MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KYIV NATIONAL UNIVERSITY OF TECHNOLOGIES AND DESIGN

EDUCATIONAL PROFESSIONAL PROGRAM
TECHNICAL ELECTROCHEMISTRY
AND ELECTROCHEMICAL POWER ENGINEERING

Level of higher education – second Master's degree

Degree of higher education – Master

Knowledge area – 16 Chemical technology and bioengineering

Specialty – 161 Chemical technologies and engineering

Qualification – Master in Chemical technologies and engineering

Kyiv 2020

1. Profile of the educational - professional program Technical electrochemistry and electrochemical power engineering

1 – General information	
Full names of the higher education institution and structural unit	Kyiv National University of Technologies and Design Department of Electrochemical Energy and Chemistry
Degree of higher education and qualification	Level of higher education - second (master) Degree of higher education - master Knowledge area – 16 Chemical technology and bioengineering Specialty - 161 Chemical technologies and engineering
Diploma and the scope	Master's degree, single, 90 ECTS credits.
Accreditation	Accreditation Certificate of the specialty UD № 11007786 dated January 08, 2019.
Cycle / level	the seventh level according to National Qualifications Framework
Prerequisites	Bachelor degree
Language	Ukrainian
The validity of the study program	July 1, 2025
Web link to the study program description	https://en.knutd.edu.ua/ects/
2 – The purpose of the educational program	
Training the specialists with deep knowledge of theoretical and technical electrochemistry, formation and development of general and professional competencies in the field of electrochemical energy, environmental protection, aimed at obtaining student training at a high world level, as well as key competencies required for self-realization, active citizenship, social harmony and the ability to work in society.	
3 – Characteristics of the educational program	
Subject area	The program is focused on the formation of applicants' for competencies to acquire deep knowledge, skills and abilities in the specialty. Compulsory educational components – 73%, of which: disciplines of general training – 4,5 %, vocational training – 36 %, practical training – 23%, learning a foreign language – 4,5%, diploma design – 32 %. Disciplines of free choice of students – 27% are selected from the university catalog in accordance with the approved procedure at the University.
Program orientation	Educational and professional training for a master's degree.
The main focus of the educational program	Emphasis is placed on the formation and development of professional competencies to solve problems in the field of technical electrochemistry and electrochemical energy, search for alternative electrochemical systems, on active involvement of students in research on basic and applied electrochemical research in chemical sources, development of professional self-improvement, creative thinking.
Study program features	The program provides in-depth theoretical, special practical and research training in electrochemistry, develops prospects for internships and employment in modern enterprises, whose activities are related to the development of alternative energy sources, high-tech coatings for various purposes and nanomaterials, electrochemical control methods. The program is implemented in an active research environment and provides opportunities for the implementation of the international academic mobility program. Certain disciplines are taught in English.

4 – Suitability of graduates for employment and further study		
The employment suitability	Professional activity in the field of chemical engineering. The graduate is suitable for employment in enterprises, organizations and institutions operating in the field of chemical technology and engineering, educational institutions, research and design institutes. The graduates can work in the following positions: chemist, chemist-analyst, research engineer, engineer-technologist (chemical technology), engineer (chemical technology), environmental engineer, engineer-technologist for water purification, assistant.	
Further study	Lifelong learning to improve professional, scientific and other activities. Possibility to continue training according to the educational-scientific program of the third (educational-scientific) level of higher education (doctor of philosophy). Acquisition of additional qualifications in the adult education system.	
5 – Teaching and assessment		
Teaching and learning	Student-centered and problem-oriented learning, research practice and self-study are used. The system of teaching methods is based on the principles of purposefulness, binary - active direct participation of research and teaching staff and higher education. Forms of organization of the educational process: lecture, practical, laboratory classes, practical training, independent work, consultation, development of professional projects.	
Assessment	Exams, tests, project work, presentations, reports, modular and test control.	
6 – Program competencies		
Integral competence (IC)	Ability to solve of the complex tasks and problems of chemical technology and engineering or in the learning process, which involves conducting research and/or innovation under uncertain conditions and requirements.	
General competencies (GC)	GC 1	Ability to generate new ideas (creativity).
	GC 2	Ability to apply knowledge in practical situations.
	GC 3	Ability to search, process and analyse information from various sources.
	GC 4	Ability to evaluate and ensure the quality of work performed
	GC 5	Ability to conduct research at the appropriate level.
Professional competencies (PC)	PC 1	Ability to research, classify and analyse of the quality indicators for chemical products, technological processes and equipment for chemical productions.
	PC 2	Ability to organize and manage chemical-technological processes in the conditions of industrial production and in research laboratories taking into account social, economic and ecological aspects.
	PC 3	Ability to use the R&D results to improve existing and / or develop new technologies and equipment for chemical production.
	PC 4	Ability to use modern special scientific equipment and software in conducting experimental research and development in the field of chemical technology and engineering.
	PC 5	Ability to correctly interpret the results based on a set of modern knowledge of electrochemistry and draw sound conclusions.
	PC 6	Ability to predict the direction of electrochemical research development in the context of the general development of science and technology
	PC 7	Ability to make rational choices of electrochemical research methods and equipment based on functional efficiency and material costs.

7 – Program learning outcomes	
Knowledge and understanding:	
PLO 1	To know and understand the laws of electrochemical processes and features of the functioning of electrochemical systems in order to further improve them.
PLO 2	To know domestic legislation in the field of copyright. Be able to protect their intellectual property and avoid infringements of other people's intellectual property.
PLO3	To know modern research methods of electrochemical systems functioning and to understand their theoretical basis
Application of knowledge and understanding (skills):	
PLO4	Critically comprehend scientific concepts and modern theories of chemical processes and chemical engineering, apply them in research and innovation.
PLO 5	To search for the necessary information regarding chemical technology, processes and equipment for the production of chemicals and materials based on them, to systematize, analyze and evaluate relevant information.
PLO 6	To evaluate the technical and economic characteristics of the results of R&D, technology and equipment of chemical production.
PLO 7	To develop and implement projects in the field of chemical technology and related interdisciplinary projects, taking into account social, economic, environmental and legal aspects.
PLO8	To organize the work and work of collective in the conditions of industrial production, design divisions, research laboratories, to define the purposes and effective ways of their achievement, to motivate and train the personnel.
PLO9	To search for the necessary information in the scientific and technical literature, patents, databases, other sources in relation to chemical technology, processes and equipment for the production of chemicals and materials based on them, systematize, and analyze and evaluate relevant information.
Formation of judgments:	
PLO 10	Communicate fluently in state and foreign languages orally and in writing to present and discuss the results of professional R&D activities, research and projects.
PLO 11	Formulate and evaluate the requirements for the conditions of electrochemical production, taking into account the technological features of environmental measures.
8 - Resource support for program implementation	
Staffing	All scientific and pedagogical workers to ensure the educational and professional program have a qualification that corresponds to the profile and direction of the disciplines taught, have the necessary experience of pedagogical work and experience of practical work. Professionals with experience in research / management / innovation / creative work and / or work in the specialty are involved in the organization of training. This will provide the necessary quality of training for masters in electrochemical energy and chemistry .
Logistics	Logistics allows to fully ensuring the educational process throughout the training cycle in the specialty. Equipment in the educational and scientific laboratory includes the necessary technical support for electrochemical research, equipped with computer and multimedia equipment, applications. Sanitary and technical passports that comply with current regulations certify the condition of the premises.
Information and methodical support	The program is fully equipped with an educational and methodological complex of all educational components, which are presented in the modular system of the educational process of the university.

9 - Academic mobility	
National credit mobility	Provides for the possibility of academic mobility in some educational components that ensure the acquisition of general or professional competencies.
International credit mobility	The program opens up prospects for participation and internships in R&D projects and academic mobility programs abroad. Performed in an active research environment, is a mobile under the program "Double Diploma" with the State University "Lublin Polytechnic" (Poland).
Studying for foreign students	Training the foreign applicants for higher education is carried out according to accredited educational programs.

2. The list of components of the educational-professional program and their logical sequence

2.1 List of components of the educational-professional program of the second (Master's) level of higher education

Cod	Components of the study program (study courses, courses projects (works), practices, qualification work)	Number of credits	Form of control
1	2	3	4
Compulsory components			
General courses cycle			
CC 1	Methodology of modern scientific researches with the basics of intellectual property	3	exam
CC 2	Business Foreign Language (English, German, France)	3	test
	Total for the cycle	6	
Professional courses cycle			
CC 3	Alternative electrochemical systems	12	exam
CC 4	Technologies of electrochemical productions	6	exam
CC 5	Electrochemical protection of the environment	3	exam
CC 6	Modern means of analysis and control of electrochemical processes	3	exam
CC 7	Research practice Pre-diploma practice	15	test
CC 8	Master`s thesis (project)	21	attestation
	The total amount of sample components	**60**	
	The total amount of required components	**66**	
Selective components of the educational program			
SCEP	Disciplines of free choice of the student	**24**	Test
	TOTAL CREDITS	**90**	