

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН  
РГП на ПХВ «ЮЖНО-КАЗАХСТАНСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ ИМ.М.АУЕЗОВА» МОН РК



**AUEZOV**  
UNIVERSITY  
1943



## ОБРАЗОВАТЕЛЬНАЯ ПРОГРАММА

- 📍 160012, город Шымкент, проспект Тауке хана, 5
- ☎ (8-725-2) 21-01-41, факс: (8-725-2) 21-01-41
- ✉ canselyarya@mail.ru, info@ukgu.kz
- 📘 @official.ukgu.kz
- 📷 @auezov\_university

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF  
KAZAKHSTAN  
M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

« APPROVED BY »  
The Rector  
d.h.s., academician Kozhamzharova D.P.  
« 25 » 02 2021



EDUCATION PROGRAMME

**8D07170 – «Chemical technology of organic substances»**

|   |  |
|---|--|
| Registration number                               | 8D07100040   |
| Code and classification of the field of education | 8D07- Engineering, manufacturing and construction industries |
| Code and classification of training areas         | 8D071- Engineering and engineering practice                  |
| Group of educational programs                     | M097 Chemical Engineering and Processes                      |
| Type of EP  | Acting   |
| ISCE level  | 8  |
| NQF level   | 8  |
| SQF of education level                            | 8  |
| Language of learning                              | Russian  |
| Typical duration of study                         | 3 years  |
| Form of study                                     | Full time  |
| The complexity of the EP                          | 180 credits  |
| Distinctive features of EP                        | -  |
| University Partner ( JEP )                        | -  |
| University Partner ( TDEP )                       | -  |
| Social Partner ( DE )                             | -  |

Shymkent , 2021

Drafters:

| Name              | Position   | Sign |
|-------------------|--|------|
| Daurenbek N.M.    | K.ch.s., Head of the PPaPCH Department                   |      |
| Mamytova G.Zh.    | Senior lecturer, OP&PCh Department                       |      |
| Artykova Zh.K.    | Senior lecturer, master OP&PCh Department                |      |
| Sarsenbayeva A.U. | Senior lecturer, master OP&PCh Department                |      |
| Issa A.B.         | Doctoral student gr. DHT-18-3r                           |      |
| Eregenov B.T.     | Production Director of "PetroKazakhstanOil Products" LLP |      |
| Ospanov I.N.      | Deputy director LLP "Neftehimstroiyug"                   |      |
| Kubelekova U.D.   | Director of quality LLP "Hill Corporation"               |      |
| Massalova V.P.    | Deputy director LLP "Eco -Shina"                         |      |
| Mamutbekov M.S.   | Director LLP "Triumf M.M.S."                             |      |

EP was considered by the Committee on Innovative Learning Technologies and Methodological Support of the Higher school of ChEaBT, protocol № 7 from 22 02 2021.

Chairman of MC (Committee) \_\_\_\_\_

sign

Considered and recommended for approval at the meeting of Educational and Methodical Council of M. Auezov SKU.

protocol № 5 from 23 02 2021.

Approved by the decision of the Academic Council of the University

protocol № 12 from 25 02 2021.

## CONTENT

|    |  |    |
|----|--|----|
|    | Introduction   | 5  |
| 1. | Passport of the educational program  | 7  |
| 2. | Learning outcomes for EP   | 8  |
| 3. | Competences of the graduate of EP  | 8  |
| 4. | Summary table showing the amount of credits mastered by the modules of the educational program | 9  |
| 5. | Information about the disciplines  | 10 |
|    | Approval sheet   | 12 |
|    | Appendix 1. Review from the employer   |    |
|    | Appendix 2. Expert opinion   |    |

## **Introduction**

### **1. Scope**

Designed for the implementation of Doctor of Philosophy (PhD) preparation by educational program (here in after - the EP) 8D07107- "Chemical technology of organic substances" in Non-profit Limited Company "M.Auezov South Kazakhstan University" of RK MES.

### **2. Regulatory documents**

Education Act of the Republic of Kazakhstan (as amended and supplemented on 04/07/2018);

Standard rules for the operation of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan from October 30, 2018 No. 595 (registered with the Ministry of Justice of the Republic of Kazakhstan on October 31, 2018 No. 17657);

State obligatory standards of higher and postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan, October 31, 2018 No. 604;

The rules for the organization of educational process on credit technology education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan on April 20, 2011 No. 152 as amended and supplemented of October 12, 2018 No. 563

The sectoral qualifications framework "Petroleum and gas, petroleum processing and petrochemical industries" was approved by the protocol of the Sectoral commission on social partnership and regulation of social and labor relations of the petroleum and gas industry dated March 30, 2017 No. 1-2017

The sectoral qualifications framework "Chemical Production" was approved by the protocol of the session of the Sectoral commissions on social partnership and regulation of social and labor relations for mining and smelting, chemical, construction industry and woodworking, light industry and mechanical engineering of August 16, 2016 No. 1.

Professional standard "Pedagogue" (Appendix to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of Kazakhstan "Atameken" No. 133 of June 8, 2017).

### **3. Educational programs concept**

The goal of the educational program is coordinated with the mission of university and is aimed at preparing the intellectual elite of the country with possessing advanced knowledge, entrepreneurial skills, fluent in three languages, demonstrating conceptual, analytical and logical thinking skills, creative approach in professional activities, being able to work in national and international teams obtaining the lifelong learning strategy.

The educational program is harmonized with the 8th level of the National Qualifications Framework of the Republic of Kazakhstan, with Dublin descriptors, the 3rd cycle of the Qualification Framework of the European Higher Education Area, also with the 8th level of the European Qualification Framework for Lifelong Education.

The educational program is focused on professional and social order through the formation of professional competencies associated with the necessary types of research, practical and business activities, adjusted to meet the requirements of stakeholders.

**The uniqueness of the preparation** of PhD doctors of philosophy according to EP 8D07107- "Chemical technology of organic substances"

EP is focused on the integration of the educational process, research and innovation activities, which contributes to the high competitiveness of graduates in the labor market;

The study program focuses on the orientation of scientific research in priority areas of science and technology development, training from leading domestic and foreign specialists, production workers, the opportunity to work in scientific laboratories with unique equipment, participation in international scientific and educational projects, internships at leading Russian and foreign companies and universities.

EP is implemented by attracting technical base and highly qualified specialists of relevant enterprises of the region.

The leading scientists of department and foreign scientists who are heads known in Kazakhstan and abroad schools of sciences are involved in educational process.

The EP focuses on the training of professional managers and specialists for the chemical engineering industries, teachers; capable to independent way of thinking and courageous original decisions, developing strategic approaches to solving research problems with in-depth scientific and pedagogical knowledge.

The educational program aims to achieve learning outcomes through the organization of the educational process using the principles of the Bologna process, student-centered learning, accessibility and inclusion.

Program learning outcomes are achieved through the following training events:

-classroom lectures: lectures, seminars, practical and laboratory works are held in the light of innovative learning technologies, the use of the latest achievements of science, technology and information systems. Laboratory classes are held in accredited laboratories of the university: Testing regional laboratory of engineering profile "Constructional and biochemical materials" and Laboratory of physical and chemical analysis methods "SAPA", on the basis of educational and scientific production complexes of "Ecoshina" LLP, Hillcorporation LLP;

- extracurricular activities: independent work of the student, including under the guidance of a teacher, individual consultations;

-pedagogical and research practices, the implementation of doctoral dissertation;

- scientific research work of a doctoral student (SRWDS): independent scientific work of the student, including the implementation of a doctoral dissertation and foreign scientific internship.

The university has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination against students.

The quality of the EP is ensured by the involvement of stakeholders in its development and evaluation, systematic monitoring and review of its content.

#### **4. Entry Requirements**

Established in accordance with the Model Rules for admission to studies in educational organizations that implement educational programs of postgraduate education by order MES RK №600 on 31.10.2018

## **1. EDUCATION PROGRAMME PASSPORT**

### **1.1 The purpose and objectives of education program by specialty**

EP purpose: Preparation of highly qualified personnel for chemical engineering, capable of generating ideas, implementing and directing scientific, educational and complex production processes.

EP objectives:

- to provide doctoral students with a solid basis for management, analytical and consulting activities in the field of chemical technology of organic substances;

- to provide doctoral students with strong analytical, research and leadership qualities and teamwork skills that allow them to solve the problems of increasing the country's competitiveness in the modern economy;

- to provide doctoral students with lifelong learning skills that will enable them to successfully adapt to changing technologies in the field of chemical technology of hydrocarbon processing throughout their professional careers;

- to provide doctoral students a broad education, which is necessary for understanding the influence of chemical technologies of hydrocarbon processing in the global and social context;

- creation based on the integration of education and science of an effective system for training scientific, scientific and pedagogical personnel of the new formation, capable of solving the issues of improving society, the economy, production, science and the development of new technologies.

#### **1.2 List of qualifications and positions**

The graduate is awarded the degree of Doctor of Philosophy (PhD) in the educational program 8D07107- "Chemical technology of organic substances"

PhD in the educational program 8D07107- "Chemical Technology of Organic Substances" may occupy the positions of General Director (Chairman of the Board), Deputy General Director (for directions), project manager, higher education teacher without presenting requirements for work experience in accordance with the industry qualification framework of the petroleum and gas, petroleum processing and petrochemical industries without making requirements for work experience in accordance with the qualification requirements "Qualification directory of positions of managers, specialists and other employees", approved by order the Minister of Labor and Social Protection of the Republic of Kazakhstan dated May 21, 2012 № 201-ø-m.

### **1.3 Qualification characteristics of the educational program graduate**

#### **1.3.1 Scope of professional activity**

The sphere of professional activity are enterprises for the production of organic substances, for the processing of petroleum, gas, coal and polymers, elastomers, paints and varnishes, research and project branch institutes, institutions, etc.

#### **1.3.2 Objects of professional activity**

The objects of professional activity are: the equipment, technological processes and industrial systems for the production of substances, materials, products, as well as their management and regulation systems; chemicals and materials; methods and devices for determining the composition and properties of substances and materials; methods and tools for assessing the state of the environment and protecting it from the effects of industrial production, energy and transport; educational and methodical documentation, technical means of education.

### 1.3.3 Subjects of professional activity

The subjects of professional activity are: products of basic and fine organic synthesis, polymers, apparatus and equipment, chemical technology of production and processing of organic substances and materials, various types of raw and auxiliary materials and substances, chemical reagents and reactants, scientific research instruments and equipment.

### 1.3.4 Types of professional activity

- scientific and research;
- production and technology;
- organizational and managerial;
- project;
- educational, pedagogical.

## 2. EP LEARNING OUTCOMES

**LO1** Use specialized knowledge to critically analyze, evaluate, and synthesize new, complex ideas with the goal of scientific, patent and marketing support of the conducted basic researches and technological development.

**LO2** Extend existing knowledge using the latest information and communication technologies and professional practice in the field of chemical engineering; to develop and apply innovations in the field of scientific and educational activities.

**LO3** Organize, plan and select efficient algorithms for the implementation of scientific research with the commercialization of the products obtained.

**LO4** Participate in oral or in writing in professional discussions, publish research results in international academic publications.

**LO5** Generate ideas, predict the results of innovation, carry out large-scale changes in the professional and social sphere, lead complex industrial and scientific processes.

**LO6** Transform the knowledge gained into innovative technologies, turning new knowledge into concrete proposals (creating significant research products).

**LO7** Have leadership and team management skills, work in a team, show tolerance and respect towards others, and carry out industrial or applied activities in an international environment.

**LO8** Adapt and summarize the results of modern scientific research for teaching specialized disciplines and leading the research work of students.

## 3. COMPETENCES OF EP GRADUATE

**3.1** Successful completion of training in EP contributes to the formation of the following competencies of a graduate:

(CC1) *language and computer*

- the ability to apply basic communication skills in a foreign language in oral and written forms; the ability to use modern information and digital technologies for analyzing, evaluating and synthesizing new complex ideas necessary for professional activities;

(CC2) *managerial, economic and entrepreneurial*

-the ability for management and entrepreneurial activities, to be responsible for planning, developing and the results of activity processes that can lead to significant changes or development of an enterprise, to manage personnel, to demonstrate entrepreneurial skills;

(CC3) *technical*

-the ability to analyze scientific-technical information in the field of chemical technology of organic substances for the purpose of scientific, patent and marketing support of ongoing



scientific research; the ability to summarize the results of research work in the form of scientific publications, to defend their position during the discussion and make professional decisions under conditions of uncertainty and risk;

(CC4) *research*

- the ability to analyze and interpret the realities of modern theory and practice based on the methodology of natural science knowledge, to apply new methods of teaching specialized disciplines in teaching activities; develop new laboratory facilities for workshops, update and deepen the knowledge necessary for scientific and educational activities;

(CC5) *methodological*

- the ability to use educational potential, knowledge and experience acquired during the study of technical disciplines in professional activities and use them to analyze and solve non-standard problem situations; the ability to carry out chemical-technological processes, develop new methods of production and test them under production conditions;

### 3.2 Matrix of correlation of EP learning outcomes in general with modules formed by competencies

|     | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CC1 | +   |     |     |     | +   | +   | +   |     |
| CC2 | +   |     | +   |     | +   |     | +   |     |
| CC3 | +   | +   | +   |     |     | +   | +   |     |
| CC4 | +   | +   | +   | +   |     |     |     | +   |
| CC5 | +   | +   |     |     |     |     |     | +   |

### 4. SUMMARY TABLE REFLECTING THE VOLUME ASSIMILATED CREDITS OF EDUCATION PROGRAM MODULES

| Course of Study | Semester | The number of mastered modules | The number of studied disciplines |    | Number of KZ credits |                   |                   |       |                   | Total hours | Total credits KZ | The number of |             |
|-----------------|----------|--------------------------------|-----------------------------------|----|----------------------|-------------------|-------------------|-------|-------------------|-------------|------------------|---------------|-------------|
|                 |          |                                | HSC                               | EC | Theoretical training | Teaching practice | Research practice | SRWDS | final examination |             |                  | exam          | dif. offset |
| 1               | 1        | 3                              | 3                                 | 3  | 25                   | -                 | -                 | 5     |                   | 900         | 30               | 6             | -           |
|                 | 2        | 2                              | -                                 | -  | -                    | 10                | -                 | 20    | -                 | 900         | 30               | -             | 2           |
| 2               | 3        | 2                              | -                                 | -  | -                    | -                 | 10                | 20    |                   | 900         | 30               | -             | 2           |
|                 | 4        | 1                              | -                                 | -  | -                    | -                 | -                 | 30    |                   | 900         | 30               | -             | 1           |
| 3               | 5        | 1                              | -                                 | -  | -                    | -                 | -                 | 30    | -                 | 900         | 30               | -             | 1           |
|                 | 6        | 1                              | -                                 | -  | -                    | -                 | -                 | 18    | 12                | 900         | 30               | 1             | 2           |
| Total           |          |                                | 3                                 | 3  | 25                   | 10                | 10                | 123   | 12                | 5400        | 180              | 6             | 8           |

## 5. INFORMATION ABOUT THE DISCIPLINES

| Module  | CYCLE | HSC/<br>EC | Component  | Brief course description<br>(30-50 words)   | Number<br>of credits | Codes                         |
|---|-------|------------|--|---|----------------------|-------------------------------|
| Achievements<br>in the field of<br>hydrocarbon<br>processing  | BD    | HSC        | Academic<br>writing  | Reflects the educational content, features of academic texts, reading behavior, writing an introduction, hypotheses and their construction, analyzing data, paragraph and its structure, writing the final part, plagiarism and ways to avoid it. Academic text-written in a complex structure aimed at explaining a specific topic. The main goals and objectives of the scientific review. Review in the system of genres of scientific discourse. Features of editorial revision in a scientific publication | 3                    | LO1, LO2,<br>LO3, LO8         |
|   | BD    | HSC        | Research<br>Methods  | Provides research novelties, a set of methods, techniques and textbooks on pedagogy and pedagogical technologies. Teaches the skills of innovative pedagogical activity, which is the basis for the formation of the competitiveness of any institution in the educational services market and determines the directions of professional growth of teachers.  | 4                    | LO1, LO2,<br>LO3, LO8         |
|   | BD    | EC         | Complex<br>processing of<br>hydrocarbon<br>resources                         | The course forms a deep system knowledge in the field of complex processing of hydrocarbon raw materials, solving scientific and technical problems in the organization of resource-saving industries. It instills the skills of in-depth analysis of scientific information for the purpose of scientific, patent and marketing support for basic research.  | 6                    | LO1, LO3,<br>LO5, LO6         |
|   |       |            | New generation<br>carbon materials   | The course considers the methods of preparation, growth mechanism, technology and physics of the structures of carbon materials of the new generation; promising areas of research in this area. It instills the skills of organizing, planning and implementing the research process in the development of new carbon materials.   |                      | LO1, LO3,<br>LO5, LO6         |
|   | BD    |            | Pedagogical<br>Practice  | The course develops skills in designing teaching materials for conducting training sessions; analysis of domestic and foreign pedagogy and psychology of higher education in order to apply innovations in scientific and pedagogical activity in the context of rapid updating and growth of information flows.  | 10                   | PO1, PO2,<br>PO3, PO8         |
| Scientific bases<br>and methods of<br>research in the<br>field of<br>chemical<br>technology of<br>organic<br>substances | Ch.D  | HSC        | Alternative<br>sources of raw<br>materials for the<br>production of<br>fuels | The course deepens knowledge about alternative sources of raw materials for fuel production. It instills the skills of applying special knowledge for critical analysis, evaluation and synthesis of new complex ideas, search and development of alternative sources of raw materials for fuel production.   | 4                    | LO1, LO3,<br>LO5, LO6         |
|   | Ch.D  | EC         | New materials<br>and processes in<br>the rubber<br>industry                  | Deepen knowledge on new developments in the field of synthetic rubber synthesis; search for new ingredients rubber compounds. It instills the skills of organizing, planning and implementing the research process in the development and use of new rubber compound ingredients for tire manufacturing.  | 4                    | LO1, LO3,<br>LO5, LO6         |
|   |       |            | Innovative<br>principles of<br>creating<br>composite                         | The course deepens the knowledge on the scientific basis of creating composite materials, on the mechanisms of their hardening. It instills the skills of organization, planning and implementation of the research process in the development and application of new composite materials.  |                      | LO1, LO3,<br>LO5, LO6,<br>LO7 |

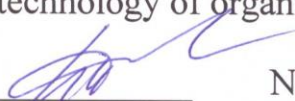
|   |      |    |  |  |            |                              |
|---|------|----|--|--|------------|------------------------------|
|   |      |    | materials                                      |  |            |                              |
|   | Ch.D | EC | Modern hydrogenation processes of oil refining | Forms the skills of analysis and synthesis of the results of numerous studies of chemistry and the mechanism of hydrogenation processes, which play an important role in oil refining and petrochemistry. Instills the skills of organization, planning and implementation of the research process in the development of hydrogenation refining processes. | 4          | LO1, LO3, LO5, LO6, LO7      |
|   |      |    | Multifunctional additives for fuels and oils   | The course deepens the knowledge of the main directions of the synthesis and development of technology of multifunctional additives to oils and fuels. Instills the skills of conducting research on the synthesis and determination of the effectiveness of functional additives on the properties of fuels and oils.                                     |            | LO1, LO3, LO5, LO6           |
|   | Ch.D |    | Research practice                              | It consolidates the practical skills of applying modern methods of scientific research, processing and interpretation of experimental data in the framework of the chosen topic of dissertation research; preparation of scientific publications, registration of applications for the proposed invention.   | 10         | LO1, LO2, LO3, LO4, LO5, LO8 |
| Module of final certification           |      |    | Doctoral Research Scientific Work              | It consolidates the practical skills of applying modern methods of scientific research, processing and interpretation of experimental data; preparation of scientific publications, presentations of a wide audience of research results, preparation and execution of competitive applications for research and design work.                              | 123        | LO1, LO2, LO3, LO4, LO5, LO8 |
|   |      |    | Writing and Defending a Doctoral Thesis        | The course develops skills to transform the knowledge gained into innovative technologies, products of research activities; generalization and systematization of research results in the form of a doctoral dissertation, presentation of the main provisions of the dissertation work to a wide audience.  | 12         | LO1, LO2, LO3, LO5, LO8      |
| <b>Total on the educational program</b> |      |    |  |  | <b>180</b> |                              |

## APPROVAL SHEET

by educational program

8D07170- «Chemical technology of organic substances»

Director of DAI

  
\_\_\_\_\_  
signature

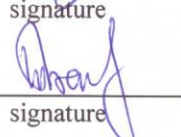
Naukenova A.S.

Director of DAS

  
\_\_\_\_\_  
signature

Nazarbek U.B.

Director of DE&K

  
\_\_\_\_\_  
signature

Bazhirov T.S