

**UNIVERSITY OF MARIBOR  
FACULTY OF CHEMISTRY AND CHEMICAL ENGINEERING**

**INFORMATION PACKAGE /  
INTERNATIONAL EXCHANGE STUDENTS' GUIDE  
2016/2017**

**Part II**

Information on study programmes

A) General description

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# FACULTY OF CHEMISTRY AND CHEMICAL ENGINEERING

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## 1. QUALIFICATION AWARDED

In the academic year 2016/2017, the Faculty of Chemistry and Chemical Engineering offers study programmes at the first (Bachelor), second (Masters) and third (Doctorate) cycle.

### 1.1. First Cycle Degrees

#### **Bachelor's university degree programme Chemical Technology**

Qualification awarded: diplomirani/a inženir/ka kemijske tehnologije (UN)  
(Bachelor's Degree in Chemical Technology)

Duration of studies: 3 years

#### **Bachelor's university degree programme Chemistry**

Qualification awarded: diplomirani/a kemik/kemičarka (UN)  
(Bachelor's Degree in Chemistry)

Duration of studies: 3 years

#### **Higher professional programme Chemical Technology**

Qualification awarded: diplomirani/a inženir/ka kemijske tehnologije (VS)  
(Higher Professional Degree in Chemical Technology)

Duration of studies: 3 years

## 1.2. Second Cycle Degrees

### Master's programme Chemical Engineering

Qualification awarded:	magister inženir kemijske tehnike, magistrica inženirka kemijske tehnike (Master's Degree in Chemical Engineering)
Options:	Chemical Engineering Biochemical Engineering
Duration of studies:	2 years

### Master's programme Chemistry

Qualification awarded:	magister/magistrica kemije (Master's Degree in Chemistry)
Duration of studies:	2 years

## 1.3. Third Cycle Degree

Doctoral programme Chemistry and Chemical Engineering

Qualification awarded:	doctor/doktorica znanosti (PhD in Science)
Duration of studies:	3 years

## 2. ADMISSION REQUIREMENTS

**Bachelor's university programme Chemical Technology** and  
**Bachelor's university programme Chemistry** admits candidates who have successfully completed:

- a secondary education programme with matura examination or
- vocational matura examination with an additional examination (mathematics or foreign language) or
- any four-year secondary education programme before 1. 6. 1995.

In case of enrolment limitations, applicants in options a) and c) are registered according:

- grade point average (GPA) on the matura or vocational matura examination (60 % of the points),
- overall GPA in the third and fourth year of secondary school (40 % of the points).

In case of enrolment limitations, applicants in option b) are registered according:

- GPA on the vocational matura examination (40 % of the points) ,
- overall GPA in the third and fourth year of secondary school (40 % of the points).
- GPA on additional examination (20 % of the points).

**Higher professional programme Chemical Technology** registers candidates who have successfully completed a final examination in any four-year secondary education programme, or vocational matura examination, or matura examination. In case of enrolment limitations, applicants are registered according to their grade point average (GPA) on the final examination, or vocational matura examination, or matura examination (60 % of the points) and their overall GPA in the third and fourth year of secondary school (40 % of the points).

**Master's programme Chemical Engineering** admits graduates who have successfully completed:

- the appropriate first cycle study programme in chemistry, chemical technology, chemical engineering, process engineering, biochemical engineering, educational chemistry,
- the first cycle study programme in any other natural or technical sciences not mentioned above. Before admission, student has to pass successfully the exams in the amount of 47 ECTS, that are essential for continuing the studies: General Chemistry, Inorganic Chemistry, Organic Chemistry I and II, Physical Chemistry I, Heat Transfer, Mass Transfer, Separation Processes II and Chemical Reaction Engineering I,
- higher professional programme, accepted before June 11, 2004, in chemistry, chemical technology, chemical engineering, process engineering, biochemical engineering,
- higher professional programme, accepted before June 11, 2004, in other natural or technical sciences not mentioned above. Before admission, student has to pass successfully the exams in the amount of 47 ECTS, that are essential for continuing the studies: General Chemistry, Inorganic Chemistry, Organic Chemistry I and II, Physical Chemistry I and II, Heat Transfer, Mass Transfer, Separation Processes II and Chemical Reaction Engineering I.

In case of enrolment limitations, applicants are registered according to their grade on Diploma Thesis (20 %), their overall GPA of the first cycle (50 %), and the average grade of the subjects Mathematics III and Chemical Reaction Engineering I at the first cycle (30 %).

**Master's programme Chemistry** admits graduates who have successfully completed:

- the appropriate first cycle study programme in chemistry, chemical technology and educational chemistry,
- the first cycle study programme in other natural sciences not mentioned above. Before admission, student has to pass successfully the exams in the amount of 45 ECTS, that are essential for continuing the studies: General Chemistry, Inorganic Chemistry, Organic Chemistry I and II, Analytical Chemistry I and II, Physical Chemistry I,
- higher professional programme, accepted before June 11, 2004, in chemistry, chemical technology, chemical engineering, process engineering, biochemical engineering,
- higher professional programme, accepted before June 11, 2004, in other natural or technical sciences not mentioned above. Before admission, student has to pass successfully the exams in the amount of 45 ECTS, that are essential for continuing the studies: General Chemistry, Inorganic Chemistry, Organic Chemistry I and II, Analytical Chemistry I and II, Physical Chemistry I.

In case of enrolment limitations, applicants are registered according to their grade on Diploma Thesis (20 %), their overall GPA of the first cycle (50 %), and the average grade of the subjects Mathematics III and Organic Synthesis at the first cycle (30 %).

**PhD programme Chemistry and Chemical Engineering** admits graduates who have successfully completed:

- any second cycle study programme.
- any university programme, accepted before June 11, 2004
- higher professional programme, accepted before June 11, 2004, together with specialization. Before admission, student has to pass study requirements in the amount of 30 ECTS, that are essential for continuing the studies and are prescribed by the Committee for Education of Faculty of Chemistry and Chemical Engineering on the basis of mentor suggestion.
- national or foreign study programme which educates for the occupation in according with EU directives or any other Master's programme (also from the fields different from Chemistry and Chemical Engineering) evaluated by 300 ECTS.

According to the admission rules student can pass to the second year of the PhD programme Chemistry and Chemical Engineering if he/she successfully completed:

- Masters's programme, accepted before June 11, 2004, and at registration 60 ECTS are acknowledged.
- University programme, accepted before June, 11, 2004 together with specialization and at registration 60 ECTS are acknowledged.

Further information on admission requirements for candidates not mentioned above can be obtained at the Faculty of Chemistry and Chemical Engineering.

### 3. EDUCATIONAL GOALS

**Study programmes at the Faculty of Chemistry and Chemical Engineering** strive to prepare their graduates to:

- productive, gainful, and ethical career in chemical, biochemical and related industries and organizations,
- utilize knowledge and advanced engineering tools, methods and techniques for research and development of (bio)chemical products and processes,
- develop the abilities for lifelong learning and development of their knowledge,
- develop the ability to pass the acquired knowledge to others,
- gain communication and management skills.

The specific goals of **Bachelor's university programme Chemical Technology** are to:

- provide students with the basic skills, knowledge and insight in the field of chemical engineering,
- train students to structurally identify a problem, apply holistic problem-solving skills based on fundamental analysis techniques and methodologies and develop scientific solutions.

The specific goals of **Bachelor's university programme Chemistry** are to provide:

- generic skills (communication, problem-solving and calculation skills in chemistry),
- chemistry related cognitive skills (demonstrate knowledge, concepts, principles and theories and applying of knowledge – evaluation, interpretation, presentation and synthesis of chemical information),
- chemistry related practical skills (laboratory work, chemical properties, chemical hazards, instrumentation, synthetic work, measurements, documentation and observations).

The specific goals of **Higher professional programme Chemical Technology** are to:

- provide students with the basic skills and knowledge in the field of chemical technology and chemistry,
- develop the abilities for applicative technological solutions.

The specific goals of **Master's programme Chemical Engineering** are to:

- provide students with the advanced skills, knowledge and insight in the field of chemical and biochemical engineering,
- train students to solve fundamental research problems of chemical and biochemical engineering, and to accomplish process and product design by taking into account safety, environmental aspects and sustainability.

The specific goals of **Master's programme Chemistry** are to:

- provide students with the understanding and ability of establishing the connections between the structure of the compounds and their reactivity,

- train students to be able to manage and lead the research departments in all areas of chemistry and chemistry related fields,
- give students the skills to resolve complex chemical problems which need the skills of team work.

The specific goals of **Doctoral programme Chemistry and Chemical Engineering** are to:

- provide students with advanced experience in developing new knowledge, concepts, methods and tools regarding theoretical background and applications in chemistry and (bio)chemical engineering,
- gain research methodology and skills for independent solving problems related to the following topics in depth: Chemical Engineering, Biochemical Engineering, Chemistry and Chemometrics, Materials in Chemistry, Chemical Environmental Protection and Sustainable Development,
- acquire the ability of leading, managing and safe performing of research and scientific work,
- gain the ability of original innovating,
- gain the ability of independent solving of complex problems.

#### 4. ACCESS TO FURTHER STUDIES

##### **Bachelor's university programme Chemical Technology**

##### **Bachelor's university programme Chemistry**

##### **Higher professional programme Chemical Technology**

Graduates who have successfully completed the first cycle university study programmes Chemical Technology or Chemistry, or Higher professional programme Chemical Technology can directly continue their studies at the second cycle programmes leading to Master's degree in Chemical Engineering or Master's degree in Chemistry.

##### **Master's programme Chemical Engineering**

##### **Master's programme Chemistry**

Graduates who have successfully completed the second cycle Master's study programmes Chemical Engineering or Chemistry (or any other study programme) can directly continue their studies at the third cycle programme leading to PhD degree in Chemistry and Chemical Engineering.

##### **PhD programme Chemistry and Chemical Engineering**

The formal education ends with the defence of the PhD thesis. Doctors of science by constant familiarising with professional and scientific literature and acquiring of new knowledge strive towards the lifelong learning and development of their knowledge and abilities. They can enlist in postdoctoral studies at top universities and research institutions in Slovenia and abroad.

#### 5. COURSE STRUCTURE DIAGRAM WITH CREDITS

Complete curricula of the first, second and third cycles study programmes are given in the following pages. Descriptions of individual course units are collected in Part Two-B. Please note that the lists of the elective courses may be modified; those elective courses with insufficient enrolment of students may not be offered. The abbreviations in the curriculum have the following meaning:

- L - Lectures
- S - Seminar
- P - Practical
- C - Compulsory course
- E - Elective course
- O - Obligatory course
- IRW - Individual Research Work

## 5.1. Bachelor's university programme Chemical Technology

YEAR 1						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Mathematics I	45	30		75	165	8
General Chemistry	45	15	60	120	120	8
Physics I	45	15		60	90	5
Computer Science in Chemistry	45		30	75	75	5
Elements of Process Equipment	30	30		60	60	4
						<b>30</b>
<b>Summer</b>						
Mathematics II	45	30		75	165	8
Inorganic Chemistry	45	15		60	60	4
Analytical Chemistry I	45		60	105	135	8
Physics II	45	15	30	90	90	6
Process Balances	30		30	60	60	4
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Mathematics III	45	30		75	105	6
Physical Chemistry I	60			60	60	4
Organic Chemistry I	45			45	75	4
Heat Transfer	45		30	75	75	5
Analytical Chemistry II	45		30	75	105	6
Mass Transfer	45		30	75	75	5
						<b>30</b>
<b>Summer</b>						
Separation Processes I	30		30	60	120	6
Organic Chemistry II	45		60	105	165	9
Physical Chemistry Experimental Course			45	45	45	3
Materials Engineering	45		30	75	105	6
Elective Course I	15		15	30	120	6
						<b>30</b>

Elective Courses of Year 2 (Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Organic Technology (Summer)	15		15	30	120	6
Physical Chemistry II (Summer)	15		15	30	120	6



YEAR 3						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Thermodynamics	45		30	75	105	6
Chemical Reaction Engineering I	45		30	75	105	6
Separation Processes II	45		30	75	75	5
Biochemical Technology – Biotechnology	30		30	60	90	5
Process Dynamics	45		30	75	75	5
Fundamentals of Economics and Entrepreneurship	30	15		45	45	3
						<b>30</b>
<b>Summer</b>						
Process Optimization	45		30	75	75	5
Elective Course II	15		15	30	120	5
Elective Course III	15		15	30	120	5
Elective Course IV	15		15	30	120	5
Bachelor's Thesis		10		10	290	10
						<b>30</b>

Elective Courses of Year 3 (Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Energy Management (Summer)	15		15	30	120	5
Computer Aided Process Design (Summer)	15		15	30	120	5
Water Technology (Summer)	15		15	30	120	5
Inorganic Technology (Summer)	15		15	30	120	5
Coatings Technology (Summer)	15		15	30	120	5
Food Technology (Summer)	15		15	30	120	5
Organic Technology (Summer)	15		15	30	120	5
Environmental Technology (Summer)	15		15	30	120	5
Fundamentals of membrane transport (Summer)	15		15	30	120	5
Biotechnology (Summer)	15		15	30	120	5
Biochemistry and Molecular Biology (Summer)	15		15	30	120	5
Biochemistry and Microbiology (Summer)	15		15	30	120	5
Bioinformatics and Genomics (Summer)	15		15	30	120	5
Polymers (Summer)	15		15	30	120	5
Industrial Project (Summer)					150	5

## 5.2. Bachelor's university programme Chemistry

YEAR 1						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Mathematics I	45	30		75	165	8
General Chemistry	60	45	60	165	195	12
Physics I	45	15		60	90	5
Computer in Chemistry	45		30	75	75	5
						<b>30</b>
<b>Summer</b>						
Mathematics II	45	30		75	165	8
Inorganic Chemistry	45	15		60	60	4
Analytical Chemistry I	45		75	120	120	8
Physics II	45	15	30	90	90	6
Chemical Calculation	30		30	60	60	4
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Mathematics III	45	30		75	105	6
Physical Chemistry I	60			60	60	4
Organic Chemistry I	45			45	75	4
Analytical Chemistry II	45		30	75	105	6
Elective Course I	15		15	30	120	5
Elective Course II	15		15	30	120	5
						<b>30</b>
<b>Summer</b>						
Organic Chemistry II	45		60	105	165	9
Physical Chemistry II	45		60	105	165	9
Materials Engineering	45		30	75	105	6
Separation Processes	30		30	60	120	6
						<b>30</b>

Elective Courses of Year 2 (Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Instrumental Analysis (Winter)	15		15	30	120	5
Heat Transfer (Winter)	15		15	30	120	5
Mass Transfer (Winter)	15		15	30	120	5
Processes at Surfaces (Summer)	15		15	30	120	5

YEAR 3						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Thermodynamics	45		30	75	105	6
Organic Synthesis	45	15	15	75	105	6
Biochemistry	45		30	75	105	6
Polymer Chemistry	30		30	60	60	4
Nanochemistry and Materials	30		30	60	60	4
Metrology in Chemistry	30		30	60	60	4
						<b>30</b>
<b>Summer</b>						
Environmental Chemistry	45		30	75	75	5
Elective Course III	15		15	30	120	5
Elective Course IV	15		15	30	120	5
Elective Course V	15		15	30	120	5
Bachelor's Thesis		10		10	290	10
						<b>30</b>

Elective Courses of Year 3 (Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Processes at Surfaces (Summer)	15		15	30	120	5
Ceramic Technology (Summer)	15		15	30	120	5
Bioinformatics and Genomics (Summer)	15		15	30	120	5
Organic Analysis (Summer)	15		15	30	120	5
<del>Practical Work (Summer)</del>					<del>150</del>	<del>5</del>

### 5.3. Higher professional programme Chemical Technology

YEAR 1						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Mathematics I	45		30	75	165	8
General and Inorganic Chemistry I	45	15	60	120	120	8
Physics I	45		15	60	90	5
Process Calculation I	30		30	60	60	4
Elements of Process Equipment	30		45	75	75	5
						<b>30</b>
<b>Summer</b>						
Mathematics II	45		30	75	165	8
General and Inorganic Chemistry II	45	15		60	60	4
Analytical Chemistry	45		60	105	135	8
Physics II	45	15	30	90	90	6
Process Calculation II	30		30	60	60	4
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Chemical Process Safety	45		30	75	75	5
Physical Chemistry	60			60	60	4
Organic Chemistry I	45			45	75	4
Heat Transfer	45		30	75	75	5
Industrial Analysis	45		30	75	165	8
Mass Transfer	30		30	60	60	4
						<b>30</b>
<b>Summer</b>						
Organic Chemistry II	45		60	105	135	8
Kinetics in Chemistry	30		60	90	150	8
Materials Technology	45		30	75	105	6
Practical Work					240	8
						<b>30</b>

YEAR 3						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
<del>Fundamentals of Economics and Business</del>	30		15	45	75	4
Fluid Mechanics	30		15	45	45	3
Basic Biochemical Technology - Biotechnology	30		30	60	60	4
Process Control	45		30	75	75	5
Process Analysis	45		30	75	75	5
Process Synthesis	60		30	90	180	9
						<b>30</b>
<b>Summer</b>						
Fundamentals of Entrepreneurship	45		15	60	90	5
Elective Course I	15		15	30	150	6
Elective Course II	15		15	30	150	6
Elective Course III	15		15	30	150	6
Bachelor Work			30	30	180	7
						<b>30</b>

**Elective Courses of Year 3** (Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Energy Management (Summer)	15		15	30	120	6
Environmental Technology (Summer)	15		15	30	120	6
Inorganic Technology (Summer)	15		15	30	120	6
Organic Technology (Summer)	15		15	30	120	6
Biochemistry and Microbiology (Summer)	15		15	30	120	6
<del>Biochemistry and Molecular Biology (Summer)</del>	<del>15</del>		<del>15</del>	<del>30</del>	<del>120</del>	<del>6</del>
<del>Basic Biotechnology (Summer)</del>						<del>5</del>
Bio and Pharmaceutical technology (Summer)	15		15	30	120	6
Water Technology (Summer)	15		15	30	120	6
Computer Aided Process Design (Summer)	15		15	30	120	6
Coatings (Summer)	15		15	30	120	6
Food Technology (Summer)	15		15	30	120	6
Polymers (Summer)	15		15	30	120	6
Ceramics (Summer)	15		15	30	120	6
Processes at Surfaces (Summer)	15		15	30	120	6
Organic Analysis (Summer)	15		15	30	120	6
Bioinformatics and Genomics (Summer)	15		15	30	120	6

#### 5.4. Master's programme Chemical Engineering

YEAR 1						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Stagewise Processes	60		50	110	160	9
Process Design	45		30	75	105	6
Chemical Reaction Engineering II	45		30	75	105	6
Process Dynamics and Optimization	60		45	105	165	9
						<b>30</b>
<b>Summer</b>						
Product and Process Development	30		15	45	135	6
Process Equipment	30		30	60	120	6
Bioseparation Processes and Biocatalysis	45		30	75	105	6
Bioreaction Engineering	30		30	60	120	6
<b>OPTION CHEMICAL ENGINEERING</b>						
Process Design - Project			45	45	135	6
						<b>30</b>
<b>OPTION BIOCHEMICAL ENGINEERING</b>						
Industrial Microbiology	30		15	45	135	6
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
<b>OPTION CHEMICAL ENGINEERING</b>						
Upstream/Downstream Processes	30		30	60	120	6
Energy Management of Processes	30		30	60	120	6
Process Synthesis	30		30	60	120	6
<b>OPTION BIOCHEMICAL ENGINEERING</b>						
Process Raw Materials for Bio and Food Industry	30		30	60	120	6
Modern Process Operations in Food Engineering	30		30	60	120	6
Genomics in Biomedical Technology	30		30	60	120	6
Elective Course I	15		15	30	120	6
Elective Course II	15		15	30	120	6
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Summer</b>						
Industrial Project					150	5
Master Thesis			20	20	730	25
						<b>30</b>

### Elective Courses of option Chemical Engineering Year 2

(Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Environmental Biotechnology (Winter)	15		15	30	150	6
Water Conditioning and Treatment (Winter)	15		15	30	150	6
Nutraceuticals (Winter)	15		15	30	150	6
Innovation Management (Winter)	15		15	30	150	6
Cleaner Production (Winter)	15		15	30	150	6
Fluid Mechanics II (Winter)	15		15	30	150	6
Solution Thermodynamics (Winter)	15		15	30	150	6
Environmental Management (Winter)	15		15	30	150	6
Eco-design and life cycle assessment (Winter)	15		15	30	150	6
Raw Materials and Manufacture of Coatings (Winter)	15		15	30	150	6
Application, Properties and Testing of Coatings (Winter)	15		15	30	150	6
Theory of Membrane Transport (Winter)	15		15	30	150	6
Transport phenomena in biological systems and biomimetic technology (Winter)	15		15	30	150	6
Novel Biotechnological Approaches and Applications (Winter)	15		15	30	150	6

### Elective Courses of option Biochemical Engineering Year 2

(Those elective courses with insufficient enrolment of students may not be offered.)

Course title	L	S	P	Contact hours	Individual work	ECTS
Enzyme Technologies (Winter)	15		15	30	150	6
Modern Biocatalysis (Winter)	15		15	30	150	6
Environmental Biotechnology (Winter)	15		15	30	150	6
Nutraceuticals (Winter)	15		15	30	150	6
Innovation Management (Winter)	15		15	30	150	6
Active Pharmaceutical Ingredients (Winter)	15		15	30	150	6
Pharmaceutical Technology (Winter)	15		15	30	150	6
Biochemistry, Microbiology and Molecular Biology (Winter)	15		15	30	150	6
Theory of Membrane Transport (Winter)	15		15	30	150	6

Transport phenomena in biological systems and biomimetic technology (Winter)	15		15	30	150	6
Novel Biotechnological Approaches and Applications (Winter)	15		15	30	150	6



## 5.5. Master's programme Chemistry

YEAR 1						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Coordination Chemistry	30		15	45	105	5
Analytical Chemistry	30		15	45	105	5
Organic Chemistry	30		30	60	90	5
Biochemistry and Molecular Biology	30		30	60	90	5
Structure of Atoms and Molecules	30		30	60	90	5
Structural and Colloid Chemistry	30		30	60	90	5
						<b>30</b>
<b>Summer</b>						
Inorganic Chemistry	30		15	45	105	5
Selected Topics in Analytical Chemistry	30		15	45	105	5
Selected Chapters in Organic Chemistry	30		15	45	105	5
Chemometrics	30		15	45	105	5
Molecular Biology and Molecular Genetics	30		15	45	105	5
Statistical Thermodynamics	30		30	60	90	5
						<b>30</b>

YEAR 2						
Course title	L	S	P	Contact hours	Individual work	ECTS
<b>Winter</b>						
Organic Analysis	30		30	60	120	6
Electroanalytical Methods	30		30	60	120	6
Chemometrics	30		30	60	120	6
Elective Course I	15		15	30	150	6
Elective Course II	15		15	30	150	6
						<b>30</b>
<b>Summer</b>						
Practical course					150	5
Master Thesis		20		20	730	25
						<b>30</b>

**Elective Courses of Year 2** (Those elective courses with insufficient enrolment of students may not be offered.)

<b>Course title</b>	<b>L</b>	<b>S</b>	<b>P</b>	<b>Contact hours</b>	<b>Individual work</b>	<b>ECTS</b>
Polymeric Membranes (Winter)	15		15	30	150	6
Quality Control (Winter)	15		15	30	150	6
Combinatorial Chemistry (Winter)	15		15	30	150	6
Farmacogenomics (Winter)	15		15	30	150	6
Mathematical Methods in Organic Chemistry (Winter)	15		15	30	150	6
Organic Materials (Winter)	15		15	30	150	6
Inorganic Materials (Winter)	15		15	30	150	6
Thermal Characterisation of Materials (Winter)	15		15	30	150	6
Environmental Chemistry (Winter)	15		15	30	150	6
Chemistry of Organic Pollutants (Winter)	15		15	30	150	6
Chemistry and Water Analyses (Winter)	15		15	30	150	6
Biochemistry and Genomics (Winter)	15		15	30	150	6
Biomolecular Simulations (Winter)	15		15	30	150	6
<del>Statistical Thermodynamics (Summer)</del>	<del>15</del>		<del>15</del>	<del>30</del>	<del>150</del>	<del>6</del>
<del>Transport phenomena in biological systems and biomimetic technology (Winter)</del>	<del>15</del>		<del>15</del>	<del>30</del>	<del>150</del>	<del>6</del>

## 5.6. PhD programme Chemistry and Chemical Engineering

Year 1 (60 ECTS)							
Winter							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Compulsory course I	C	10	10		20	430	15
Compulsory course II	C	10	10		20	430	15
		<b>20</b>	<b>20</b>		<b>40</b>	<b>860</b>	<b>30</b>
Summer							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Elective course I	E	10	10		20	430	15
Individual research work I	IRW		10		10	440	15
		<b>10</b>	<b>20</b>		<b>30</b>	<b>870</b>	<b>30</b>

Year 2 (60 ECTS)							
Winter							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Elective course II	E	10	10		20	430	15
Individual research work II	IRW		10		10	440	15
		<b>10</b>	<b>20</b>		<b>30</b>	<b>870</b>	<b>30</b>
Summer							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Individual research work III	IRW		30		30	870	30
			<b>30</b>		<b>30</b>	<b>870</b>	<b>30</b>

Year 3 (60 ECTS)							
Winter							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Individual research work IV	IRW		30		30	870	30
			<b>30</b>		<b>30</b>	<b>870</b>	<b>30</b>
Summer							
Course	Course type	L	S	P	Contact hours	Individual work	ECTS
Doctoral Thesis			45		45	855	30
			<b>45</b>		<b>45</b>	<b>855</b>	<b>30</b>

**Compulsory courses of PhD programme – Option Chemical Engineering (Year 1)**

<b>Course title</b>	<b>L</b>	<b>S</b>	<b>P</b>	<b>Contact hours</b>	<b>Individual work</b>	<b>ECTS</b>
Design of (bio)reactor systems	10	10		20	430	15
Detailed process design	10	10		20	430	15
High-pressure and other advanced separation processes	10	10		20	430	15
Mathematics applied	10	10		20	430	15
Product design	10	10		20	430	15
System synthesis	10	10		20	430	15
Process thermodynamics	10	10		20	430	15
Transmission phenomena in chemical engineering	10	10		20	430	15
Chemical-technical teaching and learning	10	10		20	430	15

**Compulsory courses of PhD programme – Option Chemistry (Year 1)**

<b>Course title</b>	<b>L</b>	<b>S</b>	<b>P</b>	<b>Contact hours</b>	<b>Individual work</b>	<b>ECTS</b>
Advanced organic chemistry	10	10		20	430	15
Biocatalysis	10	10		20	430	15
Selected topics in analytical chemistry	10	10		20	430	15
Microarrays and systems biology	10	10		20	430	15
Selected chapters of inorganic chemistry	10	10		20	430	15
Mathematics applied	10	10		20	430	15
Product design	10	10		20	430	15
System synthesis	10	10		20	430	15
Process thermodynamics	10	10		20	430	15
Chemical-technical teaching and learning	10	10		20	430	15
Computer simulations of thermodynamic properties	10	10		20	430	15

**Elective courses of PhD programme – Option Chemical Engineering**

Course title	L	S	P	Contact hours	Individual work	ECTS
<b>CHEMICAL ENGINEERING</b>						
Energy management	10	10		20	430	15
Technologies of wastewater treatment	10	10		20	430	15
Process operability	10	10		20	430	15
Nanotechnologies	10	10		20	430	15
Refrigeration process technology	10	10		20	430	15
Life cycle assessment	10	10		20	430	15
<b>BIOCHEMICAL ENGINEERING</b>						
Biotransformations	10	10		20	430	15
Bionanotechnology	10	10		20	430	15
Food products development	10	10		20	430	15
<b>CHEMICAL ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT</b>						
Industrial application of membrane separation processes	10	10		20	430	15
Sustainable development	10	10		20	430	15
Advanced methods for study of corrosion	10	10		20	430	15
Retrofit of existing processes	10	10		20	430	15

**Elective courses of PhD programme – Option Chemistry**

Course title	L	S	P	Contact hours	Individual work	ECTS
<b>CHEMISTRY AND CHEMOMETRICS</b>						
Application of electrochemical methods in analytical chemistry	10	10		20	430	15
Quality: the European way	10	10		20	430	15
Applied electrochemistry	10	10		20	430	15
Optical chemical sensors	10	10		20	430	15
Analysis of hazardous substances in environment	10	10		20	430	15
Chemometric and statistic methods in chemistry	10	10		20	430	15
Food safety and quality control	10	10		20	430	15
Selected topics of the colloid chemistry	10	10		20	430	15
Advanced methods for study of corrosion	10	10		20	430	15
<b>CHEMISTRY OF MATERIALS</b>						
Synthesis and characterization of coordination compounds	10	10		20	430	15
Chemistry of nanomaterials	10	10		20	430	15
Chemistry of ceramic materials	10	10		20	430	15
Synthesis of nanomaterials	10	10		20	430	15
Sonochemical methods	10	10		20	430	15
Polymer chemistry	10	10		20	430	15

## **6. FINAL EXAMINATION**

In order to graduate, the student has to:

- pass all the examinations specified in the course programme,
- meet the other requirements according to the rules of the programme,
- prepare the final thesis and defend it successfully.

## **7. EXAMINATION AND ASSESSMENT REGULATIONS**

The examinations are usually written and oral. Written examination can be sometimes replaced by several written tests. Laboratory attendance is obligatory and mostly involves preparation of laboratory report. Some of the courses involve the preparation of a seminar work which is usually defended by an oral presentation. The oral examination is mostly preconditioned by successful completion of the written examination.

Timetables for examinations are issued yearly by the Faculty Senate at the beginning of the academic year and are published on the notice boards. There are at least 3 to 4 examinations for each course per academic year and students are free to choose the date of examination. The students need to register for examination 4 days before the examination date. The examination can be cancelled no later than 1 day before the examination date. The use of calculators, literature and other items during the examination is determined by the lecturer and may vary from course to course.

The Bachelor and Master theses are presented before an examination board. The PhD thesis is publicly presented and defended before an examination board, chaired by the Dean of the Faculty. The members of the board are also the mentor, co-mentor and two to three internationally recognized academicians, who are experts in the field.

## **8. ERASMUS DEPARTMENTAL COORDINATOR**

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