RĪGAS TEHNISKĀ UNIVERSITĀTE

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Study programme "Chemical Technology"

Main attributes

Title	Chemical Technology
Identification code	KML0
Education classification code	45524
Level and type	Academic Master (Second 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
Accreditation	06.07.2016 - 31.12.2023; Accreditation certificate No 2020/42
Volume (credit points)	80.0
Duration of studies (years)	Full time studies - 2,0
Degree or/and qualification to be obtained	Master 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 in Chemistry, Chemical Engineering or Materials Science

Description

Abstract	Study program „Chemical Engineering" is the only program in this field in Latvia. Program envisages training of chemical engineering 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. Studies include typical education of this branch: management and automation of chemical processes, design of production units, computer modeling, chemometry, molecular spectroscopy, crystallography and crystallochemistry, ageing and protection of materials, chemistry and technology of polymer and silicate materials, fuels and lubricants, pharmaceutical compounds and environmental protection. Depending from student's choice he/she can specialize in one of directions: 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 Master thesis and within specialty subjects student acquires research methods and technique, as well as can obtain practical skills at enterprise. Education in chemical engineering let to work in enterprises of different branches, where leading 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 doctoral programs.
Aim	Training of students for independent work at leading position in enterprises, affiliated with organization and control of chemical processes, ensuring of quality of materials and products, research activities in chemical engineering, chemistry and material sciences, as well as for further studies in doctoral program.
Tasks	General tasks of study program: - to ensure competitive master level education in chemical engineering corresponding to EFCE (European Federation of Chemical Engineering) Bologna recommendations; - to train students for practical work at responsible and leading job positions: to provide advanced knowledge in chemical engineering and to offer broad range possibilities for specialization, to form skills and to develop competencies corresponding to labour market requirements; - to ensure the development and necessary changes in content of study program, studies process and research work taking into account new tendencies in chemical engineering, international praxis, scientific and didactics' praxis; - to encourage students' interest about further professional development, improvement of academic knowledge and studies in doctoral program, to improve and to promote use of research skills; - to rise students' interest about social processes, to stimulate formation of positive, modern, responsible, ethical and active personalities, which are able to act and to make decisions independently; - to ensure link between research carried out by academic staff and students and solution of real technological, quality control and environmental protection problems at different enterprises and institutions; to promote international mobility and participation in projects.

Learning outcomes	Graduate receives Master degree of engineering sciences in chemical engineering. Graduate has advanced knowledge in chemical engineering and chemistry, is specialized in one of six directions of chemical engineering provided by study program – this makes possible to carry out research and to act professionally and socially with responsibility. Graduate superintends the recent advantages in field, is able to scientifically analyze and to solve problems even when starting information is incomplete or unusually formulated, can identify and formulate complex problems of modern direction, is able to apply innovative methods for problem solving. On the ground of general principles graduate can work out conceptions and solutions of interdisciplinary problems, is able to elaborate new methods, to develop processes, to create new products and to construct necessary equipment. Graduate can find engineering solutions in case of complex problems as well as in case when only insufficient, doubtful starting information is available. Graduate can guarantee resolving of real engineering problems using scientific approach, he/she has necessary information literacy, is able to plan and to carry out theoretical and experimental research independently, is able to evaluate data critically and to make conclusions, by objective considerations is able to appraise potentialities of application of new, modern technologies and knows how to use it. Graduate can methodologically apply knowledge in different fields and to make respective conclusions, can quickly and systematically orientate in new tasks, comprehends consequence of his/her action, is able to apply different methods for problem solving, can fruitfully work in a team of people of various level of knowledge and skills, can efficiently work and communicate at national and international level.
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. Assessment of each subject is carried out according to10 grade scale or in case of the test as pass/fail. The fulfillment of program ends with the state examination, organized as public defense of Master thesis at the meeting of final examination committee, which includes simultaneous examination of theoretical knowledge in fundamental and scientific or practical competences essential for branch. The final examination committee consists from at least 3 persons, including head of structural unit realizing study program or chosen by him professor or associated professor from the same structural unit and at least two branch specialists with scientific degree, which might be invited from another structural unit. Members of committee are affirmed by dean of Faculty. Knowledge, skills and competences of student are evaluated by committee members in closed meeting within 10 grade scale taking into account author's presentation, quality of answers to questions both about thesis and regarding the main fundamental and theoretical subjects of branch, as well as taking into consideration peer's notes and assessment of thesis given by supervisor and peer.
Description of the future employment	Specialist in chemical engineering elaborates corresponding methods, equipment and technologies to approbate, to implement, to organize and to ensure realization and management of chemical processes. Such specialist designs 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, 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 engineer 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 researcher at research institutions.
Special enrollment requirements	Previous education: completed academic bachelor studies in chemistry, chemical engineering or material science.
Opportunity to continue studies	Graduates of master program can continue studies in doctoral study programs „Chemistry", „Chemical Engineering", „Materials Science". If academic master's study program „Chemical Engineering" (KML0) will be cut off, RTU will provide opportunity to continue studies in academic master's study programs „Chemistry" (code KMK0), „Materials Science" (code WMW0) or "Nanotechnologies of Materials" (code WMN0).

Courses

No	Code	Name	Credit points
A		**Compulsory Study Courses**	**25.0**
1	KPI420	Material Ageing and Protection	2.0
2	IDA700	Basics of Labour Protection	1.0
3	KVK502	Molecular Spectroscopy	3.0
4	KVT407	Chemical Processes Control and Automation	3.0
5	KST559	Crystallography and Crystal Chemistry	2.0
6	KVK511	Chemometrics	3.0
7	KVT420	Design of Production Unit	6.0
8	KVT416	Computer Aided Modeling	2.0
9	KVK501	Chemistry and Technology of Fuels and Lubricants	3.0
B		**Compulsory Elective Study Courses**	**30.0**
B1		**Field-Specific Study Courses**	**26.0**
		Biologically active compounds and their dosage forms	*26.0*
1	KOS505	The Chemistry and Technology of Medicinal Substances (selected chapters)	2.0
2	KOS410	Special Chapters of Biochemistry	2.0
3	KOS501	The Chemistry and Technology of Pharmaceuticals	4.0
4	KOS482	Medicinal Chemistry	2.0
5	KOS718	Selected Chapters of Organic Synthesis	7.0
6	KOS542	Structure of Organic Compounds and their Biological Activity	2.0
7	KOS483	Drug Dosage Forms	2.0
8	KOS716	Chemistry of Pharmaceutical Compounds	3.0
9	KOS713	Bioorganic Chemistry	2.0
10	KOS551	Organic Chemistry of Transition Metals	2.0
11	KOS732	Heterocyclic Chemistry	4.0
		Chemistry and technology of biomaterials	*26.0*
1	KST537	Tests of Biomaterials in Vivo	2.0
2	KPK537	Biopolymers and Technology	2.0
3	KVT719	Basics of Biotechnological Processes	3.0
4	KVT718	Methods of Solids Analysis	4.0
5	KVT720	Functional Medical Implants	3.0
6	KST534	Implant Coatings and Technology	2.0
7	KVT421	Principles of Cleaner Production	3.0
8	KVT571	Contaminated Site Assessment	4.0
9	KVT703	Drug Delivery Systems and Nanomedicine	3.0
10	KVT738	Biomaterials As Drug Delivery Systems	3.0
11	KVT730	Research Project - Biomaterials Research and Characterisation	5.0
		Chemistry and technology of polymer materials	*26.0*
1	KPI423	Polymer Materials Processing	5.0
2	KPI503	Ageing of Polymer Materials	2.0
3	KPI424	Polymer Coatings	3.0
4	KPI426	Fibre Materials	3.0
5	KPI433	Finishing of Fibre Materials	2.0
6	KPI324	Colour Science	2.0
7	KPI707	Advanced Polymer Materials	3.0
8	KPI435	Pigments and Dyes	3.0
9	KPI510	Technology of Polymer Composites	3.0
10	KPI508	Chemistry and Physical Chemistry of Polymers	6.0
11	KPI422	Technology of Polymer Materials	5.0
12	KPI724	Chemistry and Technology of Polymer Materials	4.0
13	KPI734	Polymer Materials Processing	4.0
14	KPI722	Chemistry and Technology of Fibre Materials	4.0
		Chemistry and technology of silicate materials	*26.0*
1	KST440	Chemical Technology of Plasma	3.0
2	KST555	Chemistry and Technology of Binders	3.0
3	KST455	Sol - Gel Technology	3.0
4	KST521	Problems of Long Life of Silicate and High-temperature Materials	4.0
5	KST721	Chemistry and Physical Chemistry of Silicates	3.0
6	KST552	Chemistry and Technology of Building Ceramics	3.0

7	KVT719	Basics of Biotechnological Processes	3.0
8	KST410	Chemistry and Physics of Solids	2.0
9	KST475	Chemistry of High Performance Glasses and Ceramics	3.0
10	KST725	Chemistry of Oxide Nanomaterials	3.0
11	KST553	Chemistry and Technology of Fine Ceramics	3.0
12	KST554	Chemistry and Technology of Glass	3.0
13	KST726	Glass Coatings	2.0
14	KST738	Chemistry and Physics of Solids	4.0
15	KST736	Silicates Chemistry and Physical Chemistry	4.0
16	KST762	Research Project	4.0
		Environmental engineering	*26.0*
1	KVT421	Principles of Cleaner Production	3.0
2	KVT511	Environment Managament	3.0
3	KVT571	Contaminated Site Assessment	4.0
4	KVT718	Methods of Solids Analysis	4.0
5	KVT508	Soil Treatment Technologies	2.0
6	KVT507	Groundwater Treatment Technologies	2.0
7	KVT557	Technological Processes Control	5.0
8	KVT421	Principles of Cleaner Production	3.0
		General chemical technology	*26.0*
1	KVT530	Special Processes and Equipment	3.0
2	KVT504	Process Simulation	2.0
3	KVT503	Statistical Processes Control	2.0
4	KVT557	Technological Processes Control	5.0
5	KVT421	Principles of Cleaner Production	3.0
6	KVT719	Basics of Biotechnological Processes	3.0
7	KVT718	Methods of Solids Analysis	4.0
8	KVT510	Water Treatment	2.0
9	KVT571	Contaminated Site Assessment	4.0
B2		**Humanities and Social Sciences Study Courses**	**4.0**
1	HFL433	Presentation Skills	2.0
2	HSP446	Pedagogy	2.0
3	HSP375	Sociology of Management	2.0
4	HSP484	Psychology	2.0
5	HFL438	European Classical Philosophy	2.0
C		**Free Elective Study Courses**	**5.0**
E		**Final Examination**	**20.0**
1	KVT002	Master Thesis	20.0
2	KST002	Master Thesis	20.0
3	KOS002	Master Thesis	20.0
4	KVK002	Master Thesis	20.0
5	KOK002	Master Thesis	20.0
6	KPK002	Master Thesis	20.0
7	MFB002	Master Thesis	20.0
8	KNK002	Master Thesis	20.0