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### Study programme "Chemistry and Chemical Technology"

#### Main attributes

Title	Chemistry and Chemical Technology
Identification code	KBM0
Education classification code	43528
Level and type	Academic Bachelor (First Cycle) Studies
Higher education study field	Chemistry, Chemical Technologies and Bio-Technology
Head of the study field	Māris Turks
Department responsible	Faculty Of Natural Sciences And Tehnology
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)	240.0
Duration of studies (years)	Full time studies - 4,0
Degree or/and qualification to be obtained	Bachelor degree of engineering science in chemical technology
Qualification level to be obtained	The 6th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF)
Programme prerequisites	Secondary education

#### Description

Abstract	<p>The study programme is the only programme in this field in Latvia, as it includes the acquisition of basic theoretical education in chemistry and chemical technology, acquisition of practical skills in teaching and research laboratories, as well as internship in the speciality. The study programme includes specialization in different fields of chemical technology: Production Technology and Environmental Aspects, Chemistry and Technology of Organic Substances, Chemistry and Technology of Biomaterials, Chemistry and Technology of Polymer Materials, Chemistry and Technology of Inorganic Materials, Analytical Chemistry. Simultaneously to theoretical studies during the elaboration of bachelor thesis and within speciality study courses student acquires research methods and technique, as well as can obtain practical skills at enterprises.</p> <p>Study programme trains specialists for enterprises dealing with processing and manufacturing chemistry, biotechnology and pharmaceutical products, food, cosmetics, fuel, wood, ceramics, textile and building materials, as well as specialists for corresponding research and quality control laboratories, research institutions and commercial companies. Knowledge of chemical technology allows graduates to work in companies of different branches, wherever there is a need for engineering specialists who are familiar with chemical processes, are able to ensure their quality, are able to develop new methods and equipment, create, design and implement new, innovative technologies. Such knowledge is necessary to work in testing, quality control and research laboratories of different products and materials. Graduates intended to research are prepared for further studies in master programmes.</p>
Aim	To educate chemical technology specialists with academic knowledge and practical research skills in the fields of chemistry and chemical technology. To prepare graduates for independent work in companies related to the organization and control of chemical processes, quality assurance of materials and products in the field of chemical technology, chemistry and materials science, as well as for further studies in the master study programme.
Tasks	<p>Tasks of the study programme:</p> <ul style="list-style-type: none"> <li>- to ensure competitive bachelor level education in chemical engineering corresponding to EFCE (European Federation of Chemical Engineering) Bologna recommendations;</li> <li>- to provide a scientific base for professional activities, to develop scientific analytical skills and the ability of independent solving of problems, as well as to prepare graduates for further master level studies.</li> </ul>

Learning outcomes	<p>Graduate of the study programme:</p> <ul style="list-style-type: none"> <li>- demonstrates knowledge and understanding of the basic theories and processes of chemistry, chemical technology and the selected specialization;</li> <li>- is familiar with basic methods and equipment for the planning, implementation, result processing, analysis and interpretation of industrial production and scientific research and understands their nature and application areas;</li> <li>- is able to apply practically and theoretically basic theories and processes of chemistry, chemical technology and selected specializations to the practice;</li> <li>- is able to independently use the basic methods and equipment of planning, implementation, processing of results, analysis and interpretation;</li> </ul> <p>able to formulate, compare and summarize the obtained research or production results in instructions, reports and is able to present these results to industry professionals and the general public;</p> <ul style="list-style-type: none"> <li>- is able to independently plan, obtain, structure, analyse and implement the basic theories of chemistry, chemical technology and the selected specialization in research and production processes;</li> <li>- is able to independently select and implement methods for processing, analysis and interpretation of results and determine the suitability of equipment for the problem to be solved.</li> </ul>
Final/state examination procedure, assessment	<p>The fulfilment of the study programme ends with the state examination, organized as a public defence of the bachelor thesis at the meeting of the Final Examination Committee (FEC). This includes also an examination of theoretical knowledge, scientific background and practical competencies essential for the selected specialization. The FEC consists of at least 3 persons, including the head of the structural unit implementing the study programme. Alternatively, the FEC consists of a 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.</p>
Description of the future employment	<p>A holder of a bachelor degree in chemical engineering implements, organizes and supervises chemical processes by applying and developing necessary methods, equipment and technologies. Such specialist designs projects of production units, technological lines and automatization of processes, elaborate 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, appraises production risks and makes responsible decisions; such specialist analyses, evaluates, creates, spreads and implements in practice processes and technologies, as well as methods of quality management and improvement in order to promote the technological development of enterprise, to increase effectiveness and quality of operation and to guarantee occupational safety. Graduate can work as laboratory assistant or technologist at any enterprise dealing with the realization of 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. Graduates can work as self-employed persons or individual businessmen, as well as laboratory assistants or research assistants at research institutions.</p>
Special enrollment requirements	<p>English language proficiency equivalent to at least CEFR B2 level.</p>
Opportunity to continue studies	<p>Graduates of the study programme can continue studies in an academic master study programme.</p>

## Courses

No	Code	Name	Credit points
<b>A</b>		<b>Compulsory Study Courses</b>	<b>174.0</b>
1	DE0124	Mathematics	13.0
2	DE0365	Engineering Mathematics (for chemical engineers)	6.0
3	DA2101	Physics	11.0
4	DA3103	Chemical Safety and the Environment	4.0
5	DA3104	General Chemistry	6.0
6	DA3105	Inorganic Chemistry	13.0
7	DA3106	Analytical Chemistry	6.0
8	DA3107	Methods for Optical Analysis	4.0
9	DA3108	Organic Chemistry	19.0
10	DA3109	Physical Chemistry, Thermodynamics	9.0
11	DA3110	Physical Chemistry, Electrochemistry, Kinetics	11.0
12	DA3111	Chromatography and Mass Spectrometry	5.0
13	DA3112	Nuclear Magnetic Resonance Spectroscopy	3.0
14	DA3113	Information Literacy in Chemistry and Materials Science	3.0
15	DE0364	Introduction to the Programming Language MATLAB	3.0
16	DA3114	Basics of Materials Science	6.0
17	DA3115	Biological Chemistry	3.0
18	DA3116	Unit Operation of Chemical Engineering	18.0
19	BM0301	Fundamentals of Graphics Communication	3.0
20	DA3117	Process Automation and Modeling	6.0
21	DA3118	Chemical Reactors and Reaction Engineering	5.0
22	DA3119	Basics of Chemical Plant Design	6.0
23	DA3120	Unit Operations of Chemical Engineering (Course Project)	3.0
24	SD0003	Innovative Product Development and Entrepreneurship	6.0
25	IV0076	Civil Defence	2.0
<b>B</b>		<b>Compulsory Elective Study Courses</b>	<b>33.0</b>
<b>B1</b>		<b>Field-Specific Study Courses</b>	<b>26.0</b>
		<i>Production technology and environmental aspects</i>	26.0
1	DA3121	Environmental Engineering	9.0
2	DA3122	Design of the Experiments and Experimental Data Processing	3.0
3	DA3123	Heat Exchange Processes and Equipment	4.0
4	DA3124	Mass Transfer Engineering	4.0
5	DA3125	Basics of Biotechnological Processes	5.0
6	DA3126	Basics of Biomaterials	5.0
7	DA3127	Analysis of Food Contaminants	5.0
8	DA3128	Chemistry of Sustainable Environment	5.0
		<i>Chemistry and technology of polymer materials</i>	26.0
1	DA0078	Introduction to Polymer Materials	5.0
2	DA0081	Polymer Chemistry and Physics	5.0
3	DA0079	Fibre Materials	5.0
4	DA0021	Polymer Composite Materials and Technologies	4.0
5	DA3146	Polymer Adhesives	4.0
6	DA0019	Polymer Coatings	4.0
7	DA3147	Polymer 3D Printing and Additive Technologies	5.0
8	DA0154	Advanced Polymer Materials	3.0
9	DA0157	Soft Matter	3.0
10	DA0146	Polymer Additives	3.0
11	DA0022	Colour Science	4.0
		<i>Chemistry and technology of organic substances</i>	26.0
1	DA3129	Electron Flow in Organic Compounds	5.0
2	DA3130	Methods of Organic Synthesis	8.0
3	DA3131	Practicum in Organic Qualitative Analysis	4.0
4	DA3132	Introduction to Stereochemistry	3.0
5	DA3133	Purification and Analysis of Organic Compounds	9.0
6	DA3134	Chemistry and Technology of Advanced Fuels	4.0
7	DA3135	Chemistry of Photonic Organic Compounds	5.0
		<i>Chemistry and technology of biomaterials</i>	26.0

1	DA3126	Basics of Biomaterials	5.0
2	DA3137	Biomaterials Engineering	8.0
3	DA3138	Anatomy and Physiology	4.0
4	DA3139	Methods for Material Analysis	6.0
5	DA3122	Design of the Experiments and Experimental Data Processing	3.0
6	DA3127	Analysis of Food Contaminants	5.0
		<i>Analytical chemistry</i>	<i>26.0</i>
1	DA3127	Analysis of Food Contaminants	5.0
2	DA3140	Analytical Chemistry of Fuels	4.0
3	DA3141	Pharmaceutical Analytical Chemistry	8.0
4	DA3142	Metrology and Quality Control in Chemistry	4.0
5	DA3139	Methods for Material Analysis	6.0
6	DA3143	Biomolecule Analysis Methods	3.0
<b>B2</b>		<b>Humanities and Social Sciences Study Courses</b>	<b>3.0</b>
1	DE0258	Sociology of Management	3.0
2	DE0279	United Europe and Latvia	3.0
3	DE0288	Politology	3.0
4	DE0259	Sociology of Personalities and Small Groups	3.0
5	IV0254	Startup Entrepreneurship	3.0
6	DA0145	History of Chemistry	3.0
<b>B6</b>		<b>Languages</b>	<b>4.0</b>
1	DE0040	The Terminology Minimum in English	4.0
<b>C</b>		<b>Free Elective Study Courses</b>	<b>9.0</b>
<b>D</b>		<b>Practical Placement</b>	<b>9.0</b>
1	DA3102	Internship in Chemistry and Chemical Technology	9.0
<b>E</b>		<b>Final Examination</b>	<b>15.0</b>
1	DA3101	Bachelor Thesis	15.0