



Syllabus Course Program



Entry into the Specialty. Introductory Practice

Specialty

133 – Industrial machinery engineering

Institute

Educational-scientific Institute of Mechanical Engineering and Transport

Educational program

Industrial machinery engineering

Department

Hydraulic Machines (150)

Level of education

Bachelor's level

Course type

Optimal (profile)

Semester

1

Language of instruction

English, Ukrainian

Lecturers and course developers



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Candidate of Technical Sciences, Associate Professor of the Department of Hydraulic Machines of NTU "KhPI"

Work experience is 10 years.

Author and co-author of more than 60 scientific and educational works.

Courses: "Technical equipment and technology of well repair", "Introduction to the specialty. Introductory practice", "Hydrogasdynamics", "Hydraulics", "Basics of scientific research", "Fountain and gas safety in the oil and gas industry", "Machines and equipment for wells drilling, equipment for oil and gas production".

General information

Summary

The course covers general knowledge of the "Industrial Mechanical Engineering" specialty. During its study, students will learn what energy sources exist, which deposits are widespread in Ukraine, study the main methods of drilling and operation of oil and gas wells, equipment used in industry. Students receive the theoretical foundations of the oil and gas industry. Students study well repair technologies and methods of intensification. Students learn about the impact of oil and gas facilities on the environment.

Course objectives and goals

Focus on the main equipment of the oil and gas industry. Deepen knowledge of oil and gas equipment designs. To form students' skills of independent management of the process of design, operation and maintenance of oil and gas complex equipment.

Format of classes

Lectures, self-study, report. Final control in the form of a test.

Competencies

GS2. Ability to apply knowledge in practical situations.

GS4. Ability to search, process and analyze information from various sources.

GS5. Ability to generate new ideas (creativity).

SC1. Ability to apply typical analytical methods and computer software tools for solving engineering problems of industrial mechanical engineering, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate computer software for solving engineering problems of industrial mechanical engineering.

SC2. Ability to apply fundamental scientific facts, concepts, theories, principles to solve professional problems and practical problems of industrial mechanical engineering.

Learning outcomes

LA2. Knowledge and understanding of mechanics and mechanical engineering and their development prospects.

LA5. Analyze engineering objects, processes and methods.

LA9. Choose and apply the necessary equipment, tools and methods.

Student workload

The total volume of the course is 90 hours (3 ECTS credits): lectures - 32 hours, self-study - 58 hours.

Course prerequisites

To successfully complete the course, it is necessary to have knowledge and practical skills in the following subjects: Chemistry, Physics

Features of the course, teaching and learning methods, and technologies

In the lectures, various methods of oral presentation of information are used: maintaining attention for a long time, activating the listeners' thinking; techniques that ensure logical memorization: persuasion, argumentation, evidence, classification, systematization, generalization, etc.

The method of discussion of educational material and discussion is used in lectures. The discussion makes it possible to significantly deepen and systematize knowledge and understanding of a particular problem, to check the basis of the conclusions reached by students during the study of a specific topic. The discussion method develops students' ability to defend their views and beliefs. The discussion helps to identify, logically and critically consider different points of view, scientific concepts and approaches to the issues under consideration. The organization and support of the discussion is achieved by using the following methods: asking questions (main, additional, leading, etc.), discussing the answers and opinions of students, correcting the answers and formulating conclusions.

Visual and practical teaching methods. Among the visual methods of learning, illustration and demonstration are used. Illustration - showing students posters, maps, graphs, sketches on the board. During distance education, lecture material is presented in the form of presentations with pictures and videos.

The material is available on the Microsoft 365 resource and on the Moodle platform.

Program of the course

Topics of the lectures

Topic 1. Introduction to the course.

Basic concepts and definitions. Historical information about the university, the department "Hydraulic machines" and its founder professor G.F. Proskura. Excursion to the museum of NTU "KhPI".

Topic 2. Studying at NTU "KhPI".

Some provisions of university status. Student work at the university. Getting to know the curriculum of the specialty. Where specialists are trained and where they work. Work with information resources of the university.

Topic 3. Energy.

Energy sources. Their characteristics and areas of use. The history of the development of the oil and gas industry in Ukraine and the world.

Topic 4. Liquid and gases.

Properties of liquids and gases. Laws that describe their states and motion.

Topic 5. Drilling wells.

Equipment used in drilling gas and oil wells. Features of drilling on land, on the sea shelf and drilling sea wells.

Topic 6. Basic methods of oil and gas extraction.

Equipment used to extract fluids. Selection of oil production method.

Topic 7. Well repair technologies.

Basic methods of intensification of wells. Carrying out repair work on the well during drilling and its operation.

Topic 8. The impact of oil and gas industry objects on the environment.

Basic measures to prevent accidents in industry. Analysis of the impact of wells on environmental change.

Topics of the workshops

There are no practical classes.

Topics of the laboratory classes

There are no laboratory classes.

Self-study

The individual task is presented in the form of an report on the topic "Description of the deposit". The abstract can be replaced by a presentation of the material.

Course materials and recommended reading

1. <https://www.kpi.kharkov.ua/eng/>
2. Umakanta Sahoo. Hybrid renewable energy systems. Hoboken, New Jersey : Scrivener Publishing. 2021. - 266 p.
3. Fay, James A. Energy and the environment / James A. Fay, Dan S. Golomb. New York: Oxford, 2002. – 314 p.
4. Ristinen, R., Kraushaar, J., & Brack, J. (2022). Energy and the Environment (4th ed.). Wiley. Retrieved from <https://www.perlego.com/book/3449556/energy-and-the-environment-pdf> (Original work published 2022)
5. Oil and gas production technology. Manual training / V. Toporov, M. Bratakh, D. Dobrunov – Kharkiv : NTU "KhPI", 2017. – 138 p.
6. Miller R., Miller M.R., Stewart H.L. Pumps and Hydraulics: Wiley Publishing, Inc., Indianapolis, Indiana, 2004. – 577 p.

7. Totten George E. (ed.) Handbook of Hydraulic Fluid Technology: Marcel Dekker, Inc. 2000. – 1272 p.
8. O. Serra. Fundamentals of Well-log Interpretation: The interpretation of logging data, Vol. 2: Elsevier, 1984. – 684 p.
9. Mitchell Bill. Advanced Oil Well Drilling Engineering Handbook & Computer Program. 10th edition. – Society of Petroleum Engineers of the AIME, 1995. – 605 p.
10. Abdel-Aal H.K., Aggour M., Fahim M.A. Petroleum and Gas Field Processing: Marcel Dekker, 2003. - 358 p.
11. Petroleum Production in Nontechnical language. Oklahoma: PennWell Books, 1995. – 416 p.
12. Sukumar Laik. Offshore Petroleum Drilling and Production. CRC Press, 2018. — 649 p.
13. Hyne N.J. Nontechnical Guide to Petroleum Geology, Exploration, Drilling, and Production. 3rd ed. – PennWell Corporation, 2012. XXXV, 698 p.
14. Gao Changhong. Petroleum Drilling Technology. Science Press, 2017. — 160 p.
15. Petroleum Engineering Handbook. Vol. 2. Drilling Engineering. Society of Petroleum Engineers. 2006. –770 p. Editor Robert F. Mitchell
16. Drilling Engineering. Manual. – Edinburgh: Heriot-Watt Institute of Petroleum Engineering, 2013. – 608 p.
17. Chaudhuri U.R. Fundamentals of Petroleum and Petrochemical Engineering. CRC Press, 2011. - 406 p.

Assessment and grading

Criteria for assessment of student performance, and the final score structure

Description of the final score structure:
 Report/presentation - 35 points.
 Test - 65 points.

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by

Date, signature

Head of the department
Andrii ROGOVYI

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Guarantor of the educational program
Iryna Tynianova

