

Study programme "Chemical Technology"

Main attributes

Title	Chemical Technology
Identification code	KBL0
Education classification code	43524
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 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	06.07.2016 - 31.12.2023; Accreditation certificate No 2023/17-A
Volume (credit points)	160.0
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	General Secondary Education or 4-year Vocational Secondary Education

Description

Abstract	Study program „Chemical Engineering” is the only program in this field in Latvia. Program envisages basic theoretical education in chemistry and chemical engineering, acquisition of practical skills in teaching and research laboratories, as well as practice in specialty. Program includes specialization in different directions of chemical technology: Biologically active compounds and their dosage forms; Chemistry and technology of biomaterials; Chemistry and technology of polymer materials; Chemistry and technology of silicate materials; Environmental engineering; General chemical technology. Simultaneously to theoretical studies during elaboration of Bachelor thesis and within specialty subjects student acquires research methods and technique, as well as can obtain practical skills at enterprise. Study program 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. Education in chemical engineering let to work in enterprises of different branches, where specialists in engineering sciences - who can manage chemical processes, can ensure quality, are capable to develop new methods and equipment, are able to create, to design and to introduce new innovative technologies - are needed. 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 programs.
Aim	The goal of studies program is to provide a theoretical knowledge, research skills and proficiency in chemistry and chemical engineering, to prepare graduates for independent work at enterprises dealing with organization and control of chemical processes, ensuring quality of materials and products in field of chemical engineering, chemistry and material science.
Tasks	General tasks of studies program: - to ensure competitive bachelor level education in chemical engineering corresponding to EFCE (European Federation of Chemical Engineering) Bologna recommendations; - to provide scientific base for professional activities, to develop scientific analytical skills and ability of independent solving of problems, as well as to prepare graduates for further master level studies.

Learning outcomes	Graduates of program: present essential for chemical engineering basic knowledge in chemistry (general, inorganic, organic, analytical, physical chemistry), chemical technology, mathematics and physics, which are vital to understand, describe and to analyze processes of chemical engineering; conceive basic principles of chemical technology (material and energy balances, chemical equilibrium, heat and mass transfer, rate of chemical reactions); comprehend basic statements of process control and basic principles of measurement of processes and products; demonstrate basic knowledge in occupational safety, health and environmental protection; conceive conception of sustainability and general principles of elaboration of chemical products; are capable to plan, to carry out, to explain and to describe simple experiments; manage to apply knowledge for elaboration of chemical processes and products; are able to design projects within chosen specialty; can manage dangerous chemical substances and realize dangerous processes, considering safety requirements; demonstrate chemical literacy, are able to search, select, analyze and use information independently; are able to apply their knowledge for solution (analytical, numerical, and graphical) of different problems in chemical engineering using general principles of chemical technology; are capable to analyze complex problems within chosen specialty, as well as to calculate and to evaluate expenses of chemical processes and projects; understand the impact of engineering solutions on environment and community; are able efficiently communicate (int. al. in English) and use modern presentation means; are able for single studies and understand necessity of lifelong education; can apply essential and corresponding to field computer programs; are able to work in multidisciplinary team, to adapt in new situations and to make decisions; Upon graduation graduates receive the Bachelor degree of engineering sciences in chemical technology.
Final/state examination procedure, assessment	The assessment system of the study results is based on RTU regulations on the assessment of learning outcomes (protocol No. 539) approved on March 29, 2010. The assessment methods for each subject are defined by the responsible academic staff according to the goals, tasks and applied teaching methods of the corresponding course. The assessment methods are explained to the students at the beginning of the semester. The main assessment methods used by teachers are the following: 1) written or oral examinations during the session; 2) written or oral individual work, which can include a presentation as one of the learning outcomes; 3) project that can be evaluated according to the student's contribution to group work; 4) regular tests during semester; 5) combination of the previously mentioned methods. Assessment of each subject is carried out according to 10 grade scale or in case of the test as pass/fail. Bachelor thesis is also evaluated according to 10 grade scale.
Description of the future employment	Specialist in chemical engineering elaborates corresponding methods, equipment and technologies to appropate, to implement, to organize and to ensure realization and management of chemical processes. Such specialist designs projects of production units, technological lines and automatization 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, appraises production risks and makes responsible decisions; such specialist analyzes, 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. Graduate can work as laboratory assistant or technologist at any enterprise dealing with 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. Graduate can work as self-employed person or individual businessman, as well as laboratory assistant or research assistant at research institutions.
Special enrollment requirements	General or professional secondary education.
Opportunity to continue studies	Graduates of study program can continue studies in academic master's study programs „Chemistry”, „Chemical Engineering”, „Materials Science” and „Nanotechnologies of Materials” or in another related RTU study program. If academic bachelor's study program „Chemical Engineering” (KBL0) will be cut off, RTU will provide opportunity to continue studies in academic bachelor's study programs „Chemistry” (code KBK0) or „Materials Science” (code WBW0).

Courses

No	Code	Name	Credit points
A		Compulsory Study Courses	124.0
1	ΚVK113	General chemistry (advanced course)	10.0
2	MFA107	Physics	8.0
3	DDM101	Mathematics	9.0
4	ΚVT106	Introduction to Chemical Engineering	2.0
5	SDD701	Innovative Product Development and Entrepreneurship	4.0
6	ΚPI103	Basics of Materials Science	2.0
7	DIM206	Engineering Mathematics (for chemical engineers)	4.0
8	ΚNF202	Analytical Chemistry (basic course)	4.0
9	ΚΟΚ221	Organic Chemistry (basic course)	5.0
10	ΚNF201	Inorganic Chemistry (basic course)	5.0
11	ΚNF285	Physical Chemistry (basic course)	6.0
12	ΚΟΚ222	Organic Chemistry (special course)	6.0
13	ΚNF293	Inorganic Chemistry (advanced)	4.0
14	ΚNF301	Physical Chemistry (advanced course)	6.0
15	ΚVK360	Chromatography	2.0
16	ΚNF300	Analytical Chemistry (Instrumental methods)	2.0
17	ΚVT310	Chemical Reaction Engineering	3.0
18	ΚΟΣ311	Management of Chemicals	2.0
19	ΚΟΚ315	Nuclear Magnetic Resonance Spectroscopy	3.0
20	ΚVT312	Chemical Process Modeling	3.0
21	ΚΤF302	Chemistry Informatics	2.0
22	ΚVK410	UV-visible, near- and far-infrared spectroscopy	4.0
23	ΚST411	Physical Methods of Investigation of Materials	2.0
24	ΚST305	Crystallography	2.0
25	ΚΟΣ702	Biological Chemistry	2.0
26	ΚΟΣ715	Chemistry and Technology of Biologically Active Compounds	2.0
27	ΚVT723	Fluid Flow, Heat and Mass Transfer	5.0
28	ΚVT724	Unit Operation of Chemical Engineering	6.0
29	ΚPI714	Chemistry and Technology of Polymer Materials	2.0
30	ΚST717	Chemistry and Technology of Silicate Materials	2.0
31	ΚVK722	Environmental Chemistry and Technology	2.0
32	ICA301	Civil Defence	1.0
33	BTG701	Fundamentals of Graphics Communication	2.0
B		Compulsory Elective Study Courses	18.0
B1		Field-Specific Study Courses	13.0
1	ΚST562	Bioceramics and Technology	3.0
2	ΚST561	Basis of Biomaterial Technology	3.0
3	ΚPI319	Natural and Special Purpose Polymer Materials	3.0
4	ΚVT725	Design of Experiments and Analysis of Results at Chemical Engineering	2.0
5	ΚΟΣ300	Electron Flow in Organic Compounds	3.0
6	ΚΟΚ304	Quantum Chemistry	2.0
7	ΚNF302	Colloidal Chemistry	2.0
8	ΚST502	Biological Harmony and Bioactivity of Materials	3.0
9	ΚΟΣ481	Methods of Organic Synthesis	3.0
10	ΚΟΣ720	Practicum in Organic Qualitative Analysis	3.0
11	ΚPI421	Physics and Chemistry of Polymers	5.0
12	ΚVT455	Heat Transfer Processes and Equipment	3.0
13	ΚVT706	Fundamentals of Technological Design of Chemical Engineering	3.0
14	ΚVT402	Environmental Engineering	8.0
15	ΚST495	General Silicate Technology	3.0
16	ΚΟΣ430	Chemistry Experiments and Demonstrations	2.0
17	ΚPI307	Fibre Materials	3.0
18	ΚΟΣ704	Purification and Analysis of Organic Compounds	5.0
19	ΚVT708	Functional Application of Biomaterials in Medicine	2.0
20	ΚΟΣ703	Technologies for obtaining biologically active substances	2.0
21	ΚVT712	Mass Transfer in Liquid-solid System	2.0
22	ΚVT714	Mass Transfer Engineering	5.0

23	QVT713	Mass Transfer Engineering	3.0
24	QST558	Mineralogy	2.0
25	QPI712	Soft Matter Materials	2.0
26	QST472	Inorganic Binding Materials	2.0
27	QPI504	Perspective Polymer Materials	2.0
28	QPI202	Polymer Materials	3.0
29	QST719	Experimental Investigation Methods of Silicate Materials	3.0
30	QST720	Chemical Analysis of Silicate Materials	3.0
31	QPI302	Interface and Boundary Processes	3.0
32	QST718	Ceramic Chemistry and Technology	2.0
33	QVT707	Environmental biotechnology	2.0
34	QVT784	Analysis of Food Contaminants	3.0
B2		Humanities and Social Sciences Study Courses	5.0
1	HSP375	Sociology of Management	2.0
2	HSP376	Sociology of Personalities and Small Groups	2.0
3	HSP377	General Sociology	2.0
4	HSP379	Political System of Latvia	2.0
5	HSP380	United Europe and Latvia	2.0
6	HVD261	Elementary Course in English	3.0
7	HVD153	The Terminology Minimum in English	3.0
C		Free Elective Study Courses	4.0
D		Practical Placement	4.0
1	QOS711	Practical placement in speciality	4.0
2	QVK711	Practice in Specialty	4.0
3	QVT711	Practical Placement in Speciality	4.0
4	QST715	Practical placement in speciality	4.0
5	QPI711	Practice in Speciality	4.0
E		Final Examination	10.0
1	QVK001	Bachelor Thesis	10.0
2	QST001	Bachelor Thesis	10.0
3	QVT001	Bachelor Thesis	10.0
4	QOK001	Bachelor Thesis	10.0
5	QOS001	Bachelor Thesis	10.0
6	MFB001	Bachelor Thesis	10.0
7	QPK001	Bachelor Thesis	10.0
8	QNK001	Bachelor Thesis	10.0