



## Syllabus Course Program

# " Methods of determining the quality of oil, gas and their processing products "

**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), Mandatory

**Semester**

7

**Language of instruction**

English

## Lecturers and course developers



Hryhorov Andrii Borysovych

[grigorovandrey@ukr.net](mailto:grigorovandrey@ukr.net)

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 peculiarities of the chemical composition of petroleum products, their physical and chemical properties and modern methods of laboratory research of these properties.

### Course objectives and goals

Study of methods of analysis and regulatory and technical documentation, which will allow to organize work in the field of research of the quality of petroleum products, in the conditions of the enterprise or testing laboratories.

### Format of classes

Lectures, laboratory works, consultations. Final control - exam.

### Competencies

- Ability to use methods of observation, description, identification, classification of objects of chemical technology and industrial products.
- Ability to choose and use appropriate equipment, tools and methods for control and management of technological processes of chemical production.
- Ability to draw up technical documentation in accordance with current requirements.

## Learning outcomes

- Carry out qualitative and quantitative analysis of substances of inorganic and organic origin, using appropriate methods of general and inorganic, organic, analytical, physical and colloidal chemistry.
- Choose and use appropriate equipment, tools and methods for solving complex problems of chemical engineering, control and management of technological processes of chemical production.

## Student workload

The total volume of the discipline is 120 hours: lectures - 32 hours, laboratory works - 16 hours, independent work - 72 hours.

## Course prerequisites

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

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

The training sessions of the course consist of classroom sessions (lectures, laboratory sessions, 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 exam).

The main type of classroom work is lectures, during which the teacher focuses on the classification of hydrocarbon raw materials, features of sampling for quality determination, metrological equipment of laboratories, features of determining the quality of oil, gas and their processing products, reduction of harmful effects on the human body and the environment, unresolved currently a technical and technological issue.

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.

Students' independent work 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 played by motor fuels in the economic development of the state

Topic 2 Nomenclature of modern motor fuels

Topic 3 Characteristics of production methods of commercial motor fuels

Topic 4 List of the main quality indicators of motor fuels regulated in regulatory documentation

Topic 5 Basic functions of lubricating oils during operation

Topic 6 Classification of lubricating oils

Topic 7 Characteristics of production methods of commercial lubricating oils

Topic 8 The list of the main indicators of the quality of lubricating oils, which is regulated in the regulatory documentation

Topic 9 Methods of laboratory research of the quality of lubricating oils

Topic 10 Express analysis methods for determining the quality of lubricating oils in field conditions

Topic 11 Basics of boiler fuel production technology

Topic 12 Nomenclature and main quality indicators of boiler fuels

Topic 13 Methods of determining the quality of boiler fuels

Topic 14 Rules for drawing up a report on laboratory testing of petroleum products

### Topics of the workshops

Practical classes within the discipline are not provided.

### Topics of the laboratory classes

Laboratory work 1 Determination of the quality and use of motor fuels



Laboratory work 2 Determination of the quality and use of lubricating oils

Laboratory work 3 Determination of the quality and use of boiler fuels

## Self-study

1. Calculate the octane and cetane number of gasoline and diesel fuel based on the results of a laboratory study.
2. Determine the compatibility of motor oils of different levels of operational properties.
3. Calculate the heat of combustion of boiler fuel based on the results of elemental analysis
4. Determination of the viscosity index of motor oils.
5. Formulation of motor fuel recipes.
6. Compilation of recipes of lubricating materials.

## Course materials and recommended reading

Basic materials:

1. Ekspluatatsiyini materialy : laboratornyy praktykum z dystsypliny dlya studentiv spetsial'nostey 132 «Materialoznavstvo», 208 «Ahroinzheneriya», 274 «Avtomobil'nyy transport» / V. V. Yefimenko, V. P. Oleksandrenko, M. S. Stechyshyn, V. S. Kurskoy. – Khmel'nyts'kyy : KHNU, 2020. – 100 s.
2. Lokomotyvni ekspluatatsiyini materialy: navch. posib. CH. 1. Palyvo / D. S. Zhalkin, S. H. Zhalkin, V. H. Puzyr, O. O. Anats'kyy; za zah. red. prof. S. H. Zhalkina. – Kharkiv: UkrDUZT, 2021. – 106 s.
3. Transportuvannya nafty, naftoproduktiv i hazu: navch. posib. / L.N. Shyrin, O.V. Denyshchenko, S.YE. Bartashevs'kyy, YE.A. Korovyaka, V.O. Rastsvyvetayev ; M-vo osvity i nauky Ukrayiny, Nats. tekhn. un-t «Dniprovs'ka politekhnika». – Dnipro: NTU «DP», 2019. – 203 s.
4. Pushka O.S. Metodychni vkazivky dlya vykonannya laboratornykh robit z dystsypliny «Palyvo-mastylni ta inshi ekspluatatsiyini materialy». UNUS : Uman', 2020. – 101 s.
5. Osnovy metrolohiyi: navchal'nyy posibnyk/ I.V. Soltys, O.V. Derevyanchuk. – Chernivtsi: Chernivets'kyy nats. un-tet, 2021. – 152 s.
6. Svyetkina O.YU. Fyzyko-khimichni metody analizu. Metodychni rekomendatsiyi do vykonannya laboratornoyi robit za temoyu «Instrumental'ni metody analizu» z dystsypliny studentamy spetsial'nostey 161 «Khimichni tekhnolohiyi ta inzheneriya» ta 132 «Materialoznavstvo». Uporyad.: O.YU. Svyetkina, O.B. Netyaha, H.V. Tarasova. – D.: NTU «Dniprovs'ka politekhnika», 2020. – 30 s

Additional materials:

1. Laruk M. M Instrumental'ni metody analizu: navch. posibn. / M. M. Laruk, P. Y. Shapoval, R. R. Huminilovych. L'viv : Vydavnytstvo L'vivs'koyi politekhniky, 2019. – 216 s.
2. Slobodnyuk R. YE. Kurs analitychnoyi khimiyi: navch. posib. / R. YE. Slobodnyuk. – Kherson: OLDI-PLYUS, 2020. – 256 s.
3. Buller M. F. Metody doslidzhen' ta vyprobuvannya vysokomolekulyarnykh spoluk : navchal'nyy posibnyk / M. F. Buller, V. A. Robot'ko. – Sumy : Sums'kyy derzhavnyy universytet, 2019. – 134 s.
4. Chromatography the Ultimate Analytical Tool / V. Samanidou, N. Kalogiouri. – MDPI, 2020. – 200 s.

## 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;
- laboratory work: 20% of the semester grade;
- individual tasks: 20% of the semester grade;
- exam: 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/>

## Approval

Approved by

Date, signature

**Head of the department**

Denys MIROShNYChENKO

Date, signature

**Guarantor of the educational program**

Iryna SINKEVYCh

