SPECIALIST COURSE. LIST OF PROGRAMS.

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Discipline	Description	Years
Fundamental and Applied Chemistry	The core educational program implemented at the LMSU Faculty of Chemistry is aimed at studying the main branches of chemistry along with practical training at the Faculty's general laboratories. The program introduces students to a range of disciplines in the following areas of study: humanities, social sciences and economics, foreign language; physics and mathematics, including practical computing classes and laboratory training, optional courses, including programming for chemistry and selected branches of physics and mathematics; fundamentals of environmental management and biological processes. The program includes special disciplines in accordance with specialization and practical training in scientific laboratories. Specialization course takes 3 academic years to complete. The qualification in Fundamental and Applied Chemistry allows graduates to do research at the interface of different disciplines and take part in international scientific projects. Graduates are well qualified to plan and conduct a scientific investigation, upgrade their skills and knowledge in the field of chemistry and biology, physics, economics. The program prepares students for efficient and successful scientific, teaching and management work in accordance with modern market economy requirements, innovative technologies and approaches.	6
Analytical Chemistry	Specialization in analytical chemistry provides graduates with knowledge of the fundamentals of reactions and processes used in chemical analysis and its metrological basis; with the understanding of principles, potentials and application areas of the main chemical and physical methods of chemical analysis; with the knowledge of the specific features of samples to be analyzed. The graduates master the methods of analysis, separation and concentration, and sample pretreatment and the skills of their application.	6

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Bioorganic Chemistry	Specialization in bioorganic chemistry provides the graduates with knowledge of the protein structure and functioning, of the nucleic acids and small-molecule natural compounds; with the understanding of molecular mechanisms of cellular processes and their regulation. The graduates master the modern methods of isolation, characterization, and modeling of biopolymers; as well as get the knowledge of the fundamental methods of genetic engineering and manipulations with cells.	6
Petrochemistry	Specialization in petrochemistry provides students with the knowledge of oil and gas refining into engine fuel and raw materials for petrochemistry, of the technology of petrochemical synthesis, of the fundamentals of heterogeneous and homogeneous catalysis, of the physical-chemical methods of catalysts study, of the properties and composition of heteroatomic compounds of sulphur.	6
Laser Chemistry	Specialization in laser chemistry provides graduates with the knowledge of the fundamental principles of laser spectroscopy and diagnostics, of laser photochemistry; of the ability to explain function principles and laser device; of the fundamental knowledge in the field of laser interaction with matter. The graduates gat practical work experience with modern laser equipment.	6
Nanobiomaterials and Nanobiotechnologies	Specialization in nanobiomaterials and nanobiotechnology provides graduates with the knowledge of the principles of self-organization of nanomaterials, with the ability to use these principles to design new artificial nanobiomaterials based on peptides, proteins, nucleic acids and lipids, as well as hybrid nanostructures. The graduates get familiar with modern methods used to study nanostructures and nanomaterials, as well as the use of nanomaterials in practice.	6
Organic Chemistry	Specialization in organic chemistry provides the graduates with the vision of strategy and tactics for functional groups of organic molecules modification. The graduates get well qualified in the classification of the organic compounds and their reactivity; they are trained to plan organic synthesis, including stereoselective synthesis, and to use modern catalytic approaches to create complex organic molecules.	6

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Physical Chemistry	Specialization in physical chemistry provides graduates with the skills in thermodynamics as well as its application to chemical reactions and phase transitions, in regularities in chemical reactions kinetics, in the fundamentals of the theory of the structure of matter, in modern calculation programs to determine the properties of compounds and systems on their basis; in up-to-date experimental methods for investigation of physical and chemical characteristics of matter.	6
Colloid Chemistry	Specialization in colloid chemistry provides graduates with the knowledge of the theory of surface phenomena, of the formation and stability of disperse systems, the fundamentals of physicochemical mechanics. The graduates master the methods of determination of free surface energy and adsorption of surfactants, the methods of dispersion analysis and preparation of nanosystems.	6
Polymers	Specialization in polymer science provides the graduates with knowledge of the fundamental principles of polymer synthesis, general concepts in the specificity of their structure, physical-and-mechanical and chemical properties, and their behavior in solution, areas of polymer materials application. The graduates have mastered the skills in modern techniques for synthesis and study of polymers.	6
Medical Chemistry and Advanced Organic Synthesis	Specialization in medicinal chemistry and advanced organic synthesis provides graduates with the knowledge of the fundamentals of drug design and their structure/activity relationship. The graduates get trained to modify structural prototypes to improve their properties and to fulfill complicated schemes of synthesis of potential medicines.	6
Inorganic Chemistry	Specialization in inorganic chemistry provides graduates with the knowledge of the principles of inorganic matter transformation; it introduces the new inorganic substances with prospective properties, along with the principles of their development and production. The graduates master the fundamentals of inorganic synthesis and get well qualified for experimental research.	6

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Radiochemistry	Specialization in radiation chemistry provides graduates with the knowledge of the fundamentals of chemistry and chemical physics in relation to the processes initiated by ionization. The graduates master the methods of research and learn to apply their skills to conventional technologies and nanotechnologies.	6
Solid State Chemistry	Specialization in solid state chemistry provides graduates with the knowledge of the interrelations between electronic and crystal structure of solid compounds with their chemical and physical properties; with the principles and mechanisms of physical and chemical transformations in solid state and on the surface. The graduates master modern methods of synthesis and investigation of structure and physical-chemical properties of solid materials.	6
Electrochemistry	Specialization in electrochemistry provides graduates with experimental techniques to study the structure of interfaces and kinetics of electrode processes and with deep understanding of various models of electrochemical systems and with the fundamental aspects of electrochemical materials science.	6
Fundamental and Applied Enzymology	Specialization in fundamental and applied enzymology provides graduates with the knowledge of the fundamentals in structure and function of enzymes, in enzyme kinetics, in physical chemistry of enzymes and enzyme catalysis, understanding of biocatalytic processes mechanisms; the program develops graduates practical skills in obtaining enzyme preparations, their modification, research and application.	6
Chemical Kinetics	Specialization in chemical kinetics provides graduates with the knowledge of theoretical principles and experimental methods of chemical kinetics as the science of velocities, mechanisms and management of chemical and biochemical processes, as well as it develops the students skills to construct kinetic schemes and to determine mechanisms of various reactions, including photochemical, catalytic, and solid ones.	6

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High-energy Chemistry	Specialization in high-energy chemistry provides graduates with knowledge of the fundamentals of chemistry and chemical physics in relation to the processes initiated by radiation. The graduates master the methods of these processes investigation and application to conventional technologies and nanotechnologies.	6
Chemistry and Technology of Substances and Materials	Specialization in chemistry and technology of substances and materials provides graduates with the knowledge of composition, properties, production techniques and application areas of the main classes of chemical substances and materials; as well it develops the students' practical skills in the comprehensive study of materials; the program provides with the competency in analysis and optimization of technological processes based on the understanding of the life cycle of materials, its safe use and disposal methods.	6
Chemistry of Ionic and Molecular Systems	Specialization in the chemistry of ionic and molecular systems provides graduates with the skills to conduct chemical experiments. The graduates master the fundamentals of synthesis methods of compounds of different chemical nature; they get an understanding of the relationship of their composition, structure, and properties; the knowledge of methods to investigate the structure and properties of ionic and molecular systems.	6