliy bazasi sayti.</p> <p>2. http://www.gov.uz. O‘zbekiston Respublikasining hukumat portali.</p> <p>3. http://ebiblioteka.uz. Respublika ilmiy pedagogika kutubxonasi sayti.</p> <p>4. http://www.dobi.oglib.ru/. Neft va gaz elektron kutubxonasi.</p> <p>5. http://ziyonet.uz. Axborot ta’lim tarmog‘i.</p> <p>6. www.edu.uz. Ta’lim tarmog‘i sayti.</p> <p>7. www.neft_pererabotka.com.ru. Neft va gazni qayta ishlash elektron ma’lumotlari tarmog‘i sayti.</p>
6.	<p>The science program was reviewed and approved by the protocol of the Karshi Engineering and Economics Institute No. "___" dated "___" ____, 202__.</p> <p>It was approved by the order of the Council of the Institute No .</p>
7.	<p>Responsible for the subject (module):</p> <p>F.E. Buronov - KEEI, senior teacher of the "Technological machines and equipment" department.</p> <p>M.S. Samadova - KEEI, assistant of the department "Technological machines and equipment".</p>
8.	<p>Reviewers:</p> <p>E.S. Mirzayev - KEEI "Technological machines and equipment" dots. of the department.</p> <p>O. Murtozayev - "Shurtan Gas Chemical Complex" LLC The head of the ethylene production.</p>

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

KARSHI ENGINEERING- ECONOMICS INSTITUTE



Registered:

№ _____

2022 year "___" ____

**TECHNOLOGICAL EQUIPMENT OF THE OIL AND GAS
INDUSTRY
RELIABILITY**

SCIENCE PROGRAM

Field of knowledge: 300000 - Production is a technical field

The field of education: 320000 - Production technologies

Field of study: 5320300 -Technological machines and equipment
(Oil and gas industry machines and equipment)