

EXPERT OPINION

on the developed Vocational Master's modular education program in specialty 6M072100 "Chemical Technology of Organic Substances" of S. Toraighyrov Pavlodar State University

The educational master program has the following specializations:

- Petroleum and gas processing and
- Environmental protection and life safety in petroleum industry.

The developed educational program is within the State Program of Industrial Innovative Development of Kazakhstan during 2015-2019. The main objectives are to improve the efficiency of the petroleum refining industry, development of a competitive domestic production, innovative techniques complex in field exploration, release of new products in petroleum related sectors of the economy, and modernization of logistics and development of the industrial base of branch institutes.

The term of study for the educational program of profile Magistracy in "Chemical Technology of Organic Substances" is 1.5 years corresponding to 90 ECTS.

The educational program includes general and specific modules that provide the formation of economic, administrative, fundamental research, and applied skills.

These modules provide advanced training in the field of petroleum and gas processing, polymer production and engineering, assessing the level of environmentally safe production, production management, and interdisciplinary field of knowledge.

General and specific competencies that graduates acquire within the specialty "Chemical Technology of Organic Substances" are:

- innovative ability, entrepreneurship, and self-development;
- current state and prospects of petroleum processing development of the Kazakhstan and Pavlodar region;
- knowledge of a foreign language to the extent necessary for professional activities;
- team building and developing a qualification structure of the professional unit by staff management;
- ability to plan and organize the implementation of a production plan, analyze industrial process activities, and maintain control of the implementation of planned industrial targets;
- ability to organize and supervise the industrial activities to ensure environmental safety and occupational health;
- ability to organize innovative activities in the enterprise, to develop and improve production processes of petroleum products in order to improve energy and resource efficiency and quality of products.

- skills to correct use of information resources.
- skills to inspect and verify materials and process quality.
- skills to conduct research in the field of petroleum refining, gas, and polymers.
- skills to communicate expert knowledge on petroleum materials and processes for experts and non-professionals.

Graduates of the Master's program will be able to work in the professional field of the petrochemical and related industry for processes of oil and gas, production of polymers in view of environmental sustainability and life safety by innovative management of the company.

The opening of a new laboratory in "Refining processes and nanotechnology" is scheduled for the development of research competences within the specialty "Chemical Technology of Organic Substances". This laboratory is intended for studies and research work, and includes 95 units of laboratory equipment. The laboratory is to be created at S. Toraighyrov, PSU, under the unified program of reforms in the field of higher and postgraduate education of the Republic of Kazakhstan in the framework of SPIID-2 for the period 2015-2017. The new laboratory is intended for studies and research work on the new educational program "Oil and gas" and "Safety and environmental protection in the petrochemical industry".

The main methods of research planned for use in the study of processes in the petrochemical industry are: gravity, titrimetric, photometric, and chromatography.

The equipment will be purchased from leading world producers, such as "IKA[®]-Werke GmbH & Co", "Agilent Technologies", "Metrohm", "Olympus", "Bruker", "Environment S.A.", to be used in the laboratory "Refining process and nanotechnology".

Important drivers for industrial development is innovative efficiency and sustainability of natural resource use and environment. In view of this, the aim of the master program is to develop necessary knowledge of future specialists in Chemical Technology of Organic Substances. The program should cover three main important aspects; *environmental protection, life safety regulations, and occupational health*. The undersigned has taken part of the planned educational program and enclosed syllabi. After assessing the planned distribution of subjects by semester, the undersigned recommends the following:

- That courses 4.1 Business organization and 4.2 Business administration are joined in to 4.1 Business organization and administration.
- That course 4.3 The organization of quality management system and system of ecological management at the enterprise is renamed to 4.3 Environmental sustainability and corporate social responsibility in petroleum industry.
- That course 14 Bases of chemical and biological safety is renamed to 14 Environmental risk management and occupational health for sustainable petroleum process development.

We suggest to give some of the courses using online platform taught by professors from Lund University. However, this requires further discussion.

We recommend to prepare all course syllabuses including literature and lecture notes before the program starts. This could be moderated with ongoing course programs at Lund University.

We believe that with the above modifications, the structure and content of educational programs of Vocational Master's program on "Chemical Technology of Organic Substances" specialty corresponds to similar Master programs of the corresponding European educational space, and will allow reaching the planned learning outcomes.

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