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Study programme "Chemistry and Chemical Technology"

Main attributes

Title	Chemistry and Chemical Technology
Identification code	KMM0
Education classification code	45528
Level and type	Academic Master Study
Higher education study field	Chemistry, Chemical Technologies and Bio-Technology
Head of the study field	Māris Turks
Department responsible	Faculty of Material Science and Applied Chemistry
Head of the study programme	Māris Turks
Professional classification code	
The type of study programme	Full time
Language	Latvian, English
Accreditation	19.04.2023 - 20.04.2029; Accreditation certificate No 2023/17-A
Volume (credit points)	80.0
Duration of studies (years)	Full time studies - 2,0
Degree or/and qualification to be obtained	Master degree of engineering science in chemical technology / –
Qualification level to be obtained	The 7th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF)
Programme prerequisites	Bachelor degree of natural sciences in chemistry, biology, biochemistry, physics, environmental science and environmental management or nature protection, or bachelor degree of engineering science in chemical technology, environmental engineering, medical engineering or food production technology, or bachelor degree of health sciences in pharmacy, or comparable education

Description

Abstract	The study programme is unique in Latvia. The study programme trains specialists in chemistry and chemical technology intending to work in manufacturing and trade companies, quality control and research laboratories, scientific institutions dealing with various chemicals, biotechnology products and materials, e.g.: biomaterials, pharmaceuticals, cosmetics, construction materials, wood processing products, polymer and composite materials, textiles. The curriculum foresees to acquire general knowledge about the management and sustainability of chemical production processes, quality control and material circulation, comprehensive theoretical knowledge and practical skills in the chosen specialization. The study programme provides an opportunity (choice of the student) to specialize in one of the fields: Production technology and environmental aspects, Chemistry and technology of polymer materials, Chemistry and technology of biologically active compounds, Chemistry and technology of biomaterials, Chemistry and technology of inorganic materials, and Sustainable chemistry. It is also possible to develop interdisciplinary knowledge by choosing study courses from several specializations. Along with the theoretical knowledge, the students will also acquire practical skills by completing a practice (working in a company or scientific institute) and master thesis, which is based on experimental work. The graduates will be prepared for both working life and further doctoral studies.
Aim	The aim of the study programme is to educate innovative and highly qualified chemical technology specialists, which are oriented towards the introduction of new technologies and knowledge. The graduates are expected to take leading positions in industry or academia in the following specializations Production technology and environmental aspects, Chemistry and technology of polymer materials, Chemistry and Technology of organic substances, Chemistry and technology of biomaterials, Chemistry and technology of inorganic materials, as well as further doctoral studies.
Tasks	Tasks of the study programme: - ensure competitive master level education in chemical engineering corresponding to EFCE (European Federation of Chemical Engineering) Bologna recommendations, preparing students for jobs in leading positions, to develop scientific research skills and to promote their use; - to provide the students with knowledge and to improve professional skills and abilities in the specialization of choice, by monitoring appropriate progress and study results in each study course and integrating them into research; - to provide students with in-depth knowledge within the chosen specialization of chemical technology, and to enable the students to acquire interdisciplinary knowledge thus developing skills and competencies in accordance with fast-changing labour market requirements; - to develop problem-solving skills (problem identification, goal formulation and plausible solution) by acquiring skills in theoretical study courses, internships and master thesis; - to encourage the interaction between students and academic personnel in order to implement fundamental and applied R&D projects in both industry and academia, and to promote the publishing of the obtained results; - to ensure intellectual development of students and to promote the amplification of their intellectual abilities during theoretical and practical activities; - to develop interest in students about their further professional development, lifelong learning or acquiring doctoral degree.

Learning outcomes	Graduate of the study programme: - demonstrates extended and specialized knowledge and know-how of the contemporary discoveries and development trends in chemistry, chemical technology and the selected specialization; - is familiar with the methods and equipment for the planning, implementation, processing, analysis and interpretation of industrial production and scientific research and understands their nature and areas of application; - is able practically and theoretically to apply the contemporary knowledge and know-how of chemistry, chemical technology and the selected field of specializations in practice; is able to transfer this knowledge to others; - is able to choose, apply, plan and independently use methods and equipment for planning, implementation, processing, analysis and interpretation of results; - is able to formulate, explain, compare, summarize and present the obtained results of scientific research or technological processes to industry specialists and the society; - is able to initiate, administer and develop scientific, innovation, cooperation and production projects in accordance with the project call, market requirements and available resources; is able to critically analyse, integrate, plan and implement the latest technologies and discoveries in research and production processes; - is able to assess, explain and justify the adequacy of planning, implementation and data analysis of the problem to be solved; is able to develop an innovative approach to the complex use of various methods and tools to meet market demand in a competitive environment.
Final/state examination procedure, assessment	The fulfilment of the study programme ends with the state examination, organized as a public defence of master thesis at the meeting of Final Examination Committee (FEC). This includes also examination of theoretical knowledge, scientific background and practical competences essential for the selected specialization. The FEC consists of at least 3 persons, including head of structural unit implementing the study programme. Alternatively, the FEC consists of professor or associated professor approved by the head of the structural unit and at least two scientific degree-holding specialists of the selected field, which can be invited from another structural unit. The FEC is approved by the dean of the faculty. The student's knowledge, skills and competence are evaluated collegially by the FEC in a closed meeting on a 10-grade scale, based on the author's presentation, the quality of answers to questions related to the developed work, the most important fundamental and branch/sub-branch theoretical study courses, and reviewer's notes, as well as considering the evaluation of the supervisor and reviewer.
Description of the future employment	A holder of master degree in chemical engineering implements, organizes and supervises chemical processes by applying and developing necessary methods, equipment and technologies. Such a specialist develops projects of production units, technological lines and automation of processes, elaborates management and monitoring methods of processes, as well as methods of quality control and conformity evaluation of products and materials, sets up measures for occupational safety and environmental protection, assesses production risks and makes responsible decisions. The degree-holder also analyses, evaluates, creates, spreads and implements in practice processes and technologies, as well as methods of quality management and improvement in order to promote technological development of enterprise, to increase effectiveness and quality of operation and to guarantee occupational safety. The graduate can work as engineer or chemist at any enterprise dealing with chemical or biotechnological processes, at research, testing and quality control laboratories, which are engaged in elaboration or quality control of new technologies, materials and products. The graduate can work as a researcher at research institutions and also as a self-employed person or individual businessman.
Special enrollment requirements	English language proficiency equivalent to at least CEFR B2 level.
Opportunity to continue studies	Graduates of the study programme can continue studies in doctoral study programmes.

Courses

No	Code	Name	Credit points
A		**Compulsory Study Courses**	**24.0**
A.1		**Study courses on the current achievements in the field**	**8.0**
1	KTM102	Chemical Industry and Sustainability	8.0
A.2		**Field-Specific Theoretical Basic and IT Study Courses**	**16.0**
		Production technology and environmental aspects	*16.0*
1	KVT734	Contaminated Site Assessment	4.0
2	KVT745	The Control and Automation of Chemical Processes	4.0
3	KVT735	Manufacturing Plant Design	4.0
4	KVT747	Biotechnological Processes and Equipment	4.0
		Chemistry and technology of polymer materials	*16.0*
1	KPI724	Chemistry and Technology of Polymer Materials	4.0
2	KPI734	Polymer Materials Processing	4.0
3	KPI725	Polymers Physical Chemistry	4.0
4	KPI732	Identification and Analysis of Polymer Materials	4.0
		Chemistry and technology of organic substances	*16.0*
1	KOS729	Organic Synthesis	8.0
2	KOS740	The Chemistry and Technology of Pharmaceuticals	4.0
3	KOS728	Organotransition Metal Chemistry	4.0
		Chemistry and technology of biomaterials	*16.0*
1	KVT742	Drug Delivery Systems and Nanotechnologies	5.0
2	KVT746	Cell Biology	3.0
3	KVT738	Biomaterials As Drug Delivery Systems	3.0
4	KVT740	Biocompatibility of Biomaterials	5.0
		Chemistry and technology of inorganic materials	*16.0*
1	KST747	Chemistry and Technology of Traditional and Modern Inorganic Materials	4.0
2	KST738	Chemistry and Physics of Solids	4.0
3	KST753	Chemistry and Technology of Modern Ceramics	4.0
4	KST736	Silicates Chemistry and Physical Chemistry	4.0
B		**Compulsory Elective Study Courses**	**20.0**
B1		**Field-Specific Study Courses**	**16.0**
		Production technology and environmental aspects	*16.0*
1	KVT736	Soil and Groundwater Treatment Technologies	4.0
2	KVT731	Methods for Materials Analysis	4.0
3	KVT729	Water Chemistry and Water Analysis	4.0
4	KVT743	Mass Transfer Processes and Equipment	4.0
		Chemistry and technology of polymer materials	*16.0*
1	KPI722	Chemistry and Technology of Fibre Materials	4.0
2	KPI753	Chemistry and Technology of Wood Materials	4.0
3	KPI733	Chemistry and Technology of Polymer Nanomaterials	4.0
4	KPI738	Technology of Polymer Composites	4.0
5	KPI739	Chemistry and Technology of Soft Matter	4.0
6	KPI740	Ageing of Polymer Materials and Recycling Technologies	4.0
7	KPI723	Chemistry and Chemical Technology of Technical Textile Materials	4.0
		Chemistry and technology of organic substances	*16.0*
1	KOS730	Physical Organic Chemistry	4.0
2	KOS725	Chemistry of Cosmetics	4.0
3	KOS737	Bioorganic Chemistry	2.0
4	KOS738	Selected Chapters of Biochemistry	2.0
5	KOS483	Drug Dosage Forms	2.0
6	KOS603	Patents	2.0
7	KOS732	Heterocyclic Chemistry	4.0
8	KOS731	Medicinal Chemistry	4.0
9	KVK751	Food Chemistry and Methods of Analysis	4.0
10	KVK752	Carbon Oxides Capture, Storage and Conversion	2.0
11	KVK720	Functional Materials and Devices with Light-emitting and Photovoltaic Properties	4.0
		Chemistry and technology of biomaterials	*16.0*
1	KVT744	Tissue Engineering and Regenerative Medicine	3.0
2	KVT730	Research Project - Biomaterials Research and Characterisation	5.0

3	KVT733	Biomaterials for Bone Tissue Regeneration	5.0
4	KVT737	Principles of Cleaner Production	3.0
		Chemistry and technology of inorganic materials	*16.0*
1	KST739	Inorganic Binders and Dry Construction Mixes	4.0
2	KST748	Chemistry of Inorganic Nanomaterials and Chemical Synthesis Methods	4.0
3	KST754	Chemistry and Technology of Building Ceramics	4.0
4	KST749	Nanostructured Thin Films and Sol-Gel Coatings	4.0
5	KST762	Research Project	4.0
B2		**Humanities and Social Sciences Study Courses**	**4.0**
1	HSP485	Communication Psychology	2.0
2	HSP446	Pedagogy	2.0
3	HSP484	Psychology	2.0
4	HSP704	Cognitive and Social Psychology	2.0
C		**Free Elective Study Courses**	**12.0**
D		**Practical Placement**	**4.0**
		Production technology and environmental aspects	*4.0*
1	KVT754	Internship in Chemical Technology of Production and Biomaterials	4.0
		Chemistry and technology of polymer materials	*4.0*
1	KPI755	Internship in Polymer Materials and Composites Technology	4.0
		Chemistry and technology of organic substances	*4.0*
1	KOS739	Internship in Chemical Technology of Organic Compounds	4.0
2	KVK731	Internship in Sustainable Chemistry and Technology	4.0
		Chemistry and technology of biomaterials	*4.0*
1	KVT754	Internship in Chemical Technology of Production and Biomaterials	4.0
		Chemistry and technology of inorganic materials	*4.0*
1	KST761	Internship in Inorganic Materials Technology	4.0
E		**Final Examination**	**20.0**
		Production technology and environmental aspects	*20.0*
1	KVT755	Master Thesis	20.0
		Chemistry and technology of polymer materials	*20.0*
1	KPI754	Master Thesis	20.0
		Chemistry and technology of organic substances	*20.0*
1	KOS002	Master Thesis	20.0
2	KVK002	Master Thesis	20.0
		Chemistry and technology of biomaterials	*20.0*
1	KVT755	Master Thesis	20.0
		Chemistry and technology of inorganic materials	*20.0*
1	KNK002	Master Thesis	20.0