



Syllabus Course Program

" Equipment of gas distribution stations "

Specialty

161 – Chemical technologies and engineering

Institute

SEI chemical technologies and engineering

Educational program

Oil, gas and solid fuel processing technologies

Department

Oil, gas and solid fuel processing technologies

Level of education

Bachelor's level

Course type

Special (professional), Selective

Semester

8

Language of instruction

English

Lecturers and course developers



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Doctor of technical sciences, professor, professor of the department « Oil, gas and solid fuel processing technologies » NTU «KhPI»

Author of more than 200 scientific and educational and methodological works

[More about the lecturer on the department's website](#)

General information

Summary

The discipline is aimed at mastering theoretical knowledge about the properties of natural gas, the technology of its preparation and transportation to end users.

Course objectives and goals

To provide students with knowledge about preparation parameters, features of natural gas transportation, design and operating conditions of technological equipment of pressure compressor stations.

Format of classes

Lectures, practical classes, consultations. Final control - exam.

Competencies

- Ability to design chemical processes taking into account technical, legislative and environmental constraints.
- Ability to use modern materials, technologies and apparatus designs in chemical engineering.

Learning outcomes

- Choose and use appropriate equipment, tools and methods for solving complex problems of chemical engineering, control and management of technological processes of chemical production.

- Understanding chemical engineering as a component of modern science and technology, its place in the development of engineering, the Ukrainian state and world culture.

Student workload

The total volume of the discipline is 120 hours: lectures - 40 hours, practical classes - 10 hours, independent work - 70 hours.

Course prerequisites

To successfully complete the course, you must have knowledge and practical skills in the following disciplines: Introduction to the specialty, familiarization practice", "Chemistry (inorganic, organic, physical, analytical)", "Physics and chemistry of combustible fossils", "Automotive operational materials".

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

The training classes of the course consist of classroom classes (lectures, practical classes, interviews with the teacher during the defense of test papers, consultations, exams) and independent work of students (performance of test papers, calculation tasks, preparation for their defense and examination).

The main type of classroom work is lectures, during which the teacher focuses on the selection of non-traditional raw materials, methods of their preparation, technological methods and equipment for the production of motor fuels.

The knowledge gained at the lectures is consolidated by students during other types of training sessions in order to transform them into knowledge and skills necessary for future practical work.

The independent work of students consists of performing control tasks, writing an essay, preparing for their defense and the exam.

Program of the course

Topics of the lectures

Topic 1 The role of natural gas in the economy of Ukraine.

Topic 2 Prospects for the development of the gas industry.

Topic 3 Gas transport system of Ukraine.

Topic 4 Properties of natural gas.

Topic 5 Bringing the gas to normal (working) parameters.

Topic 6 Purification of natural gases.

Topic 7 Odorization of natural gas.

Topic 8 Compression of natural gas.

Topic 9 Conditions of hydrate formation.

Topic 10 Equipment of gas distribution stations.

Topic 11 Safe operation of gas distribution stations.

Topics of the workshops

Practical class 1 Features of the industrial system of natural gas preparation.

Practical class 2 Drying of natural gas.

Practical class 3 Cleaning of natural gas from acidic components.

Practical class 4 Quality indicators of natural gas.

Practical class 5 Features of storage and transportation of natural gas.

Topics of the laboratory classes

Laboratory works within the discipline are not provided.

Self-study

1. Composition and physical and chemical properties of natural gas.

2. Alternative use of natural gas.

3. Prevention of hydrate formation.

4. Increasing the efficiency of operation of natural gas preparation plants.



5. New odorants for natural gases.
6. Ways to improve the gas transportation system of Ukraine.

Course materials and recommended reading

Basic materials:

1. Modeling and optimization of natural gas distribution networks for new supplier projects / O. Alves Jr, C. Fontes // Energy Conversion and Management: X. - 2022. - 100240. URL: <https://www.sciencedirect.com/science/article/pii/S2590174522000630>
2. Kurz R. Optimization of compressor stations / R. Kurz // Journal of the Global Power and Propulsion Society. -2019. - Volume 3. - P. 668–674. URL: <https://journal.gpps.global/pdf-112399-44168?filename=Optimization%20of.pdf>
3. Analysis of Hydrogen Gas Injection at Various Compositions in an Existing Natural Gas Pipeline / Jingxuan Liu, Lin Teng, Bin Liu, Peng Han, Weidong Li // Front. Energy Res. - 2021. - Volume 9. - 685079. URL: <https://www.frontiersin.org/articles/10.3389/fenrg.2021.685079/full>
4. Risk Prioritization in a Natural Gas Compressor Station Construction Project Using the Analytical Hierarchy Process / Koulinas, G.K.; Demesouka, O.E.; Bougelis, G.G.; Koulouriotis, D.E. // Sustainability. - 2022. - Volume 14. - 13172. URL: <https://www.mdpi.com/2071-1050/14/20/13172>
5. EU Gas Transmission Network Facilities Review Inventory, operation and failure modes of the main components of the EU gas system. An information source to gas risk assessments / Calisto H, Gandossi L, Rodríguez Gómez N, Bolado Lavín R. Luxembourg: Publications Office of the European Union, 2020. - 82p. URL: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC122592/jrc122592_v5.pdf

Additional materials:

1. PREVENTIVE ACTION PLAN TO SAFEGUARD THE SECURITY OF NATURAL GAS SUPPLY. SOFIA 2020. -64p. URL: https://energy.ec.europa.eu/system/files/2021-04/bg_pap_en_0.pdf

Assessment and grading

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

Points are awarded according to the following ratio:

- test papers: 20% of the semester grade;
- practical tasks: 20% of the semester grade;
- individual tasks: 20% of the semester grade;
- credit: 40% of the semester grade

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/>



National Technical University
"Kharkiv Polytechnic Institute"

Approval

Approved by

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Guarantor of the educational
program
Iryna SINKEVYCh



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