U N I V E R S I T Y O F S P L I T

FACULTY OF CHEMISTRY AND TECHNOLOGY

DETAILED PROPOSAL OF THE STUDY PROGRAMME

UNDERGRADUATE STUDY OF CHEMICAL TECHNOLOGY

SPLIT, June 2016.

GENERAL INFORMATION OF HIGHER EDUCATION INSTITUTION

Name of higher education institution	Faculty of Chemistry and Technology
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GENERAL INFORMATION OF THE STUDY PROGRAMME

Name of the study programme	Undergraduate Study of Chemical Technology		
Provider of the study programme	Faculty of Chemistry and Technology		
Other participants			
Type of study programme	Vocational study programme ☐	University study programme X	
Level of study programme	Undergraduate X	Graduate ☐	Integrated ☐
	Postgraduate ☐	Postgraduate specialist ☐	Graduate specialist ☐
Academic/vocational title earned at completion of study	University Bachelor of Chemical Engineering		

1. INTRODUCTION

1.1. Reasons for starting the study programme

By the undergraduate study of chemical technology**,** the Faculty of Chemical Technology of Split, as a high-education and scientific institution, is trying to offer a new impetus for economic development and rational economizing on natural resources. This study provides knowledge required for designing, leading and developing of sustainable chemical processes, as well as the knowledge on the methods of quality investigations and their development at the process of analysis. Students are qualified for inclusion in the rapidly changing technological developments and to encourage small and medium businesses. During the study, special attention is paid to practical work which can enable studnets to incluse into industry process (chemical, metal processing, shipbuilding, construction, food, pharmaceutical and other related industries).The basic knowledge from the field of chemical engineering is applied in the manufacture and analysis of materials, in the investigations of various degradation processes and in the protection of construction materials in different surroundings. Sustainable development is closely connected with industry and environment. When they finish this study, the students can continue studing at the graduate study of chemical technology**,** the Faculty of Chemical Technology of Split or at other related Faculties. The proposed study programs are based on the scientific knowledge of chemistry, and chemical engineering, which significantly contributes to modern education of new experts.

1.2. Relationship with the local community (economy, entrepreneurship, civil society, etc.)

The possible partners outside high-school education system interested in continuation of the study of chemical technology are the economy and public services of the Split-Dalmatia County, as well as: cement industry, shipbuilding industry, processing of polymer materials, Institute for Oceanography and Fishing, Croatian Hydrographical Institute, Institute for Adriatic Cultures and Melioration of Karsts, Institute for Civil Engineering, Public Health Institute and other County and City public services. It is important to point out that due to the geographic position of Split there is a growing presence of students not only from Dalmatia but also from Bosnia and Herzegovina, so that such a trend is expected to continue in the future.

1.3. Compatibility with requirements of professional organizations

One of the basic assumptions for quality implementation of the proposed program is educational, professional and research cooperation of all relevant factors that may contribute to the process of the training and education of students. The teachers who teach at the undergraduate study of chemical technology are members of various professional associations and commitie (Croatian Society of Chemical Engineers, Association of

Chemical Engineers Split, Croatian Chemical Society Parent Committee for Technical Sciences, Chemical Engineering field, Croatian Academy of Engineering , Croatian standard Institute, etc.).

1.4. Name possible partners outside the higher education system that expressed interest in the study programme

The possible partners outside high-school education system interested in continuation of the study of chemical technology are the economy and public services of the Split-Dalmatia County and beyond. Some of the specialized sites and laboratories with whom Faculty cooperates (usually for the purpose of student's practical and field work and the preparation of undergraduate theses of students) are: companies from Dalmatia (eg. AD Plastik, Brodosplit, CEMEX, Cian), the entire Croatia (pharmaceutical industry, oil industry, food industry, cosmetics industry, paints and varnishes, the company dealing with the protection of the environment, etc.) and Bosnia and Herzegovina (eg. Aluminij Mostar). Faculty partners are also institutes as follows: Institute Ruđer Bošković, Institute for Adriatic Crops and Karst Reclamation, Institute of Oceanography and Fisheries.

1.5. Financing

The planned source of financing for the undergraduate study of chemical technology is the Ministry of Science, Education and Sports.

1.6. Comparability of the study programme with other accredited programmes in higher education institutions in the Republic of Croatia and EU countries

When elaborating the programs, special care was taken to harmonize the subjects and their teaching programs with related studies at other high-school institutions. In that way the programmes are mutually comparable and, also, they stimulate the student and teacher mobility. The proposed program can be compared with the programmes of the following high-school institutions:

- Politecnico di Torino, Italy (www.polito.it)
- University of Maribor, Slovenia (http://www.fkkt.uni-lj.si),
- University of Pardubice, Czech Republic (http://www.upce.cz/en/fcht/uechi.html),
- Politechnika Warszawska, Poland (http://www.ichip.pw.edu.pl/)
- Università degli Studi di Roma "La Sapienza" (http://www.chem.uniroma1.it/didattica/offerta-formativa/cdl-chimica-industriale), Rome, Italy;
- Universidad Rey Juan Carlos, Madrid, Spain.

1.7. Openness of the study programme to student mobility (horizontal, vertical in the Republic of Croatia, and international)

The study programme is organized in one-semester courses, which is one of the important prerequisites of student mobility. The proposed programme of undergraduate study of chemical technology and its comparability with the related studies in the Republic of Croatia and the EU countries enables the student and teacher mobility. The mobility can be realized through the enrolment of particular

subjects in other university studies, as well as of the whole semesters in the related studies, or through the work on the final project. Institutions with which it will be possible to achieve the mobility are constituents of the University of Split, other Croatian universities (Faculty of Chemical Engineering and Technology in Zagreb, Faculty of Food Technology in Zagreb, Faculty of Food Technology in Osijek, Faculty of Textile Technology in Zagreb, Faculty of Graphic Arts in Zagreb, etc.), and certain institutions from the European Union. The Faculty has signed the agreement for Erasmus mobility of teachers and students with the Universite Techniche Dresden, Dresden, Germany, Universita degli Studi di Cagliari, Cagliari, Italy, Universita di Trieste, Trieste, Italy, AGH University of Science and Technology, Krakow, Polonia, Polytecnich institutes of Braganca, Braganca, Portugal, University of Maribor, Maribor, Slovenia, Polymer technology college, Maribor, Slovenia and others. The Faculty also participates in multilateral cooperation with the possibilities of mobility of students and teachers across the Central European Exchange Program for University Studies (CEEPUS). Through this program, the cooperation with the following foreign institutions is achived: 1) Faculty of Material Science and Ceramics, AGH University of Science and Technology, Kraków, Poland, 2) Institute für Analytische Chemie, Karl-Franzens-Universität, Graz, Austria, 3) Department of Analytical Chemistry, Slovak University of Technology, Bratislava, Slovak Republic, 4) Institute of Analytical Chemistry, Faculty of Chemical Technology, University of Pardubice, Czech Republic, 5) Faculty of Chemistry and Chemical Engineering, University of Maribor, Slovenia.

1.8. Compatibility of the study programme with the University mission and the strategy of the proposer, as well as with the strategy statement of the network of higher education institutions

The study program has been consolidated with the Strategy of the development of the Faculty, its mission and vision, as well with the strategy of the University of Split.

1.9. Current experiences in equivalent or similar study programmes

The Faculty of Chemical Technology of Split was founded in 1960, responding the economic demands of the region and aiming at fulfilling its personnel and professional needs. On the grounds of the acquired scientific knowledge and economic demands, the teaching programs have been continually improved and up-dated. Close cooperation between this region economy and the Faculty has resulted in great number of projects, expertise, elaborates and, in particular, in opening new study orientations on the undergraduate study, the content of which is just the result of this region needs.

2. DESCRIPTION OF THE STUDY PROGRAMME

2.1. General information

Scientific/artistic area of the study programme	Technical Sciences
Duration of the study programme	3 years (6 semesters)
The minimum number of ECTS required for completion of study	180
Enrolment requirements and admission procedure	Completed 4-year secondary school and secondary school leaving exam.

2.2. Learning outcomes of the study programme (name 15-30 learning outcomes)

University bachelor of chemical technology will be able to:

- solve problems appying an appropriate engineering approach based on knowledge in the area of natural and technical sciences
- work in laboratory and plant facilities on professional and safe way
- design and conduct chemical and engineering experiment
- analyze and interpret the results of measurements in laboratory or plant facility using recent computer softwares
- understand the principles of unit operations and be familiar with corresponding processing equipment and processing parameters control
- identify the influence of process parameters on unit operations performance
- recognize basic construction materials and their application fields
- determine basic materials properties applying routine instrumental analyses
- perform routine manufacturing and processing operations with respect to sustainable development approach
- suggest appropriate environmental protection procedures
- recognize the importance of conventional and renewable energy resources
- understand the impact of enginnering solution on the economy, environment and society
- understand the professional and ethical responsibility
- function effectively in multidisciplinary team work and independently present the professional contents
- recognize the importance of life-long learning.

2.3. Employment possibilities

Graduates can be employed by the aforementioned business entities with which the faculty cooperates, as well at educational institutions, various inspection services at the national and regional level, etc. Employment opportunities in the region:

- Brodosplit, Split
- AD plastik, Split
- Omial, Omiš
- Cemex, Kaštel Sućurac
- Adriacink, Split
- Vodovod i kanalizacija, Split
- TOF, Drniš
- ALPRO ATT, Trogir...

2.4. Possibilities of continuing studies at a higher level

Higher level studies are possible at the graduate studies of Chemical Technology and Chemistry and at others institutes in Croatia and abroad as well.

2.5. Name lover level studies of the proposer or other institutions that qualify for admission to the proposed study

Not applicable.

2.6. Structure of the study

Conditions and modes of studying at Undergraduate Study of Chemical Technology are based on the Ordinance on study programmes and course attendance system at the Faculty of Chemistry and Technology in Split which is in compliance with the Ordinance on study programmes and course attendance system at the University of Split. Undergraduate Study of Chemical Technology takes place during the three years, includes mandatory and elective courses, and it is based on active participation of students in all forms of studing (lectures, laboratory exercises, seminars, field trips, etc.). In general, students' obligations include presence at lectures and exercises, independent learning, literature analysis, presentations, field work and the preparation and defense of the diploma thesis. The monitoring and evaluating student's activities listed in the program are done by teachers. During the first year of study objective is focused on mastering basic knowledge of chemistry and related natural sciences, respectively. During the last three semesters of study the content of chemical engineering is gradually increased. In the final semester students have the option of choosing from a large number of elective courses. The study ends with the preparation and defense of the final thesis.

2.7. Guiding and tutoring through the study system

With the aim of providing advice, information and guidance to students during the course of study, the Faculty Council of Faculty of Chemistry and Technology appoints the head of study for student groups at each year of study

2.8. List of courses that the student can take in other study programmes

With the aim of continuing and extending their education, and strengthening and supporting professional training, especially in the context of raising awareness on the interrelation between faculties and universities, students may take elective courses from other study programmes that offer courses that relate or overlap with the topic of interest of this study programme. The procedure for selecting courses from other faculties is defined in the Ordinance on study programmes and course attendance system at the Faculty of Chemistry and Technology in Split.

2.9. List of courses offered in a foreign language as well (name which language)

As a rule, the lectures and courses held at the study shall be provided in Croatian language. Since there are courses included in the programme that are proposed to be taught in English, as necessary these courses will be provided in English.

2.10. Criteria and conditions for transferring the ECTS credits

The criteria and requirements for the transfer of ECTS credits are regulated by the Ordinance on study programmes and course attendance system at the University of Split, Statute of the Faculty of Chemistry and Technology in Split and Ordinance on study programmes and course attendance system at the Faculty of Chemistry and Technology in Split

2.11. Completion of study

Final requirement for completion of study	Final thesis ☒ Diploma thesis ☐	Final exam ☒ Diploma exam ☐
Requirements for final/diploma thesis or final/diploma/exam	Requirements for final thesis are regulated by the *Ordinance on study programmes and course attendance system at the Faculty of Chemistry and Technology in Split.*	
Procedure of evaluation of final/diploma exam and evaluation and defence of final/diploma thesis	Procedure of evaluation of final/diploma exam is regulated by the *Ordinance on final thesis/diploma thesis at the Faculty of Chemistry and Technology in Split.*	

2.12. List of mandatory and elective courses

Orientation Chemical Engineering

List of courses							
Year of study: 1st							
Semester: 1st							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA101	Matematics I	45	45	0	0	8.0

	KTA102	Physics I	45	30	0	0	8.0
	KTA103	Exercises in Pysics I	0	0	15	0	1.0
	KTA104	General Chemistry	45	30	0	0	7.0
	KTA105	Exercises in General Chemistry	0	0	30	0	2.0
	KTA113	Computer Application	30	0	15	0	4.0
	Total		165	105	60	0	30

List of courses							
Year of study: 1st							
Semester: 2nd							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA106	Mathematics II	45	30	0	0	6.0
	KTA107	Physics II	30	15	0	0	3.5
	KTA108	Exercises in Pysics II	0	0	30	0	2.0
	KTA109	Inorganic chemistry	30	15	0	0	4.0
	KTA110	Exercises in Inorganic Chemistry	0	0	30	0	2.0
	KTA111	Analytical Chemistry	60	15	0	0	6.5
	KTA112	Exercises in Analytical Chemistry	0	0	45	0	3.0
	KTA114	Fundamentals of Mechanical Engineering	15	15	0	0	3.0
	Total		180	90	105	0	30

List of courses							
Year of study: 2nd							
Semester: 3rd							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA201	Organic Chemistry	60	15	0	0	6.5
	KTA202	Exercises in Organic Chemistry	0	0	45	0	3.0
	KTA203	Physical Chemistry	60	15	0	0	6.5
	KTA204	Exercises in Physical chemistry	0	0	45	0	3.0
	KTA205	Mass and Energy Balances	30	30	0	0	5.0
	KTA206	Transport Phenomena	45	15	0	0	5.0
	KTA207	Exercises in Transport Phenomena	0	0	15	0	1.0

	Total	195	75	90	0	30

List of courses							
Year of study: 2nd							
Semester: 4th							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA208	Electrochemistry	45	15	0	0	4.5
	KTA209	Exercises in Electrochemistry	0	0	30	0	2.0
	KTA210	Thermodynamics	45	30	0	0	6.5
	KTA211	Unit Operations	45	15	0	0	4.5
	KTA212	Exercises in Unit Operations	0	0	15	0	2.0
	KTA213	Measurement and Process Control	30	0	0	0	3.0
	KTA214	Exercises in Measurement and Process Control	0	0	15	0	4.0
	KTA215	Catalysis	30	15	0	0	4.0
	KTAOSP	Professional Practice	10 days				2.5
	Total		210	75	75	0	30

List of courses							
Year of study: 3rd							
Semester: 5th							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA301	Reaction Engineering	30	15	0	0	3.5
	KTA302	Exercises in Reaction Engineering	0	0	15	0	1.0
	KTA303	Construction Materials	30	0	0	0	2.5
	KTA304	Exercises in Construction Materials	0	0	18	12	2.0
	KTA305	Technological Processes of Inorganic Industry	45	15	0	0	5.5
	KTA306	Exercises in Technological Processes of Inorganic Industry	0	0	45	0	3.0
	KTA307	Technological Processes in Organic Industry	45	15	0	0	5.5
	KTA308	Exercises in Technological processes in organic industry	0	0	45	0	3.0
	KTA309	Industry and the Environment	30	0	0	0	3.0
	KTA310	Exercises in Industry and the Environment	0	0	15	0	1.0
	Total		180	45	138	12	30

List of courses							
Year of study: 3							
Semester: 6th							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTAOZR	Final Thesis					12.0
	Total						12.0
Elective		**Group A**					
	KTA311	Inorganic Materials	30	0	0	0	3.0
	KTA312	Exercises in Inorganic Materials	0	0	10	5	1.0
	KTA313	Electrodeposition	30	0	0	0	3.0
	KTA314	Exercises in Electrodeposition	0	0	12	3	1.0
	KTA315	Mineral Raw Materials from Seawater	30	0	0	0	3.0
	KTA316	Exercises in Mineral Raw Materials from Seawater	0	0	11	4	1.0
	KTA317	Polymeric Materials	30	0	0	0	3.0
	KTA318	Exercises in Polymeric Materials	0	0	12	3	1.0

	KTA319	Processing of Plastics and Rubber	30	0	0	0	3.0
	KTA320	Exercises in Processing of Plastics and Rubber	0	0	10	5	1.0
	KTA321	Process of Precipitation and Crystallization	30	0	0	0	3.0
	KTA322	Exercises in Process of Precipitation and Crystallization	0	0	15	0	1.0
		Group B					
	KTA323	Mathematical Tools	30	0	0	0	3.0
	KTA324	Exercises in Mathematical Tools	0	0	15	0	1.0
	KTA325	Renewable Energy Sources	30	0	0	0	3.0
	KTA326	Exercises in Renewable Energy Sources	0	0	15	0	1.0
	KTA327	Preaparation of Technological Waters	30	0	0	0	3.0
	KTA328	Exercises in Preaparation of Technological Waters	0	0	15	0	1.0
	KTA329	Safety at Work	30	0	0	0	3.0
	KTA330	Exercises in Safety at Work	0	0	15	0	1.0
	KTA331	Water Protection	30	15	0	0	4.0
	A minimum of 3 courses with corresponding exercises from group A and 2 from group B should be chosen (sum must be at least 18 ECTS).						

Orientation Environmental Protection

List of courses							
Year of study: 1st.							
Semester: 1st.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTJ101	Mathematics I	45	45	0	0	7.0
	KTJ102	Physics I	45	30	0	0	6.5
	KTJ103	Exercises in Pysics I	0	0	15	0	1.0
	KTJ104	General Chemistry	45	30	0	0	6.5
	KTJ105	Exercises in General Chemistry	0	0	30	0	2.0
	KTJ111	General Biology	30	15	0	0	4.0
	KTJ112	Computer application	30	0	15	0	3.0
	Total		195	120	60	0	30

List of courses							
Year of study: 1st.							
Semester: 2nd							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTJ106	Mathematics II	45	30	0	0	7.0
	KTJ107	Physics II	30	15	0	0	5.0
	KTJ108	Exercises in Physics II	0	0	30	0	2.0
	KTJ109	Inorganic Chemistry	30	15	0	0	4.5
	KTJ110	Exercises in Inorganic Chemistry	0	0	30	0	2.0
	KTA111	Analytical Chemistry	60	15	0	0	6.5
	KTA112	Exercises in Analytical Chemistry	0	0	45	0	3.0
	Total		165	75	105	0	30

List of courses							
Year of study: 2nd							
Semester: 3rd							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA201	Organic Chemistry	60	15	0	0	6.5
	KTA202	Exercises in Organic Chemistry	0	0	45	0	3.0
	KTA203	Physical chemistry	60	15	0	0	6.5
	KTA204	Exercises in Physical chemistry	0	0	45	0	3.0
	KTA205	Mass and Energy Balance	30	30	0	0	5.0
	KTA206	Transport Phenomena	45	15	0	0	5.0
	KTA207	Exercises in Transport Phenomena	0	0	15	0	1.0
	Total		195	75	105	0	30

List of courses							
Year of study: 2nd							
Semester: 4th							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTJ201	Unit Operations in Environmental Engineering	30	15	0	0	3.5
	KTJ202	Exercises in Unit Operations in	0	0	30	0	2.0

		Environmental Engineering					
	KTJ203	General Microbiology	30	0	0	0	2.5
	KTJ204	Exercises in General Microbiology	0	0	30	0	1.5
	KTJ205	Chemistry and Air Protection	30	15	0	0	4.0
	KTJ206	Exercises in Chemistry and Air Protection	0	0	24	6	2.0
	KTJ209	Thermodynamics	45	30	0	0	6.0
	KTJ207	Analytical Environmental Chemistry	30	15	0	0	4.0
	KTJ208	Exercises in Analytical Environmental Chemistry	0	0	30	0	2.0
	KTJ OSP	Professional Practice	10 days				2.5
	Total		165	75	114	6	30

List of courses

Year of study: 3rd

Semester: 5th

STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTJ301	Waste management	30	0	0	0	3.0
	KTJ302	Exercises in Waste Management	0	0	10	5	1.0
	KTJ303	Disposal of Hazardous Waste	30	0	0	0	3.0
	KTJ304	Exercises in Disposal of Hazardous Waste	0	0	15	0	1.0
	KTJ305	Analysis and Optimization of Water Use	30	15	0	0	3.0
	KTJ306	Exercises in Analysis and Optimization of Water Use	0	0	15	0	1.0
	KTJ316	Construction Materials and Protection	30	0	0	0	3.0
	KTJ317	Exercises in Construction Materials and Protection	0	0	18	12	2.0
	KTJ307	Polymers and the Environment	30	0	0	0	3.0
	KTJ308	Exercises in Polymers and the Environment	0	0	12	3	1.0
	KTJ309	Wastewaters Treatment	30	15	0	0	4.0
	KTJ310	Exercises in Wastewaters Treatment	0	0	27	3	2.0
	Total		180	30	97	23	27
Elective	KTJ311	Environmental Menagment Systems	30	15	0	0	3.0
	KTJ312	Sustainable Development in Coastal Area	30	15	0	0	3.0
	KTJ313	Chemistry and Marine Protection	30	0	0	0	2.0
	KTJ314	Exercises in Chemistry and Marine Protection	0	0	15	0	1.0
	The minimum amount of credits that must be obtained from elective courses is 3						

List of courses							
Year of study: 3rd							
Semester: 6th							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTJ318	Selected Processes of Chemical Industry	45	15	0	0	6.0
	KTJ319	Exercises in Selected Processes of Chemical Industry	0	0	30	0	2.0
	KTJ OZR	Final thesis					10.0
	Total		45	15	30	0	18.0
Elective	KTA311	Inorganic Materials	30	0	0	0	3.0
	KTA312	Exercises in Inorganic Materials	0	0	10	5	1.0
	KTA323	Mathematical Tools in Chemical Engineering	30	0	0	0	3.0
	KTA324	Exercises in Mathematical Tools in Chemical Engineering	0	0	15	0	1.0
	KTA325	Renewable Energy Sources	30	0	0	0	3.0
	KTA326	Exercises in Renewable Energy Sources	0	0	15	0	1.0
	KTA329	Safety at Work	30	0	0	0	3.0
	KTA330	Exercises in Safety at Work	0	0	15	0	1.0
	KTJ315	Basic Biotechnology	30	15	0	0	4.0
	KTA331	Water Protection	30	15	0	0	4.0
	The minimum amount of credits that must be obtained from elective courses is 12						

2.13. Course description

Mathematics I

NAME OF THE COURSE	Mathematics I					
Code	KTA101	Year of study	1st			
Course teacher	Branka Gotovac, lecturer	Credits (ECTS)	8.0			
Associate teachers	Lucija Ružman, assistant	Type of instruction (number of hours)	L	S	E	F
			45	45		
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	To introduce students to the basic elements of calculus and linear algebra.
Course enrolment requirements and entry competences required for the course	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After finishing this course the student is expected to be able to: • identify and sketch graphs of elementary functions, to determine the domain of the given function • find the derivative of the given function • apply the dervative in practice (tangents and normals, maximum, minimum and inflection points) and to interpret the shape of graphs • solve the system of linear equations (by matrix inversion, by Gaussian elimination)
Course content broken down in detail by weekly class schedule (syllabus)	1. Sets: Notion. Algebra of sets. Sets of numbers. 2. Functions: Notion. Composite functions. Inverse function. 3. Elementary functions. 4. Functions: Limits. Continuity. 5. Derivative and application: Notion. Interpretation. Derivative techniques. 6. Differential. Higher order derivatives. 7. Theorems of differential calculus. Maximum, minimum points. 8. Inflection points. Asymptotes. Graphs sketching. 9. Sequences: Notion. Limits. 10. Series: Convergence of numeric series. Power series. Taylor series. 11. Matrices and vectors: Matrix algebra. Determinants. Inverse matrix. 12. Linear systems of equations. 13. Vector algebra. 14. Solid analityc geometry. 15. Course review. Revision.

Format of instruction	✕ lectures ✕ seminars and workshops ☐exercises ☐on linein entirety ☐partial e-learning	☐ndependent assignments ✕multimedia ☐aboratory ☐work with mentor ☐ (other)

<table>
<tr><td></td><td colspan="6">☐field work</td><td></td></tr>
<tr><td>Studentresponsibilities</td><td colspan="7">Regular attendance of classes.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>3</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>2</td><td>Oral exam</td><td>1,5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1,5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="7"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="7">Examination: either by continuously checking and grading students' progress during the semester or in exam terms by passing written and oral exam.
At the beginning of the course students will be informed of in detail elaborated rules for both models of examination.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">T. Bradić, i dr., Matematika za tehnološke fakultete, Element, Zagreb (više izdanja)</td><td>47</td><td></td></tr>
<tr><td colspan="4">B.P. Demidovič, Zadaci i riješeni primjeri iz više matematike, Tehnička knjiga, Zagreb (više izdanja)</td><td>5</td><td></td></tr>
<tr><td colspan="4">I. Slapničar, Matematika 1, Fakultet elektrotehnike, strojarstva i brodogradnje u Splitu, Sveučilište u Splitu, Split, 2002. (http://lavica.fesb.hr/mat1)</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="7">S. Kurepa, Matematička analiza I i II dio, Školska knjiga, Zagreb, 1997.

L. Krnić, Z. Šikić, Račun diferencijalni i integralni, I dio, Školska knjiga, Zagreb, 1992.

Hughes-Hallett, Gleason et al., Calculus, John Wiley and Sons, Inc., New York, 2000.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="7">Quality assurance will be performed at three levels:

(1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="7"></td></tr>
</table>

Physics I

<table>
<tr><td>COURSE NAME</td><td colspan="5">Physics I</td></tr>
<tr><td>Course code</td><td>KTA 102</td><td>Year of study</td><td colspan="3">1st</td></tr>
<tr><td>Course lecturer</td><td>PhD, Magdy Lučić Lavčević, associate prof.</td><td>Credits (ECTS)</td><td colspan="3">8.0</td></tr>
<tr><td rowspan="2">Assistants</td><td rowspan="2">Lucija Matković, assistant</td><td rowspan="2">Type of instruction</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Course status</td><td>Mandatory</td><td>Application of e-learning (percentage)</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">– Introducing students to the knowledge and principles of physics in the field of mechanics
– Forming the proper view towards the interpretation of physics phenomena and their application
– Developing the level of cognitive processing required for further studies</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Enrolled in or passed the course Exercises in Pysics I</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After the course, the student is expected to have mastered:
- Physical quantities, units and dimensional analysis;
- The characteristics of the exact approach to phenomena in both micro and macro world;
- The principles of the classic general mechanics;
- The basic principles of the special mechanics (mechanics of oscillations, waves and fluids);
- The use of calculus in mechanics contents;
- The application of the laws of mechanics in concrete physics examples;
- The application of the obtained knowledge in solving problem tasks;
- The application of the knowledge in professional situations.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">1st week: Space, time, matter. Physical quantities, Laws of Physics. Plane and space geometry, using of vector algebra, differential and integral calculus.
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course.
2nd week: Kinematics of particles
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
3rd week: Particles dynamics
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
4th week: Work and energy
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
5th week: Conservative and nonconservative forces
Partial assessment (1st preliminary test)) related to seminars and theory addressed during the course
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
6th week: Conservation of energy law
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
7th week: Systems of particles.
Seminar: Solving the numerical examples pertaining to the theoretical content</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">addressed during the course
8th week: Collisions; Conservation laws
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
9th week: Rigid body mechanics. Conservation laws. Restrictions of rigid body approximations and the theory of elasticity.
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course.
10th Equilibrium. Restrictions of rigid body approximations and the theory of elasticity.
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
Partial assessment (2nd preliminary test)) related to seminars and theory addressed during the course
11th week: Oscillations and waves
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
12th week: Many particle physics: gasses, liquids and solids. Internal energy, heat and heat disorder. Transport phenomena. Phase transition phenomena.
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
13th week: Fluid mechanics: statics
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
14th week: Fluid mechanics: dynamics
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course
15th week: Elastic waves. Sound.
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course.
Partial assessment (3rd preliminary test) related to seminars and theory addressed during the course</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
X multimedia
☐laboratory
☐work with mentor
X group and individual tutorials
X seminars</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Pre-test preparation classes</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>2.4</td><td>Oral exam</td><td>2.3</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2.3</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student</td><td colspan="6">During the semester, the final exam can be substituted via 3 midterm exams, related to lectures (theory) and seminars (solving problems), according to syllabus.</td></tr>
</table>

work in class and at the final exam	During the final examination period, the final theory exam shall be taken after passing the final problem´s solving exam. Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent.		
Required literature (available in the library and via other media)	**Book title**	**Number of books in the library**	**Available via other media**
	N. Cindro, Fizika I, Školska knjiga, Zagreb, 1985;	10	-
	E. Babić, R. Krsnik, M. Očko, Zbirka riješenih zadataka iz fizike, Školska knjiga Zagreb, Zagreb, 1990.	3	-
			-
Optional literature	• D. Halliday, R. D. Halliday, R. Resnick, J. Walker, Fundamentals of Physics, John Wiley & Sons, New York, 1993; • Janko Herak, Osnove kemijske fizike, Farmaceutsko-biokemijski fakultet Sveučilišta u Zagrebu, 2001. • V. Lopac, P. Kulišić, M. Pavičić, Zbirka zadataka iz fizike, FGZ Zagreb, 1983.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Exercises in Pysics I

COURSE NAME	**Physics I**						
Course code	KTA103	Year of study	1st				
Course lecturer	PhD, Magdy Lučić Lavčević, associate prof.	Credits (ECTS)	1.0				
Assistants		Type of instruction	L	S	E	F	
			0	0	15	0	
Course status	Mandatory	Application of e-learning (percentage)	0				
COURSE DESCRIPTION							
Course objectives	The fundamental and the inseparable part of all physics research is the experiment. The aim of this course is to introduce the students to various techniques of conducting experiments and methods of measuring the phyiscs quantities in the field of mechanics. Additionaly, the aim is to enable the development of skills needed to conduct experiments, gather data and master various numerical problems, which are related to measuring and testing physics quantities.						
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Physics I						
Learning outcomes expected at the	• Obtaining basic knowledge and skills needed to conduct experiements						

<table>
<tr><td>level of the course (4 to 10 learning outcomes)</td><td colspan="6">• The knowledge of various methods and techniques of measurement
• Mastering the calculcation of errors which occured during the measurement
• Mastering the evaluation of errors which occured during the measurement
• The skills of graphic representation of the measured data and the method of writing reports pertaining to the experiment and the results of measuring conducted</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">• Measurement of length, mass and density. (3 hours)
• Numeric and graphic processing of the measurement data. (2 hours)
• Measurements of characteristic quantities: the laws of forces (friction, Hooke´s law /conservation laws (energy, momentum). (3 hours)
• Measurements of characteristic quantities: rotation (moment of inertia, torque) (2)
• Oscillations (spring oscillations, mathematical, physical and torsional pendulum). (2 hours)
• Laws of hidrostatics (Archimedes law, surface tension). (3 hours)
• Compensating exercises
• Final revision test</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
X exercises
☐ on linein entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐independent assignments
☐ multimedia
X laboratory
☐ work with mentor
X group and individual tutorials
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.3</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Pre-test preparation classes</td><td>0.3</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.4</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Weekly tests,
Grade of the written experiment report,
Final test
Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Book title</td><td>Number of books in the library</td><td colspan="2">Available via other media</td></tr>
<tr><td colspan="3">D. Krpan Lisica, Praktikum iz fizike - I.dio, 2010, sveučilišni priručnik</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Optional literature</td><td colspan="6">•</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality assurance will be performed at three levels:

(1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer’s Level.</td></tr>
<tr><td>Other (as the</td><td colspan="6"></td></tr>
</table>

proposer wishes to add)	

General Chemistry

NAME OF THE COURSE	General Chemistry					
Code	KTA104	Year of study	1st			
Course teacher	PhD, Slobodan Brinić, associate prof. PhD, Zoran Grubač, prof.	Credits (ECTS)	7.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			45	30	0	0
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	To familiarize students with the basic chemical laws and principles and to enable students to master the chemical items that follow General Chemistry. To develop students ability to think critically about the experiments performed in the laboratory and about the involvement of of chemistry in everyday life.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in General Chemistry The condition for taking the exam: Passed the course "Exercises in General Chemistry"
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After the the course students will be able to: 1) Understand the nature and properties of the substance, differentiate elementary substances from compounds, distinguish homogeneous from heterogeneous mixtures, assume procedures for separating mixtures into pure substances. 2) Understand and applied the problem-solving approach to the balance of substances in chemical changes 3) Understand the structure of atoms and existing models of chemical bonds in such way that they can predict certain properties and reactivity of chemical elements and their ionic and covalent compounds 4) Discern the nature of certain chemical reactions. 5) Adopt the concept of pH, and assume direction of the chemical reactions on the basis of knowledge of chemical kinetics and equilibrium. 6) Independently and safely perform simple chemical experiments
Course content broken down in detail by weekly class schedule (syllabus)	Lectures: 1. Introduction - Natural sciences and chemistry. Units of measurement and measurement. Classification of matter. Pure substance. Decomposition of the substance to the pure substance. 2. Properties of a pure substances, physical and chemical properties. Atom and chemical element. The chemical symbols of elements. The laws of chemical combination by weight and volume. The atomic theoryes from the early ideas to John Dalton. Avogadro's hypothesis. 3. The discovery of the structure of atoms. The discovery of X-rays and radioactivity. Rutherford model of the atom. X-rays and crystal structure. Bragg equation. Isotopes and the structure of the atomic nucleus. 4. The structure of pure substances. The atomic structure of substances. Types of a crystal systems and crystal characteristics. Cubic crystal system. The molecular structure of substances. The nature of the gas. The nature of the fluid. The concept of temperature. The kinetic theory of gases. 5. Gas laws and the equation of state of an ideal gas. Real gases. Relative atomic and molecular weight. Methods for determining relative atomic (Dulong

	- Petit method, X-ray diffraction, mass spectrograph) and molecular weight (density of the gas, the method of Victor Mayer, Hoffman method). Periodic table of the elements and the periodic law. 6. Electronic structure of atoms - Bohr model of the atom, quantum numbers. Quantum theory of the electronic structure of atoms. Atomic orbitals. 7. Periodic Classification of elements and the periodic table. Periodic changes in physical properties. Atomic radius. Ionization energy. Electron affinity. Electronegativity. 8. Chemical bonding and molecular structure - Electronic valence theory, ionic and covalent compounds. Electronegativity and degree of oxidation. Writing Lewis structures and the octet rule. Formal charges. Exceptions from the octet rule. VSEPR model and geometry of the molecule. 9. Bond characteristics. Valence bond theory and theory of molecular orbitals. 10. Intermolecular forces. Dipole moment, Van der Waals and London forces, hydrogen bond. 11. The structure and properties of the liquid and solid. Physical properties of solutions. Types of solution. Expression of concentration. 12. The liquid in the liquid solution. Solutions of solids in liquids. Solutions of gases in liquids. Effect of temperature on the solubility. Effect of pressure on the solubility of gases. Colligative properties of solutions: nonelectrolyte and electrolyte solution. 13. Chemical reactions - types of chemical reactions, redox reactions, complex reactions (protolytic reactions and precipitation reactions and dissolution), complex reactions. 14. Chemical kinetics, reaction rate, reaction mechanism, the activation energy. Chemical equilibrium - term equilibrium, chemical equilibrium and chemical equilibrium constant. Factors that affect the chemical equilibrium. 15. Equilibrium in homogeneous and heterogeneous systems. Balance in the electrolyte solutions - equilibrium in solutions of acids and bases , the equilibrium of the complex in solution, the equilibrium between the solution and the insoluble crystals, redox balance <u>Seminars</u>: 1. The oxidation number: definition, rules for determining in ions and molecules. Examples and training. 2. Nomenclature of Inorganic Chemistry. Names of monoatomic cations and monoatomic anions. Names of poliatomic cations and anion. The names of the ligands. Names of complex ions. Names of oxo acid and their salts. 3. Naming of inorganic compounds - training. 4. Balancing chemical equations, balancing redox equations. 5. Writing redox equations - practice. 6. The stoichiometry: Qualitative and quantitative relationships in chemical reactions. Molar method. 7. Stoichiometry: Quantitative relationships. Yield in chemical reactions and processes: the relevant reactant, the reactant in excess of the theoretical amount of reactants, the theoretical amount of product, yield and loss. 8. The stoichiometry: volume and mass in chemical reactions. 9. Electronic configuration of atoms and ions 10. Lewis structural formula 11. Electronic structural formula 12. Chemical equilibrium in homogeneous and heterogeneous systems 13. Chemical equilibrium in electrolyte solutions.

Format of instruction	x lectures x seminars and workshops ☐exercises ☐*on line* in entirety	☐independent assignments ☐multimedia ☐laboratory

	☐partial e-learning ☐field work			☐work with mentor ☐ (other)		
Student responsibilities	The 80% presence at lectures and seminars, and completed all laboratory exercises.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	3	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1	Oral exam	2	(Other)	
	Written exam	1	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Students who obtain a signature from the course General Chemistry can take the exam. The exam consists of a written and oral examination. The student approached the oral exam must first pass a written examination. The written part of the exam lasts two hours. The written part of the exam is evaluated as follows : Exactly solved more than 55 % - sufficient Exactly solved more than 70 % - good Exactly solved more than 80 % - very good Exactly solved more than 90 % - excellent After the written exam on the notice board of the Department will be advertised results of the exam and time when students which did not pass the written exam can view tasks and schedule for oral examinations for students which have acquired this right. A complete examination or part thereof may be installed through three partial tests during the semester. The tests cover material presented in lectures, seminars and exercises. Written tests are evaluated in the following manner: Exactly solved more than 55 % - released a written exam Exactly solved by 60 % - freed written and oral - sufficient Exactly solved by 70 % - freed written and oral - good Exactly solved by 80 % - freed written and oral - very good Exactly solved by 90 % - freed written and oral - excellent It is necessary to pass all tests in order to pass the exam. Students who did not meet any of the tests must take written and oral exam of that part.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	I Filipović, S. Lipanović, Opća i anorganska kemija I dio, Školska knjiga, Zagreb, 1995			10		
	S. Brinić: „Recenzirana predavanja iz odabranih poglavlja Opće kemije“ Veljača 2012. KTF-Split. 30.1.2014. <http://www.ktf-split.hr/~brinic/nastava/nast.html>				web http://www.ktf-split.hr	
	Z. Grubač: „Recenzirana predavanja iz odabranih poglavlja Opće kemije“ Veljača 2012. KTF-Split. 30.1.2014. <http://www.ktf-split.hr/~grubac/opca.htm>				web http://www.ktf-split.hr	
	M. Sikirica, Stehiometrija, Školska knjiga, Zagreb					

	Vježbe iz Opće kemije (interna skripta), Kemijsko-tehnološki fakultet, Split, 2013.		
Optional literature (at the time of submission of study programme proposal)	D. D. Ebbing and S. D. Gammon, General Chemistry, 9th edition, Houghton Mifflin Company, Boston, 2009. Raymond Chang, Chemistry, 10th edition, McGraw-Hill, New York, 2010.		
Quality assurance methods that ensure the acquisition of exit competences	- Information from interviews, observations, and consultation with students during lectures - Student survey		
Other (as the proposer wishes to add)			

Exercises in General Chemistry

NAME OF THE COURSE	**Exercises in General Chemistry**					
Code	KTA105	Year of study	1st			
Course teacher	PhD, Slobodan Brinić, associate prof. PhD, Zoran Grubač, prof	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Exercising, testing and confirm knowledge from lectures. Understanding with the methods of experimental work and the acquisition of skills necessary for independent work in the lab.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in General Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will upon completion of the course be able to: 1. Practically through experiments verify the theoretical assumptions 2. Gain independence in performing experiments 3. Design simple experiments to illustrate the chemical properties of the substance 4. Actively exploring ways in which this discipline has consequently impact on the outside world.					
Course content broken down in detail by weekly class schedule (syllabus)	<u>Exercise 1</u> The basic rules of laboratory work, safety precautions and protection in the lab, basic laboratory equipment. Washing, cleaning and drying of dishes. Basic laboratory operations, chemicals and dealing with them. Decomposition of the substance to the pure substance. Decomposition of heterogeneous and homogeneous mixture <u>Exercise 2</u>					

<table>
<tr><td></td><td colspan="6">Decomposition of the mixture to the pure substance, Decomposition of heterogeneous substances, Sedimentation, decanting, centrifuging, filtering, Buchner funnel, distillation and fractional distillation, sublimation of iodine. Extraction of iodine from aqueous solutions
<u>Exercise 3</u>
Physical and chemical changes, the law of conservation of weight, Gay - Lussac's law of connected volumes. Exercise with models of unit cells. Determining the relative atomic mass of zinc. Determination of the empirical formula of copper chloride.
<u>Exercise 4</u>
Gas Laws: Determination of the molar volume of oxygen, Boyle's law, Charles Gay - Lussac's law, the pressure dependence of the temperature in gases.
<u>Exercise 5</u>
Solutions and their properties. Expressing of concentration. Preparation of the solution with given concentration. Solutions of liquids in liquids. Solutions of gases in liquids. Dependence of solubility on the nature (structure) of the substance. Dependence of solubility on temperature. Dissolution of liquids in liquids. Dissolving gases in liquids. Henry's law. Determination of molar mass by freezing point depression. Illustration of electrolytic dissociation. Illustration of ions traveling to the electrodes. Electrical conductivity of the solution. Redox - reactions of sulfur and oxygen. Redox reaction of dilute nitric acid solution and iron (II) sulfate. Decomposition and formation reactions of complexes. Ligand substitution reaction. Protolytic reactions (acid- base titration).
<u>Exercise 6</u>
Chemical kinetic, effect of concentration of reactants on the rate of chemical reactions. Effect of temperature on the rate of chemical reactions. The catalytic effect on the rate of chemical reactions. Balance in electrolyte solutions. Moving the chemical balance. Determination of the acid dissociation constant, K_a. Determination of pH: Approximately determination of pH using indicators. Determination of pH using pH sensors. Electrolysis - Determination of Faraday's constant. Electromotive force of galvanic cells - Daniell cell.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
x exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Completed all laboratory exercises.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>2</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Prior to joining the laboratory exercises, students' knowledge of the material concerned exercises will be verified by tests.</td></tr>
<tr><td>Required literature (available in the</td><td colspan="3">Title</td><td>Number of copies in</td><td>Availability via other media</td></tr>
</table>

library and via other media)		**the library**	
	Vježbe iz Opće kemije (interna skripta), Kemijsko-tehnološki fakultet, Split, 2013.		
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	- Information from interviews, observations, and consultation with students during lectures - Student survey		
Other (as the proposer wishes to add)			

Computer Application

NAME OF THE COURSE	**Computer Application**					
Code	KTA113	Year of study	1st			
Course teacher	PhD, Dražan Jozić, associated prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Acquiring a basic knowledge of computers and computer systems. Knowledge about the use of Internet content and protect your computer from malicious programs. Basic skills about the content management (folders and files) on PCs using the Windows operating system. Basic skills using programs offered in the MS Office software.					
Course enrolment requirements and entry competences required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student will be able to: 1. Manage content on PC computer (files and folders) 2. Use the MS Word in the purpose of the editing the file according to the specified requirements (defining the shape and page layout, inserting the images, finished elements, tables, graphs ...) 3. Use the MS Excel for analysis, calculation, sorting, graphical presentation and format tables.					

	4. Use the MS PowerPoint to create presentations 5. Set up and use MS Outlook for editing and emailing 6. Find reliable sources of information on the Internet		
Course content broken down in detail by weekly class schedule (syllabus)	1. Week	L	General information about the course and mode of examination, Introduction to computers application, Information activity and technology, Computerization, Computer applications in Chemistry and Chemical Engineering
		E	
	2. Week	L	Hardware (PC), Von Neumann's model computers, Computer hardware, Computer types, Basic terms in the Computer Engineering and informatics, Basic parts (components) of the PC, Central processing unit (CPU), Computer memory, Motherboards and connectors, Input and Output devices
		E	
	3. Week	L	Operating systems and applications, The BIOS (Basic Input / Output System), Preparing disks and drives for installation of the OS, File system (FAT, NTFS), Computer Programs, System programs, Application programs, Operating systems
		E	
	4. Week	L	Basics commands for MS-DOS, GUI (Graphical User Interface), Properties GUI, History of developing the MS Windows OS, Example Installations operating systems (Windows OS), Customizing the User Interface, Library, Customize settings on PC computer, Firewall, Windows Defender, Windows Update, Action Center, Commercial antivirus programs
		E	
	5. Week	L	Backup and Restore, Control Panel, Customize the computer, The Device Manager, Accounts, Network and Sharing Center, Troubleshooting, Personalization, BitLocker Drive Encryption, Region and Language, Programs and Features, Installing and uninstalling programs, Display, Devices and Printers, Default Programs, Help and Support, Accessories and system tools, Shortcuts in Window OS, Changing the language of Windows OS
		E	
	6. Week	L	Malicious software (malware), Computer viruses, Computer worms, Trojan horses, Logic bombs, Spyware, Advertising Programs (Adware), INTERNET, History of the Internet, TCP / IP protocol
		E	
	7. Week	L	First test
		E	
	8. Week	L	Internet, Computer network and classification networks, Internet protocols: HTTP, HTTPS and FTP, Web browsers, Copyright Law
		E	
	9. Week	L	MS Office, MS Word, How to start the MS Word, Layout MS Word window, The status bar, Tabs and tools, Copy and paste data, Special characters, Styles, Tabs, Sections, Creating a new document, Copy text, Headers and footers, Page numbers
		E	MS Word: How to insert and edit the text and its formatting. Paragraph formatting. Lists of lists. Working with documents. formatting documents

	10. Week	L	How to insert and edit the formulas and equations, Application of the finished style characteristics, Input tables and formatting, input images in the document, the entry of bibliographic data entry page breaks and section breaks (define different sections of the document), display the contents of the document
		E	MS Word: Insert pictures, tables and SmartArt elements in the document. Formatting headers and footers document. Entering references and footnotes in the document. Insert the page break, Section break, Application of different style for document
	11. Week	L	MS Excel, How to start MS Excel, Layout MS Excel windows, Toolbar for quick access, Status bar, Tabs and tools, Tabs formulas, Editing data within a worksheet, Graphic data presentation, Input data string in the table, Add the trend data, Sorting data set
		E	MS Excel: Working with the tables. Entering data into tables and data formatting. Entering a series of data. Entering data from different files. Displaying data graphically.
	12. Week	L	Conditional Formatting Data, Creating and deleting equations, Addresses cells (relative, absolute, mixed), Types of functions, Logical operators, Boolean functions, Examples of application functions (IF, AND, OR, COUNTIF ..), MS PowerPoint, MS PowerPoint Startup, The appearance of windows, tabs and tools, Creating presentations, add themes, Themes Edit, Insert object (images, tables, links, media content ...)
		E	MS Excel: Data processing, Calculating with tables, Input and syntax for creating mathematical equations. Showing the trend curve.
	13. Week	L	MS Outlook, MS Outlook Startup, The appearance of windows, tabs and tools, Creating a user account , Creating a new e-mail
		E	MS Power Point: Creating presentations. Choosing the design, How to make redesign of an existing template.
	14. Week	L	Databases, What databases they are?, Fields in databases, How databases are developed?, Center for online databases, Bibliographic databases, Citation databases, Databases with full-text, Sciencedirect databases, Scopus databases, Web database, Bibliography
		E	
	15. Week	L	Second Test
		E	

Format of instruction	x lectures ☐seminars and workshops x exercises ☐*on line*in entirety ☐partial e-learning ☐field work	☐independent assignments x multimedia ☐laboratory ☐work with mentor ☐ (other)
Studentresponsibilities	Class attendance in the amount of 70% to 100%, and to experimental work of 100% from total hours.	

Screening student work*(name the proportion of ECTS credits for*	Class attendance	0.5	Research		Practical training	1.0
	Experimental work		Report		Independent work	0.6

eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		Consultations	
	Tests	0.5	Oral exam		Practical part of exam	0.8
	Written exam	0.6	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The written exam can be finished over the two tests during the semester. Minimum for successful tests is the limit of the 60% resolved test. Each test in assessing participates with a share of the 15% of the final grade. Presence at lectures 70-100% participates with a share of the 5% of the final grade while the presence of the laboratory exercises from 100% participates with a share of the 15% of the final grade. Practical part of exam participates with a share of the 50% of the final grade. The examination periods there is a written and oral exam. Minimum for successful written exam is the limit of the 60% resolved test. Passing one test (previous activity) is valuable in the summer semester examination period with a share of the 20% of the final grade. Written exam has a share of the 20% and practical part of exam has a share of the 40% of the final grade. Students who have not passed any tests during the semester they take the examination through written and practical exams in the regular examination period. Minimum for successful tests the limit of the 50% resolved test. Written part of exam participates with a share of the 30% of the final grade and practical part of exam with a share of the 50% of the final grade. The final grade: 60%-71% - sufficient, 72%-81% - good, 82%-91% very good, 92%-100% - excellent.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	1. D.Jozić, Predavanja iz kolegija:Primjena računala, Kemijsko-tehnološki fakultet, Interna skripta, Split, 2013.	1	
	2. Wallace Wang, Office 2010 For Dummies, Wiley Publishing Inc., Indiana, 2010.	1	

Optional literature (at the time of submission of study programme proposal)	Selected articles from journals recommended by lecturer
Quality assurance methods that ensure the acquisition of exit competences	Tracking suggestions and reactions of students throughout the semester Student survey
Other (as the proposer wishes to add)	

Mathematics II

NAME OF THE COURSE	Mathematics II					
Code	KTA106	Year of study	1st			
Course teacher	Branka Gotovac, lecturer	Credits (ECTS)	6.0			
Associate teachers	Lucija Ružman, assistant	Type of instruction (number of hours)	L	S	E	F
			45	30	0	0

Status of the course	Mandatory	Percentage of application of e-learning	

COURSE DESCRIPTION

Course objectives	To introduce students to the basic elements of integral calculus, differential calculus of several variables and the basic of differential equations.
Course enrolment requirements and entry competences required for the course	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After finishing this course the student is expected to be able to: • apply the techniques of integration (integration by substitution, integration by parts) • use the definite integral in its geometrical applications • solve the first-order differential equations (variabels separable, homogeneous differential equations, linear differential equations, exact differential equations) • solve the second-order linear nonhomogeneous differential equations with constant coefficients
Course content broken down in detail by weekly class schedule (syllabus)	1. Indefinite integral. Table of integrals. 2. Integration by substitution. Integration by parts. 3. Integrating rational fractions. Integrating by algebraic substitution. 4. Definite integral. 5. Improper integrals. 6. Application of definite integral. 7. Functions of several variables. Limit and continuity. 8. Partial derivatives. Differential. 9. Tangent plane and normal line. Maxima and minima. 10. Double integrals. 11. Geometric application of double integrals. 12. Ordinary differential equations. 13. First-order differential equations. 14. Second-order differential equations. 15. Course review. Revision.

Format of instruction	✕ lectures ✕ seminars and workshops ☐exercises ☐on linein entirety ☐partial e-learning ☐field work	☐independent assignments ✕multimedia ☐laboratory ☐work with mentor ☐(other)
Studentresponsibilities	Regular attendance of classes.	

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,3	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1,5	Oral exam	1,1	(Other)	
	Written exam	1,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	Examination: either by continuously checking and grading students' progress during the semester or in exam terms by passing written and oral exam. At the beginning of the course students will be informed of in detail elaborated rules for both models of examination.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	T. Bradić, i dr., Matematika za tehnološke fakultete, Element, Zagreb (više izdanja)	47	
	B.P. Demidovič, Zadaci i riješeni primjeri iz više matematike, Tehnička knjiga, Zagreb (više izdanja)	5	
	I. Slapničar, Matematika 2, Fakultet elektrotehnike, strojarstva i brodogradnje Sveučilišta u Splitu, Split, 2008. (http://lavica.fesb.hr/mat2)		
Optional literature (at the time of submission of study programme proposal)	S. Kurepa, Matematička analiza I i II dio, Školska knjiga, Zagreb, 1997. Hughes-Hallett, Gleason et al., Calculus, John Wiley and Sons, Inc., New York, 2000. McCallum, Hughes-Hallett, Gleason et al., Multivariable Calculus, John Wiley and Sons, Inc., New York, 2002.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Physics II

COURSE NAME	**Physics II**					
Course code	KTA107	Year of study	1st			
Course lecturer	PhD, Magdy Lučić Lavčević, associate prof.	Credits (ECTS)	3.5			
Assistants	Lucija Matković, assistant	Type of instruction	L	S	E	F
			30	15	0	0
Course status	Mandatory	Application of e-learning (percentage)				
COURSE DESCRIPTION						
Course objectives	- Introducing students to the knowledge and principles of physics in the fields of electromagnetism, optics and elementary quantum physics - Forming the proper view towards the interpretation of physics phenomena and their application - Developing the level of cognitive processing required for further studies					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Pysics II					

<table>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="2">After the course, the student is expected to have mastered
– The principles of electromagnetism and electromagnetic radiation
– The principles of geometrical and physical optics
– The basic principles of quantum physics
– The application of the obtained knowledge in concrete physics examples
– The application of the obtained knowledge in solving professional problem tasks
– Recognition of the application of the knowledge of physics in everyday situations</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="2">1st week: Electric charges, electrostatic force and electrostatic field. Vector field flux and Gauss's law (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
2nd week: Electric potential and potential difference. Moving and storing electric charges, electric circuits. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
3rd week: Charges in motion and their interactions, electric current. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. . (1.5 hours)
4th week: Magnetic field. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
5th week: Time depending electric and magnetic fields. Faraday's law. Inductivity. Induction generators. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
Partial assessment (1st preliminary test) related to seminars and theory addressed during the course.
6th week: Alternating currents. Electric machines. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
7th week: Electromagnetic oscillating circuit and radiation. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
8th week: Electromagnetic waves and nature of light. (2 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
9th week: Interaction of electromagnetic radiation and matter: absorption, refraction, reflection, polarization, scattering, photoelectric effect. Ideas of quantum physics. (4 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1.5 hours)
10th week: Physical and geometric optics. (3 hours).
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1.5 hours)
Partial assessment (2rd preliminary test) related to seminars and theory addressed during the course</td></tr>
<tr><td>Format of instruction</td><td>X lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td>☐independent assignments
X multimedia
☐laboratory
☐work with mentor
X group and individual tutorials
X seminars</td></tr>
<tr><td>Student</td><td colspan="2"></td></tr>
</table>

responsibilities						
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	0.5	Research		Practical training	
	Experimental work		Report		Pre-test preparation classes	
	Essay		Seminar essay		(Other)	
	Tests	1.0	Oral exam	1.0	(Other)	
	Written exam	1.0	Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester, the final exam can be substituted via 2 midterm exams, related to lectures (theory) and seminars (solving problems), according to curriculum. During the final examination period, the final theory exam shall be taken after passing the final problem´s solving exam. Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent		
Required literature (available in the library and via other media)	**Book title**	**Number of books in the library**	**Available via other media**
	N. Cindro, Fizika II, Školska knjiga, Zagreb, 1985.	10	-
	E. Babić, R. Krsnik, M. Očko, Zbirka riješenih zadataka iz fizike, Školska knjiga, Zagreb, Zagreb, 1990.	3	-
Optional literature	D. Halliday, R. Resnick, Fundamentals of Physics, John Wiley, New York 2003. Janko Herak, Osnove kemijske fizike, Farmaceutsko-biokemijski fakultet Sveučilišta u Zagrebu, 2001. V. Lopac, P. Kulišić, M. Pavičić, Zbirka zadataka iz fizike, FGZ Zagreb, 1983.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Exercises in Pysics II

COURSE NAME	**Physics II**					
Course code	KTA108	Year of study	1st			
Course lecturer	PhD, Magdy Lučić Lavčević, associate prof.	Credits (ECTS)	2.0			
Assistants	PhD, Mirko Marušić, assistant Lucija Matković, assistant	Type of instruction	L	S	E	F
			0	0	30	0
Course status	Mandatory	Application of e-learning (percentage)				
COURSE DESCRIPTION						

<table>
<tr><td>Course objectives</td><td colspan="6">The basic and the inseparable part of all physics research is the experiment. The aim of this course is to introduce the students to various techniques of conducting experiments and methods of measuring the physics quantities fom the field of electromagnetism and optics. Additionaly, the aim is to enable the development of skills needed to conduct experiments, gather dana and master various numerical problems, which are related to measuring and testing physics quantities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Physics II</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">- Obtaining the basic knowledge and skills needed to conduct experiments in the field of electromagnetism and optics
- The knowledge of various methods and techniques of measurement
- Mastering the calculation of errors which occured during the measurement
- Mastering the evaluation of errors which occured during the measurement
- The skills of graphic representation of the measured data and the method of writing reports pertaining to the experiment and the results of measuring conducted.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">• Electric circuits: elements and instruments. (4 hours)
• Direct current ; Resistance and resistors.(4 hours)
• Alternating current; Capacitance and capacitors. (3 hours)
• Alternating current; Inductance and inductors. (3 hours)
• RLC circuits (3 hours)
• Laws of geometrical optics. (3 hours)
• Laws of physical optics. (3 hours)
• Optical instruments. (4 hours)
• Spectroscopy / quantization (3 hours)
• Compensating exercises
Final revision test</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐seminars and workshops
X exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐ multimedia
X laboratory
☐work with mentor
X group and individual tutorials
☐ seminars</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.6</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Pre-test preparation classes</td><td>0.6</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.8</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Weekly tests,
Grade of the written experiment report,
Final test.
Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent.</td></tr>
</table>

Required literature (available in the library and via other media)	**Book title**	**Number of books in the library**	**Available via other media**
	M. Lučić Lavčević, Praktikum iz fizike, II. dio, 2012, script in preparation		Web - portal
Optional literature			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Inorganic Chemistry

NAME OF THE COURSE	**Inorganic Chemistry**					
Code	KTA109	Year of study	1st			
Course teacher	PhD, Zoran Grubač, prof. PhD, Slobodan Brinić, associate prof.	Credits (ECTS)	7.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Introduce students to the chemical reactivity of elements along the periodic table, and with the properties and composition of common chemicals. To develop students ability to notice similarities and differences between inorganic compounds and inorganic substances. Understanding of the changes in the various physical and chemical conditions					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Inorganic Chemistry The condition for taking the exam: Passed the course "Exercises in Inorganic Chemistry"					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students upon completion of the course: 1) will know the basic characteristics and producing of chemical elements for the major groups of periodic table of elements (PTE) 3) be able to identify the type and properties of chemical compounds of main group 3) be able to identify the type and properties of transition metal compounds 4) to classified compounds on the base of their characteristics 5) to predict acidic, basic and amphoteric properties of salts 6) to know common salt crystal structure 7) to predict the possible reaction mechanisms and outcomes of chemical reactions 8) to independently and safely perform simple chemical reactions					
Course content broken down in detail by weekly class schedule (syllabus)	Lectures: 1. Hydrogen position in PTE, hydrogen properties and production, positive oxidation state and hydrides 2. Noble gases, properties of group, obtaining and using of xenon compounds 3. Introduction to halogens, elements properties in order to oxidation state 4. Fluorine production and properties, differences between the fluorine and the					

	other members of the group, fluorine compounds. Chlorine producing and properties, compounds of chlorine, bromine and Iodine 5. Introduction to chalcogen elements, elements properties in order to oxidation state 6. Oxygen properties and production, the compounds of oxygen, oxides, water 7. Sulfur properties and production, oxides and sulfur acids, other sulfur compounds, compounds of selenium and tellurium, 8. A group of nitrogen, elements properties in order to oxidation state 9. Nitrogen, properties of the production, ammonia, nitric acid and other nitrogen compounds, nitrogen fixation 10. Phosphorus, properties and production, oxides and acids of phosphorus, arsenic, antimony and bismuth 11. A group of carbon, elements properties in order to oxidation state 12. Carbon allotropes, carbon properties and production, carbon oxides, carbides, carbonates and bicarbonates. 13. The compounds of silicon, germanium, tin and lead, semiconductor properties of silicon and germanium 14. A group of boron, elements properties in order to oxidation state, boranes, boric acid. Production and properties of aluminum, aluminum compounds, gallium, indium, thallium 15. Alkali and alkaline earth metals <u>Seminars</u> : 1. Balancing chemical reactions, writing and balancing redox reactions in one line 2. Common reactions of hydrogen, the reducing action of hydrogen 3. Common reactions of chlorine, the disproportionation of chlorine in alkaline solutions, the oxidation activity of the halogens compounds 4. Common reactions of chalcogen elements, reaction of oxygen and ozone, the oxidizing action of oxygen, 5. The reaction of sulfur, the reactions which translate elemental sulfur to sulfuric acid, the oxidizing action of sulfuric acid, a dehydrating effect of sulfuric acid 6. Common reactions of nitrogen, the nitrogen production reactions, the reaction of ammonia oxidation to nitric acid, the oxidizing action of nitric acid. 7. Common reactions of phosphorus, oxidation reactions of phosphorus to phosphorus and phosphoric acid 8. Common reactions of carbon, oxides of carbon production, reducing effect of CO, binding of CO_2 from the air, the precipitation of carbonates, cation hydrolysis 9. Common reactions of the boron group elements, reaction of boric acid production, dissolution of borax in water, production of crystalline boron acid, base properties of aluminum hydroxide, 10. Aluminum reducing action, aluminotermic reaction, common reactions of metals and metal production, 11. Common reactions of alkali and alkaline earth metals with water and their salts 12. Common reactions of transition metals, proving of peroxide with titanyl ion, oxidation states of vanadium, oxidative properties of permanganate, equilibrium between chromate and dichromate, iron compounds 13. Noble metals, zinc, cadmium and mercury 14. Sea - a mixture of inorganic substances. The chemical composition of sea water, salinity, pH and speciation 15. Mixed problems	
Format of instruction	x lectures x seminars and workshops ☐exercises ☐*on line* in entirety	☐independent assignments ☐multimedia ☐laboratory ☐work with mentor

<table>
<tr><td></td><td colspan="6">☐partial e-learning
☐field work</td><td colspan="2">☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">The 80% presence at lectures and seminars and completed all laboratory exercises.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1</td><td>Oral exam</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">Students who obtain a signature from the course Inorganic Chemistry can take the exam. The exam consists of a written and oral examination. The student approached the oral exam must first pass a written examination. The written part of the exam lasts two hours. The written part of the exam is evaluated as follows:
Exactly solved more than 55 % - sufficient
Exactly solved more than 70 % - good
Exactly solved more than 80 % - very good
Exactly solved more than 90 % - excellent
After the written exam on the notice board of the Department will be advertised results of the exam and time when students which did not pass the written exam can view tasks and schedule for oral examinations for students which have acquired this right .
A complete examination or part thereof may be installed through three partial tests during the semester. The tests cover material presented in lectures, seminars and exercises. Written tests are evaluated in the following manner:
Exactly solved more than 55 % - released a written exam
Exactly solved by 60 % - freed written and oral - sufficient
Exactly solved by 70 % - freed written and oral - good
Exactly solved by 80 % - freed written and oral - very good
Exactly solved by 90 % - freed written and oral - excellent
It is necessary to pass all tests in order to pass the exam. Students who did not meet any of the tests must take written and oral exam of that part .</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="5">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="5">I. Filipović, S. Lipanović, Opća i anorganska kemija II dio, Školska knjiga, Zagreb, 1995</td><td>10</td><td></td></tr>
<tr><td colspan="5">S. Brinić, „Recenzirana predavanja iz odabranih poglavlja Anorganske kemije“ veljača 2012. KTF-Split. 30.1.2014. <http://www.ktf-split.hr/~brinic/nastava/nast.html></td><td></td><td>web http://www.ktf-split.hr/</td></tr>
<tr><td colspan="5">Z.Grubač: „Recenzirana predavanja iz odabranih poglavlja Anorganske kemije“ veljača 2012. KTF-Split. 30.1.2014. <http://www.ktf-split.hr/~grubac/opca.htm></td><td></td><td>web http://www.ktf-split.hr/</td></tr>
</table>

	Vježbe iz Anorganske kemije (interna skripta), Kemijsko-tehnološki fakultet, Split, 2013.		web http://www.ktf-split.hr/
Optional literature (at the time of submission of study programme proposal)	F. Albert Cotton et al., Basic Inorganic Chemistry, New York, John Wiley and Sons, 1995.		
Quality assurance methods that ensure the acquisition of exit competences	- Information from interviews, observations, and consultation with students during lectures - Student survey		
Other (as the proposer wishes to add)			

Exercises in Inorganic Chemistry

NAME OF THE COURSE	**Exercises in Inorganic Chemistry**					
Code	KTA110	Year of study	1st			
Course teacher	PhD, Zoran Grubač, prof. PhD, Slobodan Brinić, associate prof.	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Exercising, testing and confirm knowledge from lectures. Understanding with the methods of experimental work and the acquisition of skills necessary for independent work in the lab.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Inorganic chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will upon completion of the course be able to: 1. Practically through experiments verify the theoretical assumptions 2. Gain independence in performing experiments 3. Design simple experiments to illustrate the chemical properties of the substance 4. Actively exploring ways in which this discipline has consequently impact on the outside world.					
Course content broken down in detail by weekly class schedule (syllabus)	Exercises : 1. Exercise: HYDROGEN 2. Exercise: 17th GROUP (Halogens) 3. Exercise: 16th GROUP (Chalcogens) 4. Exercise: 15th GROUP 5. Exercise: 14th GROUP and 13th GROUP, 1st and 2nd groups (Alkali and earth alkali metals)					

<table>
<tr><td></td><td colspan="6">6. Exercise: TRANSITION ELEMENTS (groups 3 to 7)
7. Exercise: TRANSITION ELEMENTS (groups 8 to 12)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
x exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Completed all laboratory exercises.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>2</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Prior to joining the laboratory exercises, students' knowledge of the material concerned exercises will be verified by tests. All exercises must be completed.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Vježbe iz Anorganske kemije (interna skripta), Kemijsko-tehnološki fakultet, Split, 2013.</td><td>10</td><td>web http://www.ktf-split.hr/</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Information from interviews, observations, and consultation with students during lectures
- Student survey</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Analytical Chemistry

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Analytical Chemistry</td></tr>
<tr><td>Code</td><td>KTA111</td><td>Year of study</td><td colspan="4">1st</td></tr>
<tr><td>Course teacher</td><td>PhD, Ante Prkić, assistant prof.</td><td>Credits (ECTS)</td><td colspan="4">6.5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>60</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Acquiring basic basic theoretical knowledge of analytical chemistry, the role and application of analytical chemistry in various fields</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Enrolled in or passed the course Exercises in Analytical Chemistry</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After completing the course, the student will will be able to
- Define the concept of analytical chemistry
- Differentiate between the concepts of qualitative and quantitative chemical analysis
- Understand the concept of quantitative chemical reactions
- Understand the concept of gravimetric and volumetric determination
- Understand the precipitation, neutralization, complexometric and redox titrations
- Solving numerical problems from a qualitative and quantitative chemical analysis</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">First week : Description and review of curriculum. Definitions of analytical chemistry. Division of Analytical Chemistry. The concept of the analytical signal. Seminar: Solving numerical problems from theoretical lecture
Second week : The concept and definition of chemical analysis - qualitative and quantitative. Seminar: Solving numerical problems; homogeneous and heterogeneous equilibrium in analytical chemistry..
3rd week : Qualitative chemical analysis. The concept and definition of acids and bases. Consideration of acid-base balance. Seminar: Solving problems
.4th week : The concept and definition of complex ions., complexometric equilibrium . Seminar: Solving problems
5th week : The concept and definition of electrochemical reactions. Consideration of electrochemical equilibrium. Seminar: Solving problems
6th week: The concept and definition of heterogeneous equilibrium. process of dissolution and precipitation. Seminar: Solving problemsl
7th week .Recapitulation of theoretical and seminars lecture I partial exam .theoretical lecture and seminars
8th week . Quantitative chemical analysis. The concept and definition of gravimetric determination. Seminar: Solving problems,
9th week . optimization of precipitationcondition. Seminar: Solving problems.
10th week : The concept and definition of standards and standard solutions - primary and secondary. The concept and definition of the volumetric determination; Seminar: Solving problems.
11th week : The concept and definition of volumetric determinations-</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Argentometric titration; Seminar: Solving problems.
12 weeks The concept and definition of volumetric determinations based on neutralization reactions - acid-base titration; Seminar Solving problems
13th week . The concept and definition of volumetric determinations based on the complex - complexometric titrations; Seminar Solving problems
14th week . The concept and definition of volumetric determinations based on redox reactions. Seminar Seminar Solving problems
15th week : Recapitulation of theoretical and seminars lecture II partial exam .theoretical lecture and seminars.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒lectures
☒seminars and workshops
☒exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☒multimedia
☒laboratory
☐work with mentor
☐(other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Lectures attendance - at least 80% and completing exercises</td></tr>
<tr><td rowspan="5">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>3</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1</td><td>Oral exam</td><td>2</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The entire test can be applied over two partial tests during the semester. Passing threshold is 60%. Each test in assessing participates with 50%. Lectures presence of 80 to 100% is 10% marks. The examination periods there is a written and oral exam. Passing threshold is 60%. Passing one partial test of any part (previous activity) is valid throughout current academic year. Written exam has a share of 50% and oral examination also 50%. Students who have not passed the partial tests will have oral examination in the regular examination period. Passing threshold is 60% and the examination form to participate in the evaluation by 50%.

Rating: 60% -69% - satisfactory, 70% -79% - good, 80% -89% very good, 90% - 100% - excellent.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">1. D. A.Skoog, D. M. West, F. J. Holler, Fundamentals of Analytical Chemistry, Seventh Edition, Saunders College Publishing, New York, London, 1996. { šesto izdanje (englesko) 1992, prvo izdanje (hrvatsko), Školska knjiga, Zagreb, 1999.};
2.A. Skoog, D. M. West i F. J. Holler, S. R. Crouch, Fundamentals of Analytical Chemistry, 9th edition,</td><td>1. 6

1</td><td>Web page of the Department of Analytical Chemistry</td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
</table>

	Brooks&Cole, SAD, 2014.; 3. Nj. Radić, L. Kukoč-Modun, Uvod u analitičku kemiju, Redak, 2013.; 4.D.C.Harris, Quantitative Chemical Analysis, Eighth Edition, W.H.Freeman and Company, New York, 2010.		
Optional literature (at the time of submission of study programme proposal)	Z. Šoljić, Računanje u analitičkoj kemiji, Zagreb, 1998.		
Quality assurance methods that ensure the acquisition of exit competences	• registration of student's presence in class • annual analysis of students success in this course • student's survey in order to evaluate the professor • professor's self-evaluation		
Other (as the proposer wishes to add)			

Exercises in Analytical Chemistry

NAME OF THE COURSE	**Exercises in Analytical Chemistry**					
Code	KTA111	Year of study	1st			
Course teacher	PhD, Ante Prkić, assistant prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	45	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	• Acquiring students the basics principle of qualitative and quantitative chemical analysis. • learn students how to solve practical problems of sample analysis • introduce students to basic research methods in analytical chemistry, critical analysis of the results, their presentation, interpretation and linking theoretical knowledge with experimental work.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Analytical Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Learn how to handle laboratory equipment and glassware, properly perform the appropriate operations in the qualitative and quantitative analysis connect basic knowledge of control and the realization of reliable analytical results, connect a numerical solving chemical problems related to chemical analysis using the basic laws in aqueous solutions with the available techniques and methods that can be used to perform chemical analysis, development of critical thinking and teamwork, understand the concepz of qualitative and quantitative chemical analysis understand the concept of gravimetryc and volumetryc determination					

<table>
<tr><td></td><td colspan="6">Understanding precipitation, neutralization, complexometric and redox titrations</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1. Introduction in laboratory work. (4 hours)
2. Qualitative chemical analysis – determination of groups of cations. (5 hours)
3. Qualitative chemical analysis – determination of groups of anions (5 hours)
4. Gravimetric determination of nickel cations. (6 hours)
5. Preparation of standard solutions in volumetric methods. (5 hours)
6. Acid-base titrations. (5 hours)
7. Redox titrations. (6 hours)
8. Complexometric titrations (6 hours).
9. Potenciometric titration (3 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒laboratory exercises
☒independent assignments</td><td colspan="3"></td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Completed all laboratory exercises and writting reports (100 %).
Continuous assessment by tests prior of the exercise.</td></tr>
<tr><td rowspan="2">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Experimental work</td><td>2</td><td>Report</td><td>0.5</td><td></td><td></td></tr>
<tr><td>Consultations</td><td></td><td>Written exam</td><td>0.5</td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation: (success (%) / share in the assessment (%))
• presence and activity in the laboratory exercises: (100/10)
• Written exams (60 - 100/25)
• Performance measurement: (60 - 100/25)
• Writing reports (experimental data, computer data, tables and graphs, conclusion): (60 - 100/40)</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Naslov</td><td>Broj primjeraka u knjižnici</td><td colspan="2">Dostupnost putem ostalih medija</td></tr>
<tr><td colspan="3">A. Prkić, Vježbe iz analitičke kemije, Preddiplomski studij kemijske tehnologije, interna recenzirana skripta, Split, 2008.</td><td>20</td><td colspan="2">Web page of the Department of Analytical Chemistry</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- monitoring suggestions and reactions of participants during the semester
- student survey</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Fundamentals of Mechanical Engineering

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Fundamentals of Mechanical Engineering</td></tr>
<tr><td>Code</td><td>KTA 114</td><td>Year of study</td><td colspan="4">1st</td></tr>
<tr><td>Course teacher</td><td>PhD, Željko Domazet, prof.</td><td>Credits (ECTS)</td><td colspan="4">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Lovre Krstulović-Opara, prof.</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4">30%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Basic knowledge in technical drawing, strength of materials, and parts of machinery in chemical industry</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">- being capable to read and understand technical drawing
- understanding the need for dimensioning machinery parts
- recognising basic machinery parts
- recognising basic parts in chemical industry</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1: Introduction to mechanical structures. National codes. Technical drawing – basics.
Week 2: Technical drawing – cross sections, displays, dimensions.
Week 3: Technical drawing – surface finishes, tolerances
Week 4: Technical drawing – CAD, rapid prototyping, 3D scanning
Week 5: Basics of mechanics (statics, kinematics, dynamics). Materials for mechanical design. (steel alloys, cast steel materials)
Week 6: Materials for mechanical design. (copper and aluminium alloys)
Week 7: Materials for mechanical design (sinter materials, polymers). Dimensioning of structures.
Week 8: 1st colloquium. Introduction to parts of machinery.
Week 9: Bolts, springs, welding and soldering
Week 10: Shafts and clutch
Week 11: Bearings and transmissions (belt drives, friction drives)
Week 12: Gearing and chain transmissions
Week 13: Mechanical parts in chemical industry (tubes and valves)
Week 14: Vessels and seals
Week 15: 2nd colloquium</td></tr>
<tr><td>Format of instruction</td><td colspan="3">xlectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
xmultimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibiliti</td><td colspan="6">Attending 70% of courses</td></tr>
</table>

es						
Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1	Oral exam		(Other)	
	Written exam	2	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Exam is written. Exam can be passed by partially by passing two colloquiums and gaining 50% (50 points of maximum 100). Minimum for passing exam is gaining 50% on colloquiums or regular exam. Requirement for attending second colloquium is gaining 25% (25 points) on first colloquium. Colloquiums can be repeated during first two exams. Marks: 50%-61% - minimum (2), 62%-74% - good (3) ,75%-87% -very good (4), 88%-100% - excellant (5).					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Ž. Domazet, L. Krstulović-Opara, Skripta iz Osnova strojarstva, KTF, Split, 2006.	1	KTF web pages
Optional literature (at the time of submission of study programme proposal)	V. Hrgešić i J. Baldani, "Mehaničke Konstrukcije", Sveučilište u Zagrebu - Elektrotehnički Fakultet, Zagreb, 1990. E. Hercigonja, Tehnička grafika, Školska knjiga, Zagreb, 1994. K.-H. Decker, Elementi strojeva, Tehnička knjiga, Zagreb, 1980		
Quality assurance methods that ensure the acquisition of exit competences	Student's survey		
Other (as the proposer wishes to add)			

Organic Chemistry

NAME OF THE COURSE	**Organic Chemistry**					
Code	KTA 201	Year of study	2nd			
Course teacher	PhD, Ivica Blažević, assistant prof.	Credits (ECTS)	6.5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			60	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Acquiring a basic knowledge of basic organic chemistry that involves understanding the structure and properties of organic compounds and mechanisms of organic reactions as well as understanding identification by organic					

	spectroscopy techniques.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Organic Chemistry
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completing the course, the student will become familiarized with the major concepts of organic chemistry, which includes: • identifying and naming of organic compounds according to functional groups and compare their physico - chemical properties; • learn about the organic compounds isomerism, stereochemical designations, features, and separation; • learn about organic compounds structure determination by spectroscopy (MS, NMR, IR, and UV/Vis); • analyze the reactivity of organic compounds with respect to their structure and stereochemistry; • propose appropriate reaction mechanisms of organic molecules that include addition, substitution and elimination; • identify and interpret division, structure and properties of natural organic compounds (carbohydrates, nucleic acids and lipids).
Course content broken down in detail by weekly class schedule (syllabus)	➢ **LECTURES AND SEMINARS:** 1. **Introduction:** What is organic chemistry? History of organic chemistry and its modern role. The main concepts of organic chemistry (functional groups, stereochemistry, curly arrows) (*2 hours*) 2. **The nature of chemical bonds**: Electronegativity. Bonds polarity, dipol, and formal charge. Lewis structure. Atomic orbitals. Molecular orbitals. Hybridization (sp^3, sp^2, sp). Length and energy of the bonds. The molecular geometry. The modified hybrid orbitals. VSEPR theory. (*4 hours*) 3. **Physical properties and intermolecular connections:** Van der Waals forces. Dipole - dipole. "Hydrogen bond". Solubility in solvents. (*2+1 hours*) 4. **Nomenclature and classes of organic compounds**. Hydrocarbons (alkanes, cycloalkanes). Functional groups and acronyms. The nomenclature of hydrocarbons (alkenes, alkynes). Nomenclature organohalogenated compounds, alcohols, amines. Nomenclature of aldehydes and ketones, carboxylic acids, acid derivatives. Systematic (IUPAC) nomenclature. Examples. (*7+2 hours*) 5. **Structure of molecules and isomerism. Constitutional isomers.** Alkanes. **Isomers.** Shapes of molecules and IHD. Stereochemistry. Conformations of alkanes (ethane, butane) and rings (C3, C4, C5, cyclohexane). Mono-substituted cycloalkanes. (*3+1 hours*) **I. PARTIAL EXAM** (*written*, *1hour and 10 min*) 6. Configuration of the cis / trans and E / Z; CIP rule. Conformations of disubstituted cycloalkanes. Alkenes. **Chirality and the plane of symmetry. Molecules with one stereocenter.** Enantiomers and racemic mixtures. The properties of the enantiomers. Optical activity. Polarimeter. Determination of tetrahedral stereogenic center. Fischer projections. Relative configuration. **Molecules with two stereocenter.** The properties of enantiomers, diastereomers and meso compounds. The separation of the racemate. **Chiral molecules without stereocenter.** (*9+2 hours*) 7. **Determining organic structures.** Introduction. Mass spectrometry (MS). Resolution. Molecular ion. Isotopes. Fragmentation. Examples of mass spectra. Electromagnetic radiation. Ultraviolet and visible spectroscopy (UV/Vis). Infrared spectroscopy (IR). Nuclear magnetic resonance (NMR). ^{13}C NMR. ^{1}H

	NMR. Chemical shift. Spin-spin coupling. Examples of IR, and NMR spectra. (*6+3 hours*) 8. **Organic reactions**. Definitions of basic terms. The division of reactions to the change of structure and to the reaction type. Acidity, basicity, and pK_a. Factors that enhance the acidity (the size of atoms, electronegativity, resonance, hybridization, inductive effects, charge, solvation, steric effects). Acid - base reactions. The rules for determining the oxidation state of carbon. Oxidation - reduction reactions. Usage of the curly arrows in the reaction mechanism. Intermediates. Nucleophiles and electrophiles. (*4 hours*) **II. PARTIAL EXAM** (*written*, *1hour and 10 min*) 9. **Alkanes and cycloalkanes.** Oxidation. Halogenation. **Alkyl halides**. Nucleophilic substitution at the saturated carbon (SN1 and SN2 mechanism). Elimination reactions (E1, E2 mechanisms). **Alkenes and alkynes.** Electrophilic additions and free radical, polymerization. **Conjugated unsaturated compounds**. 1,2 - and 1,4 - addition. **Aromatic compounds.** Electrophilic and nucleophilic aromatic substitution. **Phenols**. **Alcohols and ethers. Organometallic compounds. Aldehydes and ketones.** Nucleophilic addition to the carbonyl group. **Carboxylic acids and derivatives.** Nucleophilic substitution at the carbonyl group. **Amines. Heterocyclic compounds**. (*18+5 hours*) 10. **Carbohydrates. Amino acids. Nucleic acid. Lipids**. (*5+1 hours*) **III. PARTIAL EXAM** (*written*, *1hour and 10 min*) **IV. PARTIAL EXAM** (*oral*, *30 min*)
Format of instruction	**X lectures** ☐ seminars and workshops **X** exercises ☐*on line*in entirety ☐partial e-learning ☐field work **X** independent assignments **X** multimedia ☐ laboratory ☐work with mentor **X** seminars
Student responsibilities	

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	1,0	Research	0	Practical training	
	Experimental work	0	Report	0	(Other)	
	Essay	0	Seminar essay	0	(Other)	
	Tests	0	Oral exam	1,0	(Other)	
	Written exam	4,5	Project	0	(Other)	

Grading and evaluating student work in class and at the final exam	Course is divided into three sections that students take over 3 partial written and 1 oral exam or joining final exam at the end of the semester. The student pass the exam if achieve at least 60%. The final grade is based on the evaluation of partial exams. Scoring: <60% insufficient; 60-70% sufficient (2); 70-80% good (3); 80-90% very good (4); 90-100% excellent (5)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. H. Pine: Organska kemija, Školska knjiga,	9	no

	Zagreb, 1994.		
	Vodič kroz IUPAC-ovu nomenkalturu organskih spojeva, preveli:Bregovec, Horvat, Majerski, Rapić, Školska knjiga , Zagreb, 2002.	1	no
Optional literature (at the time of submission of study programme proposal)	V.Rapić: Nomenklatura organskih spojeva, Školska knjiga , Zagreb, 2004. S. E. Meislich, H. Meislich & J. Scharefkin, 3000 Solved Problems in Organic Chemistry, The McGraw-Hill, 1994.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Exercises in Organic Chemistry

NAME OF THE COURSE	**Exercises in Organic Chemistry**					
Code	KTA 202	Year of study	2nd			
Course teacher	PhD, Ivica Blažević, assistant prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	45	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Acquiring a basic knowledge of basic organic chemistry that involves mastering practical laboratory techniques used in the synthesis, isolation, purification and identification of organic compounds.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Organic Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completing the course, the student will be able to use laboratory techniques (such as recrystallization, distillation, extraction, reflux, chromatography, infrared spectroscopy, etc.), for (*i*) purification, (*ii*) isolation, (*iii*) synthesis, and (*iv*) identification of the organic compounds.					
Course content broken down in detail by weekly class schedule (syllabus)	1. Laboratory safety and rules. Isolation and purification of organic compounds. Crystallization and melting point determination. Distillation. Extraction. Test. (4 hours) **Organic compounds synthesis.** 2. Nucleophilic aromatic substitution. The preparation of phenol (diazotation). Test. (9 hours) 3. Nucleophilic addition. The preparation of benzyl-alcohol and benzoic acid (Cannizzaro reaction). Test. (4 hours)					

<table>
<tr><td></td><td colspan="6">4. Nucleophilic substitution. The preparation of acetanilide (acylation). Test. (4 hours)
5. Electrophylic aromatic substitution. The preparation of p-nitroacetanilide and p-nitroaniline (nitration and hydrolysis). Test. (5 hours)
6. Oxidation-reduction reaction. The preparation of 2-butanone. Test. (4 hours)
Chromatography.
7. Thin-layer chromatography. Column chromatography. Test. (5 hours)
Organic compounds characterization.
8. Characteristic reactions of functional groups. Test. (5 hours)
9. Methods of spectroscopic analysis. (UV/Vis, FTIR). Test. (4 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
X exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ independent assignments
☐ multimedia
X laboratory
☐ work with mentor
☐seminars</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0</td><td>Research</td><td>0</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1,5</td><td>Report</td><td>0</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td>0</td><td>Seminar essay</td><td>0</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1,0</td><td>Oral exam</td><td>0,5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0</td><td>Project</td><td>0</td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The student pass the exam if all tests are positive and all the laboratory exercises are performed. The final grade is based on the evaluation of tests and experimental work.
Test scoring: <60% insufficient; 60-70% sufficient (2); 70-80% good (3); 80-90% very good (4); 90-100% excellent (5)</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, Split, 2009.</td><td>1</td><td>Yes, on the official faculty web page</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">V. Rapić: Postupci priprave i izolacije prirodnih spojeva, Školska knjiga, Zagreb, 1994.
S. Borčić, O. Kronja, Praktikum preparativne organske kemije, Školska knjiga Zagreb, 1991.
D. Kolbah, Priručnik za kemičare, Kemija u industriji, Zagreb,1986.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality assurance will be performed at three levels:

(1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer’s Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Physical Chemistry

NAME OF THE COURSE	Physical Chemistry					
Code	KTA203	Year of study	2nd			
Course teacher	PhD, Vesna Sokol, associate prof.	Credits (ECTS)	6.5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			60	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Student will acquire knowledge about principles of the thermodynamic and kinetic approach to physical and chemical changes.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Physical chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After successful completion of the course students will know the basic principles of physical chemistry, which include: 1) physical properties and structure of substances, 2) thermodynamics of mixing, 3) chemical equilibrium, 4) the rates of chemical reactions, 5) molecular motion in gases and the motion of molecules and ions in liquids, 6) electric and magnetic properties of molecules					
Course content broken down in detail by weekly class schedule (syllabus)	Lectures 1st week: Introduction. Properties of gases. The perfect gas. The states of gases. The gas laws. Real gases. Van der Waals equation. The First Law of thermodynamics. The basic concepts. Work, heat and energy. The formal statment of the First Law 2nd week: Expansion work. Heat and enthalpy. Heat capacity. Thermochemistry. Standard enthalpy changes. Enthalpies of formation. The temperature dependence of reaction enthalpies. 3rd week: Work of adiabatic expansion. Perfect gas adiabats. The Second Law. The dispersal of energy. Entropy. Entropy change during the isothermal expansion of a perfect gas. 4th week: The entropy as a state function. The entropy of irreversible change. Entropy changes accompanying specific processes. The variation of entropy with temperature. The Third Law. 5th week: Third-Law entropies. The Helmholtz and Gibbs energies. Standard molar Gibbs energies. Combining the First and Second Laws. Properties of the internal energy. Properties of the Gibbs energy. 6th week: The chemical potential. Real gases – the fugacity. Standard states of real gases. The relation between fugacity and pressure. Physical transformations of pure substances. Phase boundaries. The dependence of stability on the conditions. The location of phase boundaries. 7th week: The first partial exam. The properties of simple mixtures. Partial molar quantities. The thermodynamics of mixing. The chemical potentials of liquids. 8th week: Liquid mixtures. Colligative properties. The sovent activity. The solute activity. The phase rule. Phase diagrams.					

<table>
<tr><td></td><td colspan="6">9th week: Two-component systems. Vapour pressure diagrams. Temperature-composition diagrams. Liquid-liquid phase diagrams. Liquid-solid phase diagrams. Three-component systems. Chemical equilibrium. The Gibbs energy minimum. The extent of reaction.
10th week: The reaction Gibbs energy. Exergonic and endergonic reactions. The composition of reactions at equilibrium - the thermodynamic equilibrium constant. Perfect gas equilibria. The general case of a reaction. Le Chatelier's principle.
11th week: The second partial exam. The rates of chemical reactions. Rate laws and rate constants. Reaction order. The determination of the rate law. Integrated rate laws. First-order reactions. Half-lives. Second-order reactions.
12th week: Reactions approaching equilibrium. The temperature dependence of reaction rates. Elementary reactions. Consecutive elementary reactions. The rate-determing step. The steady-state approximation. Pre-equilibria. Third-order reactions. Unimolecular reactions. Molecules and ions in motion. Molecular motion in gases.
13th week: Viscosity. The conductivity of electrolyte solutions. Strong electrolytes. Weak electrolytes. The drift speed. Ion mobilities. Mobility and conductivity.
14th week: The measurement of transport numbers. Conductivities and ion-ion interactions. Spectroscopy. The electric and magnetic properties of molecules. Permanent and induced electric dipole moments. Polarization at high frequencies. The relative permittivity. Refractive index. Optical activity. Beer-Lambert law.
15th week: Atomic spectra. Molecular spectra. Infrared spectroscopy. Rotational and vibrational spectra. Measurement of IR spectra. Visible and ultraviolet spectroscopy. The Franck-Condon principle. Charge-transfer transitions.

<u>Seminars</u>
Solving numerical problems.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">xlectures
xseminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
xmultimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Students are required to attend classes (lectures and seminars 80%) and actively participate in the teaching process. This will be recorded and evaluated in making a final assessment.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.5</td><td>Oral exam</td><td>1.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The course content is divided into three units that students take over partial exams or joining final exam at the end of the semester. The written exam is considered passed if students achieve at least 60%. The final grade is based on the evaluation of partial exams. Grades: <60% not satisfied, 60-69% successful (2), 70-79% good</td></tr>
</table>

	(3), 80-89% very good (4), 90-100% excellent (5).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	P. Atkins, J. de Paula, Atkins' Physical Chemistry, 8th Edition, Oxford University Press, Oxford 2006.	3	
	I. Mekjavić, Fizikalna kemija 1, Školska knjiga Zagreb, 1996.	10	
	I. Mekjavić, Fizikalna kemija 2, Golden marketing, Zagreb, 1999.	10	
Optional literature (at the time of submission of study programme proposal)	I. Tominić, Fizikalna kemija II, Kemijsko-tehnološki fakultet, Split, 2010.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Exercises in Physical Chemistry

NAME OF THE COURSE	**Exercises in Physical Chemistry**					
Code	KTA204	Year of study	2nd			
Course teacher	PhD, Vesna Sokol, associate prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	45	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The aim of the course is to train students to work independently in the laboratory of physical chemistry, processing experimental data and presenting the results of data processing in written form.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Physical Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After successful completion of the course students will: 1) be acquainted with the fundamental operating procedures in the laboratory of physical chemistry 2) learn the principles of various laboratory instruments and devices 3) be able to independently perform measurements in the laboratory 4) know about how to process and present the collected data and measurement results using the computer 5) know to identify and independently solve engineering problems					

<table>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Vapour pressure of pure liquid.
2nd week: Refractometric determination of composition of two-component mixture.
3rd week: Viscosity.
4th week: Colligative properties.
5th week: Equilibrium constant of homogeneous reaction.
6th week: Phase diagram for three-component system.
7th week: Transport numbers by Hittorf method.
8th week: Conductometry and conductometric titration.
9th week: Rate constant of inversion of sucrose by polarimetric method.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
xexercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
☐multimedia
xlaboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Students are required to carry out all laboratory exercises. Before each exercise, students should take the oral partial exam. After each exercise, students should submit a report on the completed exercise. This will be recorded and evaluated in making a final assessment.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1.5</td><td>Report</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The final grade is based on the score of the partial oral examination before each exercise, practical work in the laboratory and submitted reports.
Scoring: <60% of the student is not satisfied; 60-69% is sufficient (2); 70-79% good (3); 80-89% very good (4); 90-100% excellent (5).</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">J. Radošević, Lj. Aljinović, Fizikalna kemija, Laboratorijske vježbe, Sveučilišna naklada Liber, Split, 1980.</td><td>30</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">A. M. Halpern, Experimental Physical Chemistry, A Laboratory Textbook, Second Edition, Prentice Hall, New Jersey, 1997.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Mass and Energy Balances

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Mass and Energy Balances</td></tr>
<tr><td>Code</td><td>KTA205</td><td>Year of study</td><td colspan="5">2nd</td></tr>
<tr><td>Course teacher</td><td>PhD, Marija Ćosić, assistant prof.</td><td>Credits (ECTS)</td><td colspan="5">5.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Nenad Kuzmanić, prof.</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Gain knowledge of application of principles of conservation of mass and energy to chemical process systems. To acquire a basic knowledge of the systematic problem solving related to the quantity and composition of process input and outputs.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam the student is expected to know:
- explain the law of conservation of mass and write general material balance equation on (continuous) steady-state and (batch) unsteady-state processes,
- write material balances on unreactive and reactive processes,
-write a flowchart of single and multiple-unit processes and solve the system of mass balance equations in order to define amount and composition of material of each process stream,
- apply the law of conservation of energy and write energy balances for chemical processes,
- write energy balances on opened and closed steady-states systems,
- apply simultaneous material and energy balances.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Introductions to engineering calculations.
2nd week: Processes and process variables
3th week: General material balance equation.
4th week: Material balances on continuous steady-states processes without chemical reaction.
5th week: Material balances on batch unsteady-states processes without chemical reaction.
6th week: Material balances on process with recycle and bypass.
7th week: Material balances on multiple-unit processes.
8th week: Material balances on reactive processes.
9th week: Balances on atomic and molecular species.
10th week: Balances on combustion processes.
11th week: Energy and energy balances. Instructional objectives.
12 th week: Energy balances on closed systems at steady-states.
13th week: Energy balances on opened systems at steady-states.
14th week: Energy balances on reactive processes.
15th week: Simultaneous material and energy balances.</td></tr>
</table>

<table>
<tr><td>Format of instruction</td><td colspan="6">x lectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="6">☐independent assignments
x multimedia
☐aboratory
☐work with mentor
x seminars
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="12">Students are required to attend at least 80% of lectures and seminars.</td></tr>
<tr><td rowspan="5">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>3.0</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="12">During the semester student may take the exam by two written tests. Tests are consisting of questions from lectures and seminars. Test passing score is 55%. After passing both tests the grade of theoretical part is determined from the average score by the following criteria: 55%-66% - satisfactory, 67%-78% - good, 79%-89% - very good, 90%-100% - excellent.
Students who do not pass the partial exams have to take a written exam in the regular examination periods. Final grade is determined by previously notated criteria.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="8">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="8">R. M. Felder, R. W. Rousseau, Elementary Principles of Chemical Processes, 3rd ed., John Wiley & Sons, Inc., New York, 2005.</td><td>1</td><td></td></tr>
<tr><td colspan="8">D. M. Himmelblau: Basic Principles and Calculations in Chemical Engineering, 7th ed., Prentice-Hall Inc., New Jersey, 2003.</td><td>1</td><td></td></tr>
<tr><td colspan="8">R.H. Perry, D.W. Green, J.O. Maloney, Perry's Chemical Engineer's Handbook, 7th ed., McGraw-Hill, New York, 2007.</td><td>1</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="12">Luyben, W. L., Wenzel, L. A.: Chemical Process Analysis: Mass and Energy Balances, Prentice-Hall Inc., New Jersey, 1998.
T. Bradić, R. Roki, J. Pečarić, M. Strunje: Matematika za tehnološke fakultete, Sveučilište u Zagrebu, Multigraf – Zagreb, Zagreb, 1994.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="12">- monitoring of students suggestions and reactions during semester
- students evaluation organized by University</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="12"></td></tr>
</table>

Transport Phenomena

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Transport Phenomena</td></tr>
<tr><td>Code</td><td>KTA206</td><td>Year of study</td><td colspan="4">2nd</td></tr>
<tr><td>Course teacher</td><td>PhD, Nenad Kuzmanić, prof.</td><td>Credits (ECTS)</td><td colspan="4">5.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Renato Stipišić, senior lecturer
Antonija Kaćunić, assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4">-</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Gaining knowledge about the principles of transfer of momentum, heat and mass transfer on the principle of a unified approach to transport phenomena. This knowledge forms the basis of chemical engineering unit operations, and they are therefore essential for a fuller understanding of process engineering.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercises in Transport Phenomena</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam the student is expected to know:
- how to apply the laws of conservation of the fluid flow
- about molecular and convective mechanisms of transport of momentum, energy and mass
- how to recognize the major resistance at transport phenomena and how to intensifying the observed transfer
- how to gain insight into the functional dependence of the characteristics of a given system by the use of similarity theory and dimensional analysis
- the analogy of transfer of momentum, energy and mass</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Introduction to physical transport phenomena. Conservation law. Molecular and convective transport mechanisms.
2nd week: Stationary and non-stationary processes. Rate of transport processes. Momentum, heat and mass fluxes. Fluid characteristics (density, relative density, specific weight...)
3rd week: Momentum transfer. Newton's low of viscosity. Momentum flux. Application of momentum and mass balances in fluid mechanics.
4th week: Application of heat balance in fluid mechanics: Bernoulli equation and its application in process engineering.
5th week: Theories of similarity. Dimensional analysis. Flow phenomena. Laminar flow. Stationary laminar flow between two flat horizontal plates.
6th week: Stationary laminar flow through a horizontal circular tube. Hagen-Poiseuille law. Turbulent flow. Pressure drop in straight channels and in pipe systems. Moody diagram.
7th week: Flow around obstacles. Rate of sedimentation.
8th week: Flow through beds of particles. Fluidization.
9th week: Fundamental principles of heat transfer. Stationary heat conduction. Heat conduction through walls and through cylindrical walls.
10th week: Heat transfer by forced convection. Thermal boundary layer. Partial and overall heat transfer coefficients. Heat transfer during laminar and turbulent flows in</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">pipes. Heat transfer during condensation.
11th week: Heat transfer during boiling. Heat transfer around obstacles. Heat transfer during natural convection.
12th week: Heat transport by radiation.
13th week: Fundamental principles of mass transfer. Stationary diffusion. Equimolar counterdiffusion and one-component diffusion.
14th week: Mass transfer with forced convection. Mass transfer by natural convection.
15th week: Interphase mass transfer. Analogy between heat and mass transfer.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
X seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lecture attendance: 80 %. Laboratory exercises attendance: 100 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>3.0</td><td>Research</td><td></td><td>Practical training</td><td>0</td></tr>
<tr><td>Experimental work</td><td>0</td><td>Report</td><td></td><td>Exercises tests study (Other)</td><td>0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Field work (Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>1.2</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.8</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two partial tests during the semester. Examination passing rate is 55%. Students who do not pass the partial exams have to take an exam in the regular examination periods. The exam consists of theoretical (oral) and written part. Minimum score is 55%. Written part will constitute 30% and the theoretical part of the exam 70 % of the test score.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">W. J. Beek, K. M. K. Muttzall, J. W. van Heuven, Transport Phenomena, 2nd ed., J. Wiley and Sons Inc., London, 1999.</td><td>3</td><td colspan="2"></td></tr>
<tr><td colspan="3">N. Kuzmanić, Prijenos tvari i energije, Priručnik za predavanja (for internal use only), Kemijsko-tehnološki fakultet u Splitu, Split, 2012.</td><td></td><td colspan="2">Web site of institution</td></tr>
<tr><td colspan="3">R. Byron Bird, W. E. Stewart, E. N. Lightfoot, Transport Phenomena, 2nd ed., J. Wiley and Sons Inc., New York, 2002.</td><td>2</td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Welty, J. W. Wicks, R. E. Wilson, G. L. Rorrer, Fundamentals of Momentum, Heat and Mass Transfer, 5th ed., J. Wiley & Sons Inc., New York, 2007.</td><td>2</td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study</td><td colspan="6">E. Mitrović-Kessler: Prijenos tvari i energije, Tehnološki fakultet Split, Split, 1991.</td></tr>
</table>

programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- monitoring of students suggestions and reactions during semester - students evaluation organized by University
Other (as the proposer wishes to add)	

Exercises in Transport Phenomena

NAME OF THE COURSE	**Exercises in Transport Phenomena**					
Code	KTA207	Year of study	2nd			
Course teacher	PhD, Nenad Kuzmanić, prof.	Credits (ECTS)	1.0			
Associate teachers	Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	Gaining knowledge in application of basic measurements in process engineering, conducting measurements of fluid flow, pressure and temperature, analysis of experimental data and writing final reports, basic use of Microsoft Office Excel in data processing.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Transport Phenomena					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After finishing the laboratory exercises, student is expected to know: - how to determine and measure fluid flow - how to calibrate an orifice plate and rotameter in order to use them as a flow meter in a pipeline - how to measure a pressure drop in a pipeline and determine pipe roughness and friction coefficients - how to conduct appropriate measurements needed to calculate particle sedimentation rate - how fluidization is conducted and where can it be applied - what are the major resistances in heat and transfer and know the basics in how to reduce them					
Course content broken down in detail by weekly class schedule (syllabus)	Laboratory exercises: Exercise 1: Determination of fluid flow type and the critical Reynolds number (1 hour) Exercise 2: Applying the Bernoulli's theorem: Dynamic and Surface Flow Meters - Calibration of orifice plate and rotameter (2 hours) Exercise 3: Determination of pressure drop in the pipeline (2 hours)					

<table>
<tr><td></td><td colspan="6">Exercise 4: Determination of particle sedimentation rate in a stationary fluid (2 hours)
Exercise 5: Determination of fluidized bed characteristics (2 hours)
Exercise 6: Determination of partial and overall heat transfer coefficients (2 hours)
Exercise 7: Complex heat transfer by radiation and convection (2 hours)
Exercise 8: Interphase mass transfer. (2 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
X exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
X laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Laboratory exercises attendance: 100 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.1</td><td>Research</td><td></td><td>Practical training</td><td>0.2</td></tr>
<tr><td>Experimental work</td><td>0.2</td><td>Report</td><td>0.2</td><td>Exercises tests study (Other)</td><td>0.1</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Field work (Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Student is obligated to attend 100% of all laboratory exercises. During the semester and after a certain exercise, student is obligated to write a report consisted of description of exercise assignment, apparatus, calculations and graphs based on measurements conducted in laboratory and appropriate conclusions. Upon completion of all exercises, a final (written) test will be held. Minimum score is 50%.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Zavod za kem. inženjerstvo, Prijenos tvari i energije, priručnik za vježbe (for internal use only)</td><td></td><td>Faculty web site</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- monitoring of students suggestions and reactions during semester
- students evaluation organized by University</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Electrochemistry

NAME OF THE COURSE	Electrochemistry					
Code	KTA208	Year of study	2nd			
Course teacher	PhD, Senka Gudić, prof.	Credits (ECTS)	4.5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			45	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students will learn the basic laws of electrolysis and electrochemical kinetics which play an important role in materials science and materials engineering, corrosion protection of materials, electroorganic and inorganic synthesis processes and also in modern and sustainable technologies.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Electrochemistry The condition for taking the exam: Completed the course "Exercises in Electrochemistry"					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After the successfully passed exam student is able to: - explain the difference between chemical and electrochemical reactions - describe the components and processes in the electrochemical reactor - identify the types of conductors and conductivity - define the concept of electrode potential - explain the structure of electrified phase boundary - differentiate between the concepts of polarization and overvoltage - explain the causes of different overvoltage types - recognize the important electrochemical processes - introduce electrochemical aspects of environmental protection - apply the acquired knowledge in solving numerical problems in electrochemistry.					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Introduction. Overview of the main problems in electrochemistry. Chemical and electrochemical reactions. Electrochemical systems. Basic concepts in electrochemistry. Types of conductivity. Electrochemical stoichiometry – Faraday law. 2nd week: Ionics. Ion-solvent interaction. Electrolyte definition. Solvent and dissolution process. Ion hydration. Ion-ion interaction. Concept of ionic atmosphere. 3rd week: Non-stationary phenomena in electrolyte solutions. Current flow through electrolyte solutions. 4th week: The modern theory of electronic conductors. 5th week: First test. Electrochemical thermodynamics. Equilibrium cell voltage. Redox reactions and electrochemical systems. Reversibility of electrochemical processes. 6th week: Electrode potentials. Absolute electrode potential. Volta potential, real potential and relative electrode potential. Electrode potential measurement. Nernst relation. Definition of standard electrode potential. Reference electrodes. Standard hydrogen potential scale. 7th week: Phase boundary. Ideally polarizable electrode and electrocapillarity. Adsorption. Nonspecific and specific adsorption. Double layer structure and models. Helmholtz model. Gouy-Chapman model. Stern model. Stern-Gram model. 8th week: Electrokinetic phenomena and zeta-potential. Electrooosmosis.					

	Strearming potential. Electrophoresis. Dorn effect. Electrode kinetics. Electrochemical systems in non-equilibrium conditions. 9th week: Anodic and chatodic processes. Electrochemical reaction mechanism and rate determining step. Polarization and overpotential. Overvoltage types. Second test. 10th week: Electrochemical overpotential. Buttler-Volmer and Tafel equations. Diagnostic criteria. 11th week: Diffusion overpotential. Diffusion in stationary and non-stationary condition. 12th week: Reaction ovrepotential. Crystallization overpotential. Electrochemical measurement methods - stationary and non-stationary. 13th week: Analysis of mechanism selected electrode processes. Electrocatalysis - evolution and reduction of hydrogen and oxygen. Deposition and dissolution of metals. Corrosion of metals. 14th week: Nucleation and new phase formation. Passivity phenomena. Conversion and storage of energy. 15th week: Environmentally oriented electrochemistry. Third test. Seminars (one hour weekly): Solving numerical problems in electrochemistry.
Format of instruction	× lectures × seminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning ☐field work ☐independent assignments × multimedia ☐laboratory ☐work with mentor ☐(other)
Studentresponsibilities	

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	0.5	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1	Oral exam	2	(Other)	
	Written exam	1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The complete exam can be passed through three tests during semester. The passing score is 60 % and the fraction of each test is 33 %. In the exam period the student has to attend to written and oral exam. Grades: < 60% insufficient, 60-70% sufficient, 71-80% good, 81-92% very good, 93-100% excellent.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	A. Despić, Osnove elektrokemije 2000, Zavod za udžbenike i nastavna sredstva, Beograd, 2003.		
	J.O'M. Bockris, A.K.N. Reddy, M. Gamboa-Aldeco, Modern Electrochemistry 2A, Fundamentals of Electrodics, 2nd Edition, Kluwer Academic/Plenum Publishers, New York, 2000.	1	

Optional literature	C. H. Hamann, A. Hamnett, W. Vielstich, Electrochemistry, Wiley-VCH Weinheim, 1998.
Quality assurance	- monitoring of students suggestions and reactions during semester

methods that ensure the acquisition of exit competences	- students evaluation organized by University
Other (as the proposer wishes to add)	

Exercises in Electrochemistry

NAME OF THE COURSE	**Exercises in Electrochemistry**					
Code	KTA209	Year of study	2nd			
Course teacher	PhD, Ivana Smoljko, assistant prof.	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	P	S	V	T
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The objective of this course is to develop the student's abilities needed for experimental work and measurement processes. The course helps the student to understand the nature of the electrochemical reactions and the peculiarities of electrochemical kinetics.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Electrochemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	By the end of this course, students will be able to: - use theory to understand/predict experimental observations - explain the nature of the electrochemical terms, the nature of electrochemical reactions, and the kinetics of electrochemical reactions - plan and perform electrochemical experiments - identify and demonstrate the safe and correct use of measurement and laboratory equipment - perform measurements, analysis and testing in the laboratory with the appropriate lab equipments and software - document scientific information and experimental data and write scientific reports, with graphical presentation of data - demonstrate teamwork skills.					
Course content broken down in detail by weekly class schedule (syllabus)	Eight laboratory exercises to accompany the course of lectures on Electrochemistry. Ex. 1 Electrolyte decomposition voltage Ex. 2 Electrogravimetric analysis Ex. 3 Determination of the Tafel constants Ex. 4 Electrochemical production of calcium gluconate Ex. 5 Electrorefining of silver Ex. 6 Electrochemical energy sorces Ex. 7 Cyclic voltamerty of Fe^{3+}/Fe^{2+} redox couple Ex. 8 The influence of the salt solution composition on corrosion behaviour of Al-2.5Mg alloy					

Format of instruction	☐lectures ☐seminars and workshops **x** exercises ☐*on line*in entirety ☐partial e-learning ☐field work	**x** independent assignments ☐multimedia **x** laboratory ☐work with mentor ☐(other)
Studentresponsibilities	Laboratory exercises attendance: 100 %.	

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	0.5	Report	0.5	(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam	0.5	(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	The mean (average grade) is the arithmetic of all positive grades obtained in examinations (Pre-Lab oral exam 45%, Experimental work 5%, and Lab report 50%).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	J. Radošević, Vježbe iz elektrokemije (za unutarnju uporabu), Kemijsko-tehnološki fakultet u Splitu, Split.		
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Thermodynamics

NAME OF THE COURSE	**Thermodynamics**					
Code	KTA210	Year of study	2nd			
Course teacher	PhD, Vanja Martinac, prof.	Credits (ECTS)	6.5			
Associate teachers	PhD, Miroslav Labor, asociated prof. PhD, Jelena Jakić, assistant	Type of instruction (number of hours)	P	S	V	T
			45	30	0	0

Status of the course	Mandatory	Percentage of application of e-learning	
COURSE DESCRIPTION			
Course objectives	The course of Thermodynamics covers the basics of general thermodynamic principles and their application in engineering. The goal is for students to master the knowledge of basic thermodynamic principles and their application in engineering, which will be helpful in their further studies as well as in their work.		
Course enrolment requirements and entry competences required for the course			
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, students are expected to: – specify and define the units of measurements of basic thermodynamic magnitudes and the state equation – specify and correctly interpret the basic laws of thermodynamics – specify and explain thermodynamic changes of the state of ideal gases – define and explain the processes of expansion and compression – define and explain cycles processes – define and explain irreversible processes (throttling, mixing of gases) – specify and describe heat properties and changes of the state of real gases – discern and analyse processes in devices used to obtain low temperatures and processes in devices for gas liquefaction. – discern standard state of solutions – apply the knowledge acquired to solving tasks related to changes of the state of ideal and real gases and liquids, compression processes, cycles processes, processes in devices used to obtain low temperatures		
Course content broken down in detail by weekly class schedule (syllabus)	1st week: General concepts. Heat and energy parameters in thermodynamic processes. 2nd week: Basic laws of thermodynamics. The first law of thermodynamics using internal energy and enthalpy. Thermodynamic changes of the state of ideal gases (isobaric, isochoric, isothermal, adiabatic and polytrophic changes of state). 3rd week: The second law of thermodynamics, reversibility, irreversibility, thermal diagram and changes of the state in thermal diagrams. 4th week: The second law of thermodynamics applied to the energetic transformation - exergy and anergy. 5th week: Maximum work of the system. 6th week: Cycles processes. Carnot and thermal efficiency degree. 7th week: Compression and expansion processes. 8th week: Processes with external and internal combustion. Exam (I preliminary exam) 9th week: Real gases: liquid state, evaporation, wet and dry saturated steam, superheated steam, fundamental processes. 10th week: Thermal properties and changes of the state of real gases. Thermodynamics diagrams and tables for variables of state. 11th week: Water vapour – thermodynamic parameters of the state. Vapour power cycles 12th week: Thermodynamic fundamentals of the cooling process. Vapor-compression refrigeration. Coefficient of performance. Heat pump. 13th week: Processes in devices for gas liquefaction. 14th week: Thermodynamics of solutions – theory and application. Thermodynamic fundamentals of vapor-liquid equilibrium. 15th week: Standard state of solutions. Gibbs-Duhem equation for solutions. Exam (II preliminary exam) Numeric examples demonstrating the topics covered are analysed during the		

<table>
<tr><td></td><td colspan="6">course, making an integral whole with the lectures.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
x seminar</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attendance to lectures and seminars for 80% of the total number of hours.</td></tr>
<tr><td rowspan="5">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.5</td><td>Oral exam</td><td>2.0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2.0</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Attendance to lectures and seminars is registered (not included in the rating). A written and an oral exam are held in the examination periods. The passing threshold is 60%. The oral exam is mandatory for all students, and the written exam is mandatory if a student is not exempt from it. Continuous assessment through partial preliminary exams (twice in a semester) allows for exemption from the written exam. The passing threshold is 60%. Partial preliminary exams are not mandatory. Preliminary exams are not eliminatory. Each passed preliminary exam participates with 25% in the rating. A passed preliminary exam also participates with 25% in the autumn examination period. The written exam participates with 25%, and the oral one with 50%. Students who have not passed the written exam through preliminary exams take the full exam (final exam) consisting of the written and the oral exam in regular examination periods. The passing threshold is 60%, and each exam form participates in the rating with 50%.
Ratings: 60%-70% – satisfactory, 71%-80% – good, 81%-90% – very good, 91%-100% – excellent.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">M. J. Moran, H. N. Shapiro, D. B. Daisie, M. B. Bailey, Fundamentals of Engineering Thermodynamics, 7th Ed., Wiley, New York, 2010.</td><td>2</td><td></td></tr>
<tr><td colspan="3">N. Petric, I. Vojnović, V. Martinac, Technical thermodynamics (in Croatian), 2nd Ed., on line (2007-01-09), Faculty of Chemistry and Technology, Split, 2007.</td><td></td><td>On line</td></tr>
<tr><td colspan="3">V. Martinac, Thermodynamics and Thermotechnics, Handbook-Formulas and Tables, (in Croatian), on line (2008-12-09), Faculty of Chemistry and Technology, Split, 2008.</td><td></td><td>On line</td></tr>
<tr><td colspan="3">J. M. Smith, H. C. Van Hess, M. M. Abbott, Introduction to Chemical Engineering Thermodynamics, 7th Ed., McGraw-Hill, New York, 2005.</td><td>1</td><td></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	Y. A. Cengel, M. A. Boles, Thermodynamics: An Engineering Approach, 7th Ed., McGraw-Hill, New York, 2011. R. E. Sonntag, C. Borgnakke, G. J. Van Wylen, Fundamentals of thermodynamics, 8th Ed., Wiley, New York, 2012. R. Budin, A. Mihelić-Bogdanić, Fundamentals of technical thermodynamics (in Croatian), 3rd Ed., Školska knjiga, Zagreb, 2012.
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.
Other (as the proposer wishes to add)	

Unit Operations

NAME OF THE COURSE	**Unit Operations**					
Code	KTA 211	Year of study	2nd			
Course teacher	PhD, Marija Ćosić, assistent prof.	Credits (ECTS)	4.5			
Associate teachers	Renato Stipišić, senior lecturer Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			45	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	To gain knowledge about the basic unit operations in the process engineering through theoretical expressions based on the mass and energy balances. Students are also acquainted with the working principles of the most used devices and selection of their optimum working conditions regarding minimization of energy consumption and product quality.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Transport Phenomena Enrolled in or passed the course Transport Phenomena Enrolled in or passed the course Exercises in Unit Operations					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: – fundamental principles of mechanical and of heat and mass transfer operations, – explain the laws that follow ***performance of individual operation,*** – explain the influence of operating variable on each operation, – explain their working principle of the most common used equipment for particular operation, – for a given process, select the appropriate equipment, – possible operating problems that may occur during operation performance.					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Introduction to chemical engineering processes. Fluid transport. 2nd week: Centrifugal pumps. Characteristic curves of a centrifugal pump. Special purpose pumps. Gas transport. 3rd week: Classification. Classification equipment. 4th week: Separation. Separation equipment. 5th week: Filtration. General Consideration. Filtration equipment.					

<table>
<tr><td></td><td colspan="6">6th week: Mixing of Newtonian and non-Newtonian fluids. Power consumption.
7th week: Mixing of particulate solids. Selection and dimensioning of mixing equipment.
8th week: Heat and mass transfer operations. Heat-exchange equipment.
9th week: Evaporation. Types of evaporators.
10th week: Gas absorption. Packings and packed tower design.
11th week: Principles of absorption.
12th week: Principle of drying. Use of psychometric charts.
13th week: Drying equipment.
14th week: Zeotropic and azeotropic mixtures Phase equilibrium. Batch distillation; flash and vacuum distillation. and boiling point diagram. .
15th week: Continuous distillation with reflux. Rectification and stripping. Number of ideal plates; McCabe -Thiele Method.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
x seminars</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lecture and seminar attendance: 80 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Exercises tests study (Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Field work (Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>1.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1.0</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester student may take the exam by two theoretical (oral) and two calculation (written) tests. Test passing score is 55%. After passing all tests the average score for oral and written parts is calculated and the grade of each part is determined by the following criteria: 55%-66% - satisfactory, 67%-78% - good, 79%-89% - very good, 90%-100% - excellent.
In the final grade theoretical part constitutes 67% of grade while written part 33%. Students who do not pass the partial exams have to take exam in the regular examination periods. Final grade is determined by previously notated criteria.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">W. L. McCabe, J. C. Smith, P. Harriot, Unit Operations of Chemical Engineering, 7th ed., McGraw-Hill, New York, 2004.</td><td>2</td><td colspan="2"></td></tr>
<tr><td colspan="3">C. J. Geankoplis, Transport Prosesses and Separation Process Principles (Includes Unit Operations), 4th ed., Pearson Eucation, Inc.,New Jersey, 2007.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">Hraste, Mehaničko procesno inženjerstvo, 2. izdanje, HINUS, Zagreb, 2003.</td><td>5</td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study programme</td><td colspan="6">J. Welty, J. W. Wicks, R. E. Wilson, G. L. Rorrer, Fundamentals of Momentum, Heat and Mass Transfer, 5th ed., J. Wiley and Sons Inc., New York, 2007.
R.H. Perry, D.W. Green, J.O. Maloney, Perry's Chemical Engineer's Handbook, 7th</td></tr>
</table>

proposal)	ed., McGraw-Hill, New York, 1999.
Quality assurance methods that ensure the acquisition of exit competences	- monitoring of students suggestions and reactions during semester, - - students evaluation organized by University.
Other (as the proposer wishes to add)	

Exercises in Unit Operations

NAME OF THE COURSE	**Exercises in Unit Operations**					
Code	KTA212	Year of study	2nd			
Course teacher	PhD, Marija Ćosić assistant professor	Credits (ECTS)	2.0			
Associate teachers	Renato Stipišić, senior lecturer Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	Students will be practically acquainted with functional dependence of process variables during the performance of individual experiment. They will acquire the sense of selection of the optimal process operating conditions. To educate students how to determine unknown process variables applying the theoretical expressions and values of process variables measured during the experiments.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Unit Operations					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After finishing the laboratory exercises, student is expected to know: - explain the purpose and the aim of each of experiment (exercise) conducted, - describe the elementary parts of apparatus used during individual experiments, - bring up the variable needed to be measured in order to determine specific (demanded) process variables or parameters, - explain the functional dependence of measured process variables and their influence on the final result of the experiments, - explain the main resistance and driving force for each of experiment conducted.					
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1: Classification of the particulate solids. Exercise 2: Mixing - power consumption determination. Exercise 3: Filtration - determination of filtration coefficient and filtration cake resistance. Exercise 4: Heat exchanger - determination of partial and overall heat transfer					

<table>
<tr><td></td><td colspan="6">coefficient.
Exercise 5: Gas absorption- determination of pressure drop and limiting flow rates.
Exercise 6: Drying rate determination.
Exercise 7: Distillation - determination of the number of theoretical plates.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ectures
☐seminars and workshops
x exercises
☐on line in entirety
☐partial e-learning
☐ield work</td><td colspan="3">☐independent assignments
x multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Laboratory exercises attendance: 100 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.5</td><td>Report</td><td>0.4</td><td>Exercises tests study (Other)</td><td>0.4</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Field work (Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">After each exercise, student is obligated to write a report. It consists of calculations based on an application of theoretical expressions and the values of process variables measured during the experiments. Beside calculation, student needs to draw the diagrams of process variable dependence, specific for individual operation. Upon completion of all exercises, a final (written) test will be held. Minimum score is 55%. Final grade from the exercise consists of grade from the practical work, report and final test.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">Tehnološke operacije, priručnik za vježbe (for internal use only)</td><td></td><td colspan="2">Faculty web site</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">E. Mitrović-Kessler: Prijenos tvari i energije, Tehnološki fakultet Split, Split, 1991.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- monitoring of students suggestions and reactions during semester
- students evaluation organized by University</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Measurement and Process Control

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Measurement and Process Control</td></tr>
<tr><td>Code</td><td>KTA 213</td><td>Year of study</td><td colspan="5">2nd</td></tr>
<tr><td>Course teacher</td><td>PhD, Jadranka Marasović, prof.</td><td>Credits (ECTS)</td><td colspan="5">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Enable students to understand the importance of automated systems, to comprehend that the autonomous operation of such systems is the result of carefully thought and physically realized control procedures, and to be able to grasp the role of measuring equipment in that work. Enable students to gain basic knowledge on the use of computers as a support for the process control.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercises in Measurement and Process Control</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After completing this course, students will be able to describe the different measuring transducers, as well as to analyze the importance and impact of individual measurements in process control. Students will be able to describe the basic concepts from the process management and control theory and to argue their choice of instrumentation. They will be able to describe the basic use of computers as a support for the control theory and to calculate the elementary data needed to control a simple system.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Significance and importance of instrumentation in chemical engineering. General characteristics of transducers. Pressure measurements. Temperature measurements. Fluid flow measurements. Level measurements. Humidity and moisture measurements. Introduction to process control principles. Systems and control. Process control objectives. Behavior of control process: mathematical modeling. Control theory basics: Laplace transformation, transfer function, block diagram algebra. Analysis of first and second order processes. First and second order processes in control loop, stability analysis, and synthesis of P - controller. Design and characteristics of instrumentation in control loop.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
☐multimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Students reponsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Screening student work(name the proportion of ECTS credits for each</td><td>Class attendance</td><td>1 ECTS</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Independent learning (Other)</td><td>1 ECTS</td></tr>
</table>

<table>
<tr><td rowspan="3">activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5 ECTS</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5 ECTS</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester, there will be two mid-term exams. At the end of the semester, students will take a written exam. In order to get a positive grade from this course, students need to acquire minimum 50% of the total score on each of the mid-term exams or at the final exam.
The final grade is determined as follows:
Percentage Grade
50% to 61% sufficient (2)
62% to 74% good (3)
75% to 87% very good (4)
88% to 100% excellent (5)</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">1. J. Božičević, Basics of Automatic Control 1 (in Croatian: Temelji automatike 1, Školska knjiga, Zagreb, 1992;</td><td></td><td></td></tr>
<tr><td colspan="3">2. R. Žanetić, Industrial Process Control (in Croatian: Vođenje procesa u proizvodnji, Interna skripta, KTF, Split, 2006.;</td><td></td><td>Faculty web page</td></tr>
<tr><td colspan="3">3. R. Žanetić, R. Stipišić, Industrial Process Transducers (in Croatian: Mjerni pretvornici u procesnoj industriji, Interna skripta, KTF, Split, 2005.</td><td></td><td>Faculty web page</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">1. J. Božičević, Basics of Automatic Control 2 (in Croatian: Temelji automatike 2, Školska knjiga, Zagreb, 1992;
2. J. Marasović, Basic Principles in Automation (in Croatian: Temeljni postupci u automatici, Interna skripta, FESB, Split, 2001;
3. D.E. Seborg, T.F. Edgar, D.A. Mellichamp, Process Dynamics and Control, J. Wiley, New York, 1989;
4. J.W. Dally, W.F. Riley, K.G. McConnell, Instrumentation for Engineering Measurements, J. Wiley, New York, 1994.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">During the semester, there will be two mid-term exams. At the end of the semester, students will take a written exam. Each mid-term exam and the final exam will consist of several short questions intended to evaluate the students' understanding of the theory and their ability to describe the fundamental concepts, as well as to test students' ability to apply the theory onto simple, practical examples.
Quality and accomplishment assurance will be performed at three separate levels: (1) University level, (2) Faculty level, by the Teaching Quality Control Committee, (3) Professor's Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Exercises in Measurement and Process Control

NAME OF THE COURSE	Exercises in Measurement and Process Control				
Code	KTA214	Year of study	2nd		
Course teacher	Renato Stipišić, senior lecturer	Credits (ECTS)	1.0		
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	Acquisition of knowledge in working with measuring instruments to control the process.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Measurement and Process Control
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to know: - Describe the basic principles of measuring instruments - Select instrument needed to measure physical parameters essential for process - Identify sources of error in measuring - To measure certain physical quantity by measuring instrument
Course content broken down in detail by weekly class schedule (syllabus)	First week: Description and view the contents of the lecture. The principles of the measurement. General characteristics of the measuring instruments. Second Week: Pressure Measurement. 3rd week: Liquid manometers. 4th week: Manometers with solid weights. Deformation manometers. 5th week: Vakuummeters. 6th week: Temperature measurement. Liquid thermometers. 7th week: Mechanical thermometers. Pressure thermometers. 8th week: Thermocouples. 9th week: Heat resistant thermometers. Radiation pyrometers. 10th week: Flow measurement. Turbine flowmeters. Ionization flowmeters. The ultrasonic flowmeters. 11th week: Level measurement of liquids and solids. 12th week: Application of computers in measurement. 13th week: A/D converters 14th week: D/A converters 15th week: Examination
Format of instruction	x lectures seminars and workshops x exercises *on line*in entirety partial e-learning x field work independent assignments x multimedia laboratory work with mentor (other)
Studentresponsibilities	Attendance in the amount of 80% of the hourly rate.

Screening student work*(name the proportion of ECTS credits for*	Class attendance	0.3	Research		Practical training	0.3
	Experimental work		Report		(Other)	

eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		(Other)	
	Tests	0.2	Oral exam	0.2	(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The entire test can be applied over written exams. Passing threshold is 60%. The examination periods shall be taken oral exam. Passing threshold is 60%. Rating: 60 - 69% - sufficient (2), 70 - 79% - good (3), 80-89% very good (4), 90 - 100% - excellent (5).					

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	J. Božičević Temelji automatike I, Školska knjiga, Zagreb, 1992.	16	
	J. Božičević Temelji automatike II, Školska knjiga, Zagreb, 1992.	16	
	R. Žanetić, R. Stipišić, Mjerni pretvornici u procesnoj industriji, Skripta za internu upotrebu, KTF- Split, 2005.	3	web
	R. Žanetić, Vođenje procesa u proizvodnji, Skripta za internu upotrebu, KTF- Split, 2006.	3	web
Optional literature (at the time of submission of study programme proposal)	1. Seborg, D. E., T. F. Edgar & D. A. Mellichamp, Process Dynamics and Control, 2nd ed., John Wiley & Sons, New York, 2010. 2. W. Altman, D. Macdonald, Practical Process Control for Engineers and Technicians, Elsevier, London, 2005.		
Quality assurance methods that ensure the acquisition of exit competences	- Monitoring suggestions and reactions of students throughout the semester - Student survey		
Other (as the proposer wishes to add)			

Catalysis

NAME OF THE COURSE	Catalysis					
Code	KTA215	Year of study	3rd			
Course teacher	PhD, Branka Andričić, prof.	Credits (ECTS)	4.0			
Associate teachers	PhD, Matko Erceg, associate prof.	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	- acquiring knowledge about the role of catalysts in chemical reaction - identify the key variables for the preparation of better catalysts - overview of the processes of catalysts preparation					

	- understanding the importance of catalysts in industry and sustainable development through the improvement of existing or development of new chemical, petrochemical and related processes	
Course enrolment requirements and entry competences required for the course	None.	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to be able to: - list and describe types of catalysts - explain the principle of operation of the catalyst in a chemical reaction - know the role of each component in catalyst system - explain the processes of catalysts preparation - explain deactivation, reactivation and regeneration of catalyst - give examples of the catalyst application in real systems - to argue the importance of a catalyst for industry and sustainable development	
Course content broken down in detail by weekly class schedule (syllabus)	1st week: General concept of catalysis: the definition of catalysis and catalysts, the historical development of catalytic processes, the economic importance of the catalyst. 2nd week: Distribution of catalysis and katalizatora. Comparison of homogeneous and heterogeneous catalysts and the industrial značaj. General theory of catalysis. Effect of catalyst on reaction rates and the position of the chemical equilibrium. The activation energies. 3rd week: The mechanism of catalysis, inhibition, initiation. Basic features of the catalyst: activity, selectivity and stability. 4th week: Homogeneous catalysis in the gaseous and in the liquid phase. Homogeneous catalysis by acids and bases, by ions and transition metal compounds. 5th week: Coordination complexes as catalysts. Metallocenes. 6th week: Heterogeneous catalysis: the basic stages of heterogeneous catalytic reactions. Physical and chemical adsorption and their comparison. The heat of adsorption (Lennard-Jones diagram). 7th week: Types of adsorption isotherms. The basic laws of adsorption. Mechanisms and kinetics of heterogeneous catalytic reactions in the gas phase: Langmuir Hinshelwood mechanism. Eley-Rideal mechanism. 8th week: Theories of the catalytic activity of heterogeneous catalysts: the theory of unstable intermediates, the theory of active centers, the theory of geometric factors. 9th week: Theory of electronic factors. The selectivity of catalysts. 10th week: Durability (stability) and resistance to deactivation. Poisoning and selectivity coefficient of toxicity. Deactivation of the catalyst layers on the surface. Deactivation by sintering and phase transformation. Loss of catalyst by evaporation. Mechanical disintegration of the catalyst. Prevention of deactivation. Reactivation and regeneration of the catalyst. 11th week: Zeolites: properties, catalytic properties, selectivity. Zeolite modification processes. 12th week: Design of heterogeneous catalysts: active components, carriers, promoters, moderators, inhibitors, activators. 13th week: Characterization of heterogeneous catalysts. Determination of physical properties of the catalyst: the volume and the pore size, the total area of the catalyst. Mechanical properties of the catalyst. 14th week: Methods of heterogeneous catalysis: the precipitated catalysts impregnated catalysts, skeletal catalysts, catalysts with active coating. Monolithic catalysts. 15th week: Biocatalysts. Final comments, discussion, conclusions.	
Format of instruction	x lectures x seminars and workshops ☐exercises	☐ndependent assignments x multimedia ☐aboratory

<table>
<tr><td></td><td colspan="3">☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending lectures and seminars in the 80% amount of the total number of lessons.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.9</td><td>Oral exam</td><td>0.7</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.9</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation:
The entire exam can be passed over two colloquium during the semester. Pass threshold for each colloquium is 50%. Each colloquium participates with 45% in a final grade while attending lectures in 80-100% amount is 10% of a final grade.
Final evaluation:
One passed colloquium (previous activity) is recognized as 10% of a final grade. The remaining part is taken on written and oral exam at prescribed examination terms. Written exam accounts for 40% and oral exam for 50%, respectively.
Students who did not take or pass colloquiums take written and oral exam at prescribed examination terms. Passing threshold is 50%. Written exam accounts for 50% and oral exam for 50% of a final grade, respectively.
Grades definitions and percentages: sufficient (50-61%), good (62-74%), very good (75-87%), excellent (88-100%).</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">T. Kovačić, B. Andričić, Kataliza, Faculty of Chemistry and Technology, Split, 2010.</td><td>5</td><td>WEB library of KTF</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">S. Zrnčević, Kataliza i katalizatori, Hinus, Zagreb, 2005.
J. Hagen, Industrial Catalysis-A Practical Approach, 2nd ed., Wiley-VCH, Weinheim, 2006.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality assurance will be performed at three levels: (1) University Level, (2) Faculty Level by Quality Control Committee, (3) Lecturer’s Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Reaction Engineering

NAME OF THE COURSE	Reaction Engineering					
Code	KTA301	Year of study	3rd			
Course teacher	PhD, Davor Rušić, prof.	Credits (ECTS)	3.5			
Associate teachers	PhD, Sandra Svilović, associate prof.	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	To familiarize students with the principles of reactor designing.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Transport Phenomena Enrolled in or passed the course Exercises in Reaction Engineering
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Kinetic analysis, analysis of reactor.
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: The concept of chemical reactors. Week 2: The mathematical description of the general equations of balance and mass transfer. Week 3: Reactor models of ideal reactor types. Week 4: The kinetics of chemical reactions in homogeneous systems. Week 5: Goals of kinetic studies. Week 6: Selection of the experimental reactor. Week 7: Selection of kinetic models. Week 8: Selection of methods for estimation of kinetic parameters. Week 9: The systematization contents taught Week 10: First test Week 11: The kinetics of reactions in heterogeneous systems. Week 12: The problem of the presence of physical processes accompanying a chemical reaction. Week 13: Experimental methods in kinetic studies of reaction systems fluid-solid, gas-liquid and reaction with solid catalysts. Week 14: The factors that determine the choice of the reactor. Week 15: Second test
Format of instruction	x lectures ☐seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐field work x independent assignments ☐multimedia ☐laboratory ☐work with mentor x (other)
Student responsibilities	**Student responsibilities:** Regular attendance and active participation at lectures, seminars and exercises.
Screening student work(*name the*	Class attendance		Research		Practical training	

proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	**Grading and evaluating student work in class and at the final exam:** A student can pass a part or the entire exam by taking two partial tests during the semester. Students who do not pass the partial exams have to take an exam in the regular examination term. During the examination terms students take written and oral exam. Scoring: <55% insufficient;55-66% sufficient (2); 67-79% good (3); 80-92% very good (4); 93-100% excellent (5)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	O.Levenspiele, CHEMICAL ENGINEERING	-	
	Z Gomzi, KEMIJSKI REAKTORI	10	
	S.Slavica, D.Rušić, INTERACTIVE MATHCAD COLLECTION OF TASK FOR REACTION ENGINEERING	5	

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	**Quality assurance methods that ensure the acquisition of exit competences:** Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.
Other (as the proposer wishes to add)	

Exercises in Reaction Engineering

NAME OF THE COURSE	**Exercises in Reaction E$ngineering**					
Code	KTA 302	Year of study	3rd			
Course teacher	PhD, Sandra Svilović, associate prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						

<table>
<tr><td>Course objectives</td><td colspan="6">Students will be acquainted with the basic knowledge of software Mathcad and use of this program for solving problems in reaction engineering.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Reaction Engineering</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After completing the course, the student will be able to:
- calculate using Mathcad
- write a report for laboratory exercises in Mathcad
- find the best-fitting curve to a given set of experimental data (least squares method)
- use Mathcad for reactor design</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Exercise 1. Mathcad basic - toolbars, calculator
Exercise 2. Mathcad basic - graph
Exercise 3. Mathcad basic - formatting, units, functions, matrix
Exercise 4. Solving a problems in reactor design using Mathcad
Exam</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
x exercises
☐*bn line*in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
☐multimedia
☐aboratory
☐work with mentor
☐(other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Regular attendance and active participation at exercises.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td>0.3</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.6</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass exam by taking a test at the end of the semester or in the regular examination term.
Scoring: <55% insufficient;55-66% sufficient (2); 67-79% good (3); 80-92% very good (4); 93-100% excellent (5)</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">D. Rušić, E. Bacci, Matematički alati - priručnik, Kemijsko-tehnološki fakultet u Splitu, 2011</td></tr>
<tr><td>Quality assurance methods that ensure the</td><td colspan="6">Quality of the teaching and learning, monitored at the level of the
(1) teachers, accepting suggestions of students and colleagues, and
(2) faculty, conducting surveys of students on teaching quality.</td></tr>
</table>

acquisition of exit competences	
Other (as the proposer wishes to add)	

Construction Materials

NAME OF THE COURSE	Construction Materials					
Code	KTA303	Year of study	3rd			
Course teacher	PhD, Maja Kliškić, prof.	Credits (ECTS)	2.5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	The objective of this course is to achieve a knowledge and understanding of a wide variety of construction materials and their properties and their importance of practical applications; f*undamentals* of *corrosion* processes and *corrosion protection, and* methods of corrosion testing and prevention. This course will provide student to acquire an orderly pattern of thought in solving practical corrosion problems in a critical and creative manner.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Construction Materials The condition for taking the exam: Completed the course " Exercises in Construction Materials "					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	By the end of this course, students will be able to: - differentiate of various types of structural materials due to their composition, properties and applications - explain the advantages and disadvantages of the main structural materials - evaluate the resistance of materials for any given conditions - define and classify the corrosion processes - perform the corrosion tests - *ascertain and select* the most effective *corrosion protection system* for any given conditions – project related and on-site if appropriate – and *evaluate its durability*					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Materials as the basis for the development of modern civilization. Economic and technological aspects. Distribution of construction materials with regard to the composition, properties and application. 2nd week: Structure of materials. 3rd week: Physical and chemical properties of construction materials. 4th week: Mechanical properties. Norms. 5th week: Behavior of materials under different conditions of exploatation. 6th week: The main metal materials and their applications. Iron, carbon and low alloy high alloyed steels. Non-ferrous metals and alloys. 7th week: Inorganic non-metallic materials. The organic construction materials. Composite materials. 8th week: First test 9th week: The definition of the economic importance of corrosion. Chemical					

<table>
<tr><td></td><td colspan="6">corrosion of metals and alloys.
10th week: The types of corrosion attack.
11th week: Corrosion under specific conditions: in the atmosphere, water, soil, sea water, melt, biocorrosion, corrosion by stray currents.
12th week: Methods of protection. Ecological approach to the design of corrosion protection. Changing the properties of corrosion environment.
13th week: Protection by changing the electrode potential. Surface protection. Corrosion tests.
14th week: Classification and standardization of methods. Methods of testing in the laboratory. Tests on the model, the ongoing exploatation of the field.
15th week: Second test.
Monitor of atmospheric corrosion, Polarization of iron in sulphuric acid solution, Determination of efficiency of corrosion inhibitors by thermometric method, Cathodic protection of metal by protector, Investigation of oxide films formed on stainless steel, Field work in the laboratories of the Quality Insurance of Shipbuilding Industry Split, Field work in the company AD Plastik Split, Field work at the Institute IGH d.d.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">xlectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
xfield work</td><td colspan="3">☐ndependent assignments
xmultimedia
☐aboratory
☐work with mentor
☐(other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lecture attendance: 80 %. Exercises attendance: 100 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The entire course can be passed by two partial exams during the semester. Passing threshold is 60%. Each partial exam in assessing participates with 40% and exercises with 20%. On examination shedule students will have oral exam. Scoring: <60% insufficient, 61 - 69% - sufficient (2), 70 - 79% - good (3), 80-89% very good (4), 90 - 100% - excellent (5).</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">T. Filetin, F. Kovačiček, J. Indof, Svojstva i primjena materijala, Fakultet strojarstva i brodogradnje,Zagreb, 2007.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">T. Filetin, Pregled razvoja i primjene suvremenih materijala, Hrvatsko društvo za materijale i tribologiju, Zagreb, 2000.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">T. Filetin, Izbor materijala pri razvoju proizvoda, Fakultet strojarstva i brodogradnje, Zagreb, 2006.</td><td></td><td colspan="2"></td></tr>
</table>

	J.R. Davis, Corrosion – understanding the basic, ASM International, 2000.		
	B. Jarić, A. Rešetić, Korozija i katodna zaštita, Korexpres, Zagreb, 2003.		
Optional literature (at the time of submission of study programme proposal)	Uhlig's Corrosion Handbook, 2nd edition, R.W. Revie (ed.), Pennington, New Yersey, 2000. I. Esih, Osnove površinske zaštite, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, Zagreb, 2003.		
Quality assurance methods that ensure the acquisition of exit competences	- Tracking suggestions and reactions of participants during the semester - Student survey		
Other (as the proposer wishes to add)			

Exercises in Construction Materials

NAME OF THE COURSE	**Evercises in Construction Materials**					
Code	KTA304	Year of study	3rd			
Course teacher	PhD, Ladislav Vrsalović, associate prof.	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	18	12
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Presentation of various types of construction materials and their properties relevant to their practical application; the fundamental processes of corrosion and protection of materials as well as methods for testing and control of corrosion processes. The course will teach students to acquire creative approach to solving the problems caused by corrosion in order to protect the environment.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Construction Materials					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the training, students are expected to know: • Select appropriate methods of testing mechanical properties of materials • Distinguish practical methods to protect metals from corrosion • Calculate the velocity of corrosion • Graphic display test results, correctly interpret them and draw appropriate conclusions.					
Course content broken down in detail by weekly class schedule (syllabus)	1. Monitor of atmospheric corrosion 2. Polarization of iron in sulphuric acid solution 3. Determination of efficiency of corrosion inhibitors by thermometric method. 4. Cathodic protection of metal by protector 5. Investigation of oxide films formed on stainless steel 6. Field work in the laboratories of the Quality Insurance of Shipbuilding					

<table>
<tr><td></td><td colspan="6">Industry Split
7. Field work in the company AD Plastik Split.
8. Field work at the Institute IGH d.d.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
×exercises
☐on line in entirety
☐partial e-learning
×field work</td><td colspan="3">☐independent assignments
☐multimedia
×laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">laboratory exercises, field work, writing reports</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1</td><td>Report</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Preliminary exams, writing reports.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Lj. Aljinović, Vježbe iz konstrukcijskih materijala i zaštite, Tehnološki fakultet, Split, 1991.</td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">S. Martinez i I. Štern, Korozija i zaštita – eksperimentalne metode, Hinus, Zagreb 1999.
I Esih, Osnove površinske zaštite, Udžbenik Sveučilišta u Zagrebu, Zagreb 2003.
M. Kliškić, L. Vrsalović, Vježbe iz tehnologije površinske zaštite, Kemijsko-tehnološki fakultet, Split, 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Keeping records of student attendance; student survey in order to evaluate teachers, self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Technological Processes of Inorganic Industry

NAME OF THE COURSE	**Technological Processes of Inorganic Industry**		
Code	KTA305	Year of study	3rd
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	5.5

Associate teachers		Type of instruction (number of hours)	L	S	E	F
			45	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	Gaining knowledge about the basics of technological processes of inorganic industry and the significance of technological processes in the economy and the practical implementation, with particular emphasis on the economy and sustainable development setting.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Technological Processes of Inorganic Industry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, students gain theoretical and practical knowledge of basic technological processes and allows them to be independent: - Systematize the basic technological processes - Interpret technological processes through conceptual, ideological and procedural and process diagrams Knowledge of: - Modes of combustion and fuel quality, and necessary calculations - Basic catalytic inorganic processes - Fundamentals of crystallization and precipitation of inorganic salts and obtaining, displays a two, three - and four component system using diagrams - Procedures for the preparation of process water: flocculation and sedimentation, water softening, demineralization - ion exchange, reverse osmosis and electrodialysis					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: Introduction, course content, basic definitions, basic technological processes and systematization display processes using diagrams, processes and sustainable development Week 2: Oxidation and reduction processes during the combustion parameters of judgment of quality fuel stoichiometric ratio of fuel to air-surplus costs, the amount and composition of flue gas, homogeneous and heterogeneous equilibrium processes and mechanisms at combustion Week 3: Examples of industrial gases and combustion of liquid fuels, chemical Breeding of solid fuel, the oxidation of sulfur, nitrogen and phosphorus, and obtaining of inorganic acids Week 4: Processes of oxidation and reduction in electrochemical processes, electrolysis of molten electrolyte, basic catalytic inorganic processes; Week 5: Seminar (tasks): fuel, industrial electrolysis, basic catalytic processes Week 6: Hydrogenation processes and the synthesis of ammonia Week 7: I. Partial colloquium, processes of dissolution and crystallization (precipitation) in aqueous systems Week 8: Three-component systems and the balance in three component systems Week 9: Four-component systems and their representations 10th week: Basic processes of extraction and separation of mineral salts, getting of KNO_3, kaustification of soda, 11th week: Aqueous dispersion of colloids, flocculation and sedimentation of colloids Week 12: Basic processes in the procedures for the preparation of water in industry-depositional processes 13th week: Seminar (tasks): processes of melting and crystallization in multicomponent systems, decarbonisation and softening water demineralisation Week 14: demineralization of water, processes with ion exchange, reverse osmosis and electrodialysis Week 15: II. Partial preliminary examination, repetition of important issues relevant					

	to the course oral exam
Format of instruction	x lectures x seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning x field work ☐independent assignments x multimedia ☐laboratory ☐work with mentor ☐ (other)
Student responsibilities	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	3	Research		Practical training	
	Experimental work		Report		Attending of seminars	1
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	1	(Other)	
	Written exam	0.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	Continuous evaluation: Written examination can be laid across two exams during the semester. Pass rate threshold is 60%. Each colloquium in assessing participates with 20%, oral exam with 50% and the presence of lectures in 80-100% amount is 10% of the final grade. Final evaluation: Students who have passed one colloquium, it is recognized as part of the exam (20% score). The remaining part is laid in the regular examination periods. Students who did not pass any colloquium, written exam in the regular examination periods laid the whole subject matter. Prague passing is 60% and a written examination form part of the assessment with 40%. Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	P. Krolo, P. Dabić, D. Barbir, Praktikum iz tehnoloških procesa anorganske industrije, nastavni tekstovi za predavanja i vježbe, Kemijsko-tehnološki fakultet Split, 2014.	1	Web site KTF
	R. Krstulović, Tehnološki procesi anorganske industrije, Sveučilište Split, Tehnološki fakultet u Splitu, Split, 1986.	3	-
	J. A. Moulin, M. Makkee, A. E. Van Diepeen, Chemical Process Technology, 2nd ed., John Wiley & Sons, Ltd., Chichester, 2013.	1	-
	M. L. Souza-Santos, Solid fuels combustion and gasification: modeling, simulation, and equipment operations, CRC Press, New York, 2010.	1	
	Encyclopedia of separation technology, vol I-II., Ed., D. M. Rurhven, A. Kirk-Othmer Encyclopedia, John Wiley & Sons, Inc., New York, 1997.	1	-

	Gray, N. F., Water Technology, 2nd ed., Elsevier Science & Technology Books, Amsterdam, 2005.	1	-
Optional literature (at the time of submission of study programme proposal)	J. N. Lalena, D. A. Cleary, Principles of Inorganic Materials Design, John Wiley & Sons, New Jersey, 2005. McAllister, S., Chen, J. Y., Fernandez-Pello, A. C., Fundamentals of Combustion Processes, Springer, New York, 2011.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Annual Performance analysis Examination - Monitoring suggestions and reactions of participants during the semester - Student survey		
Other (as the proposer wishes to add)			

Exercises in Technological Processes of Inorganic Industry

NAME OF THE COURSE	**Exercises in Technological Processes of Inorganic Industry**					
Code	KTA306	Year of study	3rd			
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	3.0			
Associate teachers	PhD, Damir Barbir, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			0	0	45	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Practical application of basic technological processes with the given conditions.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Technological Processes of Inorganic Industry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exercises student gets the basic knowledge on the: - practical application and - implementation of basic technological processes under the conditions of work with respect to - conversion, - spatial and - temporal utilization of reactor control and analysis processes and - analyzing the results.					
Course content broken down in detail by weekly class schedule (syllabus)	Determination of calorific value of solid (liquid) fuel. Electrolytic preparation of zinc in the form of a compact cathode product. Obtaining of sodium chlorate by electrochemical oxidation. Contact process for the catalytic oxidation of SO_2 to SO_3 to obtain sulfuric acid. Processes of double excange - causticising soda and getting a base. Chemical sedimentation with coagulation and decarbonization. Water treatment processes of decarbonization with lime (fast reactor).					

	Decarbonization with lime and ion exchange with neutral Na-exchanger in the preparation or softening water. Demineralization and deionization of water using ion exchangers.					
Format of instruction	☐lectures ☐seminars and workshops ☒exercises ☐*on line* in entirety ☐partial e-learning ☐field work		☐independent assignments ☐multimedia ☒laboratory ☐work with mentor ☐ (other)			
Student responsibilities	Attendance at 100% of the total number of lessons.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	2.0	Report	0.5	(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Exercises can be activated after passing oral exams for every exercise. The assessment exercises included knowledge of oral exams (10%), report writing (10%) and commitment during the experimental work in the laboratory (80%). Laboratory work involved in assessing a share of 20%. Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**		**Availability via other media**
	P. Krolo, P. Dabić D. Barbir, Practicum in technological processes of inorganic industry, Handouts, Split, 2014			1		WEB site KTF
Optional literature (at the time of submission of study programme proposal)						
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Teacher level.					
Other (as the proposer wishes to add)						

Technological Processes in Organic Industry

NAME OF THE COURSE	**Technological processes in organic industry**		
Code	KTA307	Year of study	3rd

<table>
<tr><td>Course teacher</td><td>PhD, Nataša Stipanelov Vrandečić, prof.</td><td>Credits (ECTS)</td><td colspan="4">5.5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">The aim of the course is to acquaint students with technological processes of refining of petroleum and natural gas for the production of fuels and lubricants and selected petrochemicals, as well as the processes of conversion of petrochemicals in the intermediate and/or final products with respect to economic, environmental and safety conditions in industrial production.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Enrolled in or passed the course Exercises in Technological processes in organic industry</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After the successfully passed exam student should be able to:
- explain the specifics of the organic chemical industry
- describe the of primary and secondary processes of petroleum processing
- describe the processes of petroleum products refining
- specify the basic petroleum products and their characteristics
- describe technological processes of conversion of selected petrochemicals in the intermediates and / or products
- sketch diagrams of selected technological processes
- synthesize chemical engineering knowledge on the examples of industrial processes in modern organic chemical industry</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">1st week: Introduction. Characteristics and significance of the organic chemical industry. The development of the organic chemical industry
2nd week: Petrochemical raw materials and products. World production and consumption of oil and natural gas; an estimation of remaining oil reserves
3rd week: Classification and characteristics of chemical reactions and processes; Chemical reactors; optimization of chemical processes; economy and ecology of chemical processes
4th week: Petroleum: energent, petrochemicals source. Origin, exploration, drilling and transportation of petroleum. Chemical composition and properties of petroleum.
5th week: Processes and products of petroleum processing. The primary petroleum refining processes: distillation processes
Written test (first)
6th week: The secondary petroleum refining processes: thermal processes - cracking, visbreaking, coking;
7th week: Catalytic processes - cracking, hydrocracking, reforming, isomerization, oligomerization, alkylation)
8th week: Refining processes of petroleum fractions: specially treating of the fuels and lubricating oils (sweeting, deasphalting, dewaxing, furfural extraction, hydrofining process).
9th week: Oxidation processes-removal of sulfur compounds; Bitumen production.
10th week: The basic petroleum products.
Written test (second)
11th week: Natural gas: exploration and processing
12th week: Processes of production of components for organic synthesis: Production of alkanes. Methane. Syngas, production and applications. Methanol. Formaldehyde. Acetic acid. Fisher-Tropsch synthesis.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">13th week: Production of alkenes: pyrolysis of hydrocarbons. Chemicals from C_4 and C_5 fraction. Oligomerization of ethylene. Uses of ethylene: acetaldehyde, ethylene oxide, ethylene glycol.
14th week: Uses of C_4 hydrocarbons. Acetylene. Production of aromatic hydrocarbons. Separation BTX hydrocarbons. Uses of the aromatic hydrocarbons: phenol, styrene.
15th week: Polymers and polymerization processes (chain and step polymerization reactions). Production of polyethylene.
Written test (third)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">xlectures
xseminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
xfield work</td><td colspan="3">☐ndependent assignments
xmultimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.50</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>3.50</td><td>Oral exam</td><td>(1.50)</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>(2,00)</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">CONTINUOUS EVALUATION
The complete exam can be passed through three partial tests during semester.
Attendance on lectures, A_1(successfulness =70 -100 %), share in grade, k_1 =0,10
1st test, A_2 (successfulness =60 -100 %), share in grade, k_3 =0,30
2nd test, A_3 (successfulness =60 -100 %), share in grade, k_4 =0,30
3rd test, A_4 (successfulness =60 -100 %), share in grade, k_4 =0,30
GRADE (%) = $0,10A_1+0,30A_2 + 0,30A_3+ 0,30A_4$

FINAL EVALUATION
Students who did not take or pass partial tests have to attend to written and oral exam in the regular exam periods.
Activitie A_1 is evaluated in the same way as indicated above.
Written exam, A_5 (successfulness =60 -100 %), share in grade, k_5 =0,45
Oral exam, A_6 (successfulness =60 -100 %), share in grade, k_6 =0,45
GRADE (%) = $0,10A_1+ 0,45A_5 + 0,45A_6$

FINAL GRADE: successful (60% – 70 %), good (71% – 80 %), very good (81% – 90 %), excellent (91% – 100 %).

In the case that student passed only one or two tests during continuous evaluation, he/she have to attend to written and oral exam in the regular exam periods. The passed test will be recognized by the end of the academic year as a part of the written exam.</td></tr>
<tr><td>Required literature (available in the</td><td colspan="3">Title</td><td>Number of copies in</td><td>Availability via other media</td></tr>
</table>

library and via other media)		**the library**	
	N. Stipanelov Vrandečić, Tehnološki proces organske industrije, nastavni materijali u obliku PPT prezentacija, 2013.		web KTF-a
	I. Klarić, (I. dio), interna skripta, Kemijsko-tehnološki fakultet, Split, 2008.	1	web knjižnica KTF-a
	Z. Janović, Naftni i petrokemijski procesi i proizvodi, Hrvatsko društvo za goriva i maziva, Zagreb, 2005.	10	
Optional literature (at the time of submission of study programme proposal)	N. P. Cheremisinoff, Handbook of Chemical Processing Equipment, Buterworth Heinemann, Boston, 2000. S. Matar, L. F. Hatch, Chemistry of Petrochemical Processes, 2nd edition, Gulf Publ. Co., Boston, 2001.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Exercises in Technological Processes in Organic Industry

NAME OF THE COURSE	**Exercises in Technological Processes in Organic Industry**					
Code	KTA308	Year of study	3rd			
Course teacher	PhD, Nataša Stipanelov Vrandečić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	45	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The course prepares students to conduct the technological processes in laboratory scale with quality control of raw materials and products.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Technological Processes in Organic Industry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After the successfully passed exam student should be able to: - conduct technological process in laboratory scale - perform an analysis of raw materials and products - interpret collected data and measurement results - participate in team work and to present results of investigation					
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1: Fuels, lubricants and other petroleum products (standard testing methods) Exercise 2: Intermediates and industrial chemicals (dehydrogenation of ethanol to acetaldehyde, oxidation of paraffin waxes in the fatty acids, esterification - synthesis of dibutylphthalate) Exercise 3: The synthesis of dyes and dyeing of fibers (dyes analysis) Exercise 4: Oils and fats, and surfactants (soap preparations; analysis of liquid and					

<table>
<tr><td></td><td colspan="6">powder detergents)
Exercise 5: Polymers and polymerization: analysis of PVC powder, K-value, thermal degradation of PVC in the blends; synthesis of polymer (step polymerization and chain polymerization)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ectures
☐seminars and workshops
x exercises
☐*on line* in entirety
☐partial e-learning
☐ield work</td><td colspan="3">☐ndependent assignments
☐multimedia
xlaboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1,5</td><td>Report</td><td>0,50</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1,00</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The student is required to pass a colloquium before each exercise.
The student is required to prepare a report after performed exercise.
Success threshold for each activity is 60%.

FINAL GRADE: successful (60% – 70 %), good (71% – 80 %), very good (81% – 90 %), excellent (91% – 100 %).</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">T. Kovačić: Vježbe iz Tehnoloških procesa organske industrije, (1 do 5) (dopunjeno izdanje), Zavod za organsku tehnologiju, Kemijsko-tehnološki fakultet, Split, 2000</td><td>1</td><td>web KTF-a</td></tr>
<tr><td colspan="3">I. Klarić, Vježbe iz Procesa polimerizacije, Tehnološki fakultet u Splitu, Split 1990.;</td><td>1</td><td>web KTF-a</td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Industry and the Environment

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Industry and the Environment</td></tr>
<tr><td>Code</td><td>KTA309</td><td>Year of study</td><td colspan="5">3rd</td></tr>
<tr><td>Course teacher</td><td>PhD, Marina Trgo, prof.</td><td>Credits (ECTS)</td><td colspan="5">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The students get insight into the basic processes that take place in hydrosphere, lithosphere and atmosphere, and explain the basic physical, physico-chemical and biological processes as well as the selection of process equipment for processing waste streams from industry to protect the environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercises in Industry and the Environment</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam the student is expected to know:
- Explain the cycles processes of in hydrosphere, lithosphere and atmosphere
- Sources of air pollution
- Sources of pollution of the hydrosphere
- Methods and process equipment to prevent emissions from industrial sources in the environment
- Methods and procedures for waste management.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Industrial development and environment. Principles of sustainable development.
2nd week: Technology, raw materials and energy in the process of production planning.
3rd week: Ecosystems in nature. Industrial sources of pollutants in atmosphere, hydrosphere and lithosphere.
4th week: Properties of atmosphere. Air pollutants and global climate changes.
5th week: Methods and equipment for prevention of atmospheric pollution.
6th week: Solid waste. Waste management.
7th week: Waste disposal. Recycling and recovery.
8th week: Mechanical and biological treatment.
9th week: Energetic value of solid wastes. Biogas production.
10th week: Hydrological cycle. Pollution and contamination of natural waters.
11th week: Depuration and eutrophication.
12th week: Physical, chemical and biological indicators of water pollution.
13th week: Sources of wastewaters. Methods and procedures of wastewater treatment.
14th week: Mechanical, physicochemical and biological treatments
15th week: Tertiary treatment. Examples of technological solutions for wastewater treatments in chemical industry.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning</td><td colspan="3">☐independent assignments
☐multimedia
☐laboratory
☐work with mentor</td></tr>
</table>

	x field work			☐ (other)		
Student responsibilities						
Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2.5	Research		Practical training	
	Experimental work		Report		Field work	
	Essay		Seminar essay		(Other)	
	Tests	0.3	Oral exam	0.2	(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Overall assessment can be applied over three written tests and one oral assessment. Written tests are related to material adopted on lectures. Ratings on the written exams: 60-69% is sufficient, 70-79% good, 80-89% is very good, 90-100% excellent. Students who have not passed the exam through the assessment should have the regular exam. Regular exam means written test and oral exam. The rating, which is entered in the index, is the mean score of written tests.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	H.D. Sharma and S.P. Lewis, Waste Containment System, Waste Stabilization, and Landfills, John Wiley & Sons Inc., New York, 1994.		
	S. Tedeschi, Zaštita voda, HDGI, Zagreb, 1997		
	R.T. Wright, B.J. Nebel, Environmental Science, 9th edition, Prentice Hall Inc, New Jersey, 2004.		
	N.G. Wung Jern, Industrial Wastewater Treatment, Imperial College Press, London, 2006.		

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous writing assessment - Results on the written knowledge tests - Student's questionnaire.
Other (as the proposed wishes to add)	

Exercises in Industry and Environment

NAME OF THE COURSE	**Exercises in Industry and Environment**						
Code	KTA310	Year of study	3rd				
Course teacher	PhD, Marina Trgo, prof.	Credits (ECTS)	3.0				
Associate teachers	PhD, Ivona Nuić, assistant	Type of instruction	L	S	E	F	

		(number of hours)	0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	The students get insight into the basic laboratory methods of identification of environmental pollution.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Industry and the Environment
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: - Determine the content of organic matter in the water and wastewater - Determine the physico-chemical parameters of water quality - Assess the possibility of using solid waste for the purpose of obtaining energy - Determine the content of harmful substances in the atmosphere.
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1: Determination of dissolved oxygen in the water. Exercise 2: Determination of COD and BOD values in different aqueous samples. Exercise 3: Simulation of aerobic biodegradation of organic matter in wastewater. Exercise 4: Testing the chemical stability of solid wastes of different origin. Exercise 5. Visiting monitoring station for air pollution control, statistical data processing. Visiting of landfill. Visiting device (scrubber) to prevent emissions into the environment.

Format of instruction		
	☐lectures	☐ndependent assignments
	☐seminars and workshops	☐multimedia
	x exercises	x laboratory
	☐*bn line* in entirety	☐work with mentor
	☐partial e-learning	☐ (other)
	☐field work	

Student responsibilities	

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	0.8	Report	0.1	Field work	
	Essay		Seminar essay		(Other)	
	Tests	0.1	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	The requirement for admission of laboratory exercises is passed oral exam for exercise. Overall rating of laboratory practice includes evaluating oral exams, exercise performance, and report writing. Ratings of oral exercise exams are: 60-69% - sufficient, 70-79% - good, 80-89% - very good, 90-100% -excellent.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Internal material for laboratory exercises		

Optional literature (at the time of submission of study	

programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous writing assessment - Student's questionnaire.
Other (as the proposed wishes to add)	

Inorganic Materials

NAME OF THE COURSE	**Inorganic Materials**					
Code	KTA311	Year of study	3rd			
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			45	15	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students will be able to assess the relationship between structure and properties of selected inorganic non-metallic materials as an important prerequisite for their production, control and application with special emphasis on chemical engineering and environmental aspects, economic efficiency and sustainable development.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Inorganic Materials					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, students will be able to: 1. Distinguish and explain the physical and chemical conditions of the genesis of mineral resources. 2. Classify ceramic materials with respect to their properties and applications. 3. Predict the inter-relationship between microstructure, properties and production of ceramic materials. 4. Explain the characteristics and behavior of clay minerals in a water-clay system depending on the structure of clay minerals. 5. Explain the difference in the structure of ceramics depending on the processes of drying and firing (sintering). 6. Distinguish and explain the mechanisms of hydration, setting and hardening of mineral binders. 7. Assess the impact of the environment (weathering) on the resistance and durability of technical glass and decorative stone, including historic and cultural heritage monuments. 8. Explain the difference between the natural and synthetic inorganic pigments. 9. Evaluate and propose protection measures in order to improve the durability of selected inorganic non-metallic materials.					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Introduction. Historical overview, development and meaning of the commercial inorganic non-metallic materials industry (clay wares, refractories, porcelain, technical glasses, cement, concrete, etc.). 2nd week: Sources of raw materials. The earth's crust, rocks, minerals, the environment, conditions and processes of mineral genesis. Classification of					

<table>
<tr><td></td><td colspan="6">minerals and rocks.
3rd week: Silicates, oxides and other minerals Structure and properties.
4th week: Ceramic materials. Traditional (classical) and advanced (high-tech) ceramics. Resemblances and differences.
5th week: Raw materials for traditional ceramics and demands for their quality. Phase diagrams of the systems important in ceramics.
6th week: Raw materials for advanced ceramics and demands for their quality. Pure oxide ceramics. Non-oxide ceramics. Bioceramics.
7th week: The water-clay system. Characterization of ceramic slurries (reological properties, thixotropy, plasticity, etc.). Forming processes (slip casting, pressing, jiggering, extrusion, etc.). Drying and firing (sintering).
8th week: A high-temperature reactions and sintering processes in the traditional and advanced ceramics production.
9th week: The written knowledge tests (I Colloquium).
10th week: Glass. Structure and classification of glass. A property of glass melts. Glass forming operations and equipment.
11th week: Overview and properties of particular types of ceramics (porcelain, cements, refractories, technical glass). Flow diagrams of chosen inorganic material production with special reference to the physical and chemical base of the processes, equipment and environmental aspects.
12th week: Technical and decorative stone. Stone types, properties and exploiting.
13th week: The impact of aggressive environment on the durabilty of ceramics, technical glass and decorative stone including historic and cultural heritage monuments.
14th week: Inorganic pigments. Natural and synthetic. Overview and properties of particular pigments.
15th week: The written knowledge tests (II Colloquium).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
x multimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.0</td><td>Oral exam</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two (2) partial tests during the semester. Test passing score is 60%. Students who do not pass the partial exams have to take an exam in the regular examination periods. The exam consists of theoretical (oral) and written part. Exam passing score is 60%..
Grades depending on the test score: 60% - 70% - satisfactory, 71% -81% - good, 82% -92% very good, 93% -100% - excellent.</td></tr>
<tr><td>Required literature (available in the</td><td colspan="3">Title</td><td>Number of copies in</td><td>Availability via other media</td></tr>
</table>

library and via other media)		**the library**	
	J. Zelić, Practicum in the Processes of Inorganic Industry /Praktikum iz procesa anorganske industrije (in Croatian), Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials), http:// www.ktf-split.hr/bib/nm/Procesi _anorganske_ industrije.pdf	1	www.ktf-split.hr
	J. Zelić, Engineering of Selected Inorganic Materials/ Inženjerstvo odabranih anorganskih materijala (in English), Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials), http:// www.ktf-split.hr/bib/nm/Inzenjerstvo _odabranih_ anorganskih_materijala_en.pdf	1	www.ktf-split.hr
	J. Zelić, Engineering of Selected Inorganic Materials/ Inženjerstvo odabranih anorganskih materijala (in English), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 2014, peer review.		
	J. Zelić, Z. Osmanović, Čvrstoća i trajnost cementnih kompozita/ Strength and Durability of Cement Composites (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 2014, ISBN 978-953-7803-01-8.	1	www.ktf-split.hr
	Z. Osmanović, J. Zelić, Proizvodnja Portland-cementa / Production of Portland Cement, Manualia Universitatis Studiorum Tuzlaensis, University of Tuzla, B&H, Tuzla, 2010., ISBN 978-9958-897-04-7. http://www.knjiga.ba/proizvodnja_portlandj_cementa-k7412.html	5	www.knjiga.ba
Optional literature (at the time of submission of study programme proposal)	1. Z. Kolumbić, M. Dunđer, Materijali, Sveučilišni udžbenik, Sveučilište u Rijeci, 2011., ISBN 978-953-6104-85-7. 2. M. Tecilazić-Stevanović, Osnovi tehnologije keramike, Univerzitet u Beogradu, Tehnološko-metalurški fakultet, Beograd, 1990., YU ISBN 86-7401-065-2. 3. C. Saiz-Jimenez (Ed.), Air pollution and Cultural Heritage, Taylor & Francis Group, London, 2004, ISBN 90 5809 682 3.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) Faculty, conducting surveys of students on teaching quality.		
Other (as the proposed wishes to add)			

Exercises in Inorganic Materials

NAME OF THE COURSE	Exercises in Inorganic Materials						
Code	KTA312	Year of study	3rd				
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	1.0				
Associate teachers	PhD, Mario Nikola Mužek, assistant	Type of instruction (number of hours)	L	S	E	F	
			0	0	10	5	
Status of the course	Elective	Percentage of application of e-learning					

COURSE DESCRIPTION

Course objectives	Qualifying students to analyze the chemical and physical processes at different stages of production of inorganic non-metallic materials including ecological aspects, quality control and quality assurance.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Inorganic Materials
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course the student will be able to: 1. Conduct experiments on laboratory measuring equipment. 2. Perform measurements independently and within a team. 3. To analyze the chemical and/or physical processes according to preset conditions and material properties. 4. Interpret the results of experiments. 5 Create systems, system components and processes under defined conditions. 6. Recommendation of process parameters in order to optimize processes in the particular phases of selected inorganic non-metallic materials production.
Course content broken down in detail by weekly class schedule (syllabus)	1. Determination of exchange capacity of clays. Characterisation of clay. 2. Application of thermal analysis (DTA-TG-DTG) and infrared spectroscopy (FTIR) in the analysis of non-metallic materials. 3. Determination of porosity of the sintered ceramic body. Manufacturing ceramics by slip-casting technique in laboratory scale. 4. Determination of "Mediterranean patinas" on the marble and limestone monuments including historic and cultural heritage monuments. 5. Determination of chemical resistance of inorganic pigments. 6. Field work - visit technological facilities of inorganic industry.
Format of instruction	☐ectures ☐seminars and workshops **x** exercises ☐*bn line*in entirety ☐partial e-learning **x** field work ☐independent assignments ☐multimedia **x** laboratory ☐work with mentor ☐ (other)
Student responsibilities	Implementation and analysis of selected processes according to preset conditions. Each student is required to attend laboratory practice and field work (100%). On completion of all exercises the final written exam is obligated.

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of*						
	Class attendance	0.2	Research		Practical training	
	Experimental work	0.3	Report	0.2	(Other)	
	Essay		Seminar essay		(Other)	

ECTS credits is equal to the ECTS value of the course)	Tests		Oral exam		(Other)	
	Written exam	0.3	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Successful completion of laboratory works has share 60% and the final written exam 40% score. Exam passing score is 60%. Grades: 60% - 70% - satisfactory, 71% -81% - good, 82% -92% very good, and 93% -100% - excellent.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	J. Zelić, Practicum in the processes of inorganic industry / Praktikum iz procesa anorganske industrije (in Croatian), Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials), http:// www.ktf-split.hr/bib/nm/Procesi _anorganske_ industrije.pdf			1	www.ktf-split.hr	
Optional literature (at the time of submission of study programme proposal)	1. Z. Kolumbić, M. Dunđer, Materijali, Sveučilišni udžbenik, Sveučilište u Rijeci, 2011., ISBN 978-953-6104-85-7. 2. M. Tecilazić-Stevanović, Osnovi tehnologije keramike, Univerzitet u Beogradu, Tehnološko-metalurški fakultet, Beograd, 1990., YU ISBN 86-7401-065-2. 3. C. Saiz-Jimenez (Ed.), Air pollution and Cultural Heritage, Taylor & Francis Group, London, 2004, ISBN 90 5809 682 3.					
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) Faculty, conducting surveys of students on teaching quality.					
Other (as the proposed wishes to add)						

Electrodeposition

NAME OF THE COURSE	**Electrodeposition**					
Code	KTA313	Year of study	3rd			
Course teacher	PhD, Ladislav Vrsalović, associate prof.	Credits (ECTS)	5.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	To familiarize students with the basic principles of electrodeposition. Introduce students with the practical problems and applications of electrodeposition. Acquisition of basic theoretical and practical knowledge which are necessary for work in electroplating facilities.					
Course enrolment requirements and entry competences	Enrolled in or passed the course Exercises in Electrodeposition The condition for taking the exam: Completed the course "Exercises in Electrodeposition“					

<table>
<tr><td>required for the course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After successfully passing the exam, students will be able to:
1. Select the most appropriate metal coating for the corresponding metal surfaces.
2. Distinguish all process parameters that affect the quality of metal coatings.
3. Independently run or monitor the electroplating process.
4. Identify the causes of the occurrence of errors on the coating and find appropriate solutions.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1: Introduction. Tehnological process of obtaining galvanic and chemical coatings. Metal deposition on cathode.
Week 2: electrocrystallization. The current distribution and metal deposits on the cathode.
Week 3: The sedimentary power of electrolytes.
Week 4: Preparation of specimen for metallic coatings deposition. Mechanical, chemical and electrochemical preparation.
Week 5: Electroplating. The composition of the bath. Material and shape of anodes for electroplating. Temperature and bath convection.
Week 6: Current types and current density. Sources of current and facilities for electroplating.
Week 7: The most important processes of metals electroplating. Tin electroplating.
Week 8: I partial knowledge test. Zinc electroplating.
Week 9: Nickel electroplating.
Week 10: Copper electroplating. Chrome electroplating.
Week 11: Causes of coating errors in metals plating. Electroplating with noble metals.
Week 12: Manufacturing of metallic coatings by hot metal coating processes. The coatings obtained by diffusion processes.
Week 13: Electroplating of non-metallic substrates. Electroplating objects made by plastic ABS-materials. Electroplating objects made by porous materials.
Week 14: Electroforming.
Week 15 Water in electrodeposition procesess. II. partial knowledge test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">×lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
×multimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lectures, tests</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1</td><td>Oral exam</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two partial tests during the semester. Students who do not pass the partial exams have to take an exam in the regular examination term. During the examination terms students take written and oral exam.</td></tr>
</table>

	Scoring: <55% insufficient;55-66% sufficient (2); 67-78% good (3); 79-90% very good (4); 91-100% excellent (5)		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	M. Gojić, Površinska obradba materijala, Metalurški fakultet Sveučilišta u Zagrebu, Sisak 2010.	2	
	E. Stupnišek-Lisac, Korozija i zaštita konstrukcijskih materijala, FKIT Zagreb, Zagreb 2007.	1	
	M. Schlesinger, M. Paunović, Modern electroplating, IV. edition, J. Willey & Sons, USA, 2000.	1	
Optional literature (at the time of submission of study programme proposal)	I. Esih, Z. Dugi, Tehnologija zaštite od korozije, Školska knjiga, Zagreb,1990. I. Esih, Osnove površinske zaštite, Sveučilište u Zagrebu, Zagreb, 2003. D.A. Jones, Principles and Prevention of Corrosion, 2nd Ed. Prentice Hall, Upper Sadle River, 1996. M. Paunović, M. Schlesinger, Fundamentals of electrochemical deposition, J. Wiley & sons, USA 1998.		
Quality assurance methods that ensure the acquisition of exit competences	Keeping record so students attendance; annual analysis of the exam results; students survey in order to evaluate teachers; self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.		
Other (as the proposer wishes to add)			

Exercises in Electrodeposition

NAME OF THE COURSE	**Exercises in Electrodeposition**					
Code	KTA314	Year of study	3rd			
Course teacher	PhD, Ladislav Vrsalović, associate prof.	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	12	3
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	To familiarize students with the basic principles of electrodeposition. To present students the practical problems and applications of electrodeposition. Students will acquire the basic theoretical and practical knowledge important for a work in electroplating facilities.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Electrodeposition					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the training, students are expected to know: • Distinguish different methods of production metal coatings. • Select the most suitable metalic coating for the corresponding metal surfaces. • Independently calculate the required process parameters for conducting the					

<table>
<tr><td></td><td colspan="6">electroplating.
• Determine the thickness of the obtained metallic coatings.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1. Nickel electroplating
2. Copper electroplating
3. Influence of additives on electrodeposition of bright nickel.
4. Determination of mechanisms of coumarin adsorption on Pt-electrode.
5. Electroless formation of metallic coatings.
6. Field work in hot dip galvanizing facility Adriacink d.o.o.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
×exercises
☐on linein entirety
☐partial e-learning
×field work</td><td colspan="3">☐ndependent assignments
☐multimedia
×laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">laboratory exercises, field work, writing reports</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td>0.5</td></tr>
<tr><td>Experimental work</td><td>0.5</td><td>Report</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Preliminary exams, writing reports.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">J. Radošević, S. Gudić, Procesi galvanotehnike, upute za vježbe, kemijsko-tehnološki fakultet 1999.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">J. A. Poyner, Electroplating, Argus Books Ltd., England 1991.;
I. Esih, Osnove površinske zaštite, Fakultet strojarstva i brodogradnje, Zagreb 2003.;
G. O. Mallory, J. B. Hajdu, Electroless plating: fundamentals and applications, Noyes Publications Mnlliam Andrew Publishing, LLC, New York, 1991.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Keeping records of student attendance; student survey in order to evaluate teachers, self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Mineral Raw Materials from Seawater

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Mineral Raw Materials from Seawater</td></tr>
<tr><td>Code</td><td>KTA315</td><td>Year of study</td><td colspan="4">3rd</td></tr>
<tr><td>Course teacher</td><td>PhD, Vanja Martinac, prof.</td><td>Credits (ECTS)</td><td colspan="4">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Through the program of lectures the students master the knowledge of basic properties of seawater and methods of exploiting mineral raw materials from seawater.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercises in Mineral Raw Materials from Seawater</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam, students are expected to:
– explain and discern physical and chemical properties of seaware
– discern macro and micro constituents in seawater
– describe separation of certain salts at isothermal evaporation of seawater
– describe technological processes of extracting mineral raw materials (magnesium, sodium chloride, bromine and fresh water) from seawater</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1. week: Seawater – a source of mineral raw materials.
2. week: The basic properties of seawater.
3. week: Physical and chemical characteristics of the seawater.
4. week: Composition of seawater. Classification of components dissolved in seawater.
5. week: Concentration and chemical forms of elements in seawater.
6. week: Constant ratios of major components of seawater.
7. week: Minor components of seawater.
8. week: Isothermal evaporation of seawater and separation of certain salts.
9. week: The effect of climactic and other factors on the evaporation process.
10. week: Evaporation of concentrated sea bittern.
11. week: Possibilities of technological exploitation of seawater.
12. week: Extraction of common salt.
13. week: Extraction of bromine from seawater.
14. week: Recovery of magnesium and magnesium compounds from seawater.
15. week: Extraction of fresh water from the seawater – desalination processes.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attendance to lectures for 80% of the total number of hours.</td></tr>
<tr><td>Screening student work(name the</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
</table>

proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)	Experimental work		Report		Field work	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	2.0	(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Attendance to lectures is registered (not included in the rating). An oral exam is held in the examination periods. The oral exam is mandatory for all students. Ratings: 60%-70% – satisfactory, 71%-80% – good, 81%-90% – very good, 91%-100% – excellent.					

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	F. J. Millero, Chemical Oceanography, 3th Edition, CRC Press, Boca Raton, 2005.	1	
	V. Martinac, Magnesium oxide from Seawater, on line (2010-12-13), University handbook, (in Croatian), Faculty of Chemistry and Technology, Split, 2010.		on line
	Desalination, Trends and Technologies, Ed by M. Schorr, on line (2011-02-28), InTechOpen, 2011.		on line
	M. J. Kennish, Practical Handbook of Marine Science, 3rd Edition, CRC Press, Boca Raton, 2001.	1	
Optional literature (at the time of submission of study programme proposal)	M. E. Q. Pilson, Introduction to the Chemistry of the Sea, 2st edition, Prentice Hall, 2013. K. Stowe, Exploring Ocean Science, Wiley, New York, 1996.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Exercises in Mineral Raw Materials from Seawater

NAME OF THE COURSE	**Exercises in Mineral Raw Materials from Seawater**					
Code	KTA316	Year of study	3rd			
Course teacher	PhD, Miroslav Labor, associate prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	11	4
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Through a program of exercises, students gain practical knowledge needed to					

<table>
<tr><td></td><td colspan="6">master the laboratory techniques for chemical analysis of seawater, as well as practical knowledge of the methods of exploitation of mineral raw materals from seawater.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Mineral Raw Materials from Seawater</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam, students are expected to:
- carry out the analysis of seawater for the content of calcium and magnesium independently according to work instructions
- carry out the analysis of seawater for the boron content independently according to work instructions
- determine the CO_2 content in seawater independently according to work instructions
- describe technological processes of recovery of magnesium oxide from seawater
- describe technological processes of extraction of common salt from seawater</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">During exercises, seawater is chemically analysed for the content of calcium, magnesium, boron and free CO_2. Practical knowledge is obtained of technological processes of extracting mineral raw materials (magnesium oxide and sodium chloride) from seawater. List of Exercises:
Exercise 1. Analysis of seawater for its content of magnesium oxide and calcium oxide,
Exercise 2. Analysis of seawater for its content of CO_2,
Exercise 3. Determination of boron in seawater,
Exercise 4. Recovery of magnesium oxide from seawater (seawater pretreatment, precipitation with 80% of the stoichiometric quantity of dolomite lime, washing and filtration, calcinations of magnesium hydroxide, chemical analysis of magnesium oxide from seawater),
Exercise 5. The visit to industrial plant – salt works - extraction of common salt from seawater.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
x exercises
☐on line in entirety
☐partial e-learning
x field work</td><td colspan="3">☐ndependent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Full attendance to exercises and field work (100% of the total number of hours).</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.2</td><td>Report</td><td>0.2</td><td>Field work</td><td>0.2</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>0.4</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at</td><td colspan="6">During the semester students have to perform exercises (lab and field work). After performing exercises followed by treatment of the experimental results and</td></tr>
</table>

the final exam	preparation of reports. Finally completed students take the oral examination of the material covered by the exercises. Experimental part of the work in the lab scored with 30% of the final assessment report after completion of the exercise with 2%, and the final oral exam with 60%. Ratings: 60%-70% – satisfactory, 71%-80% – good, 81%-90% – very good, 91%-100% – excellent.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	V. Martinac, M. Labor, Seawater as sources of mineral raw materials, on line (2011-01-18), Laboratory exercises, Internal mimeographed notes, (in Croatian), Faculty of Chemistry and Technology, Split, 2011.		on line
	V. Martinac, Magnesium oxide from Seawater, on line (2010-12-13), University handbook, (in Croatian), Faculty of Chemistry and Technology, Split, 2010.		on line
	M. E. Q. Pilson, Introduction to the Chemistry of the Sea, 2st edition, Prentice Hall, 2013.	1	
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Polymeric Materials

NAME OF THE COURSE	**Polymeric Materials**					
Code	KTA318	Year of study	3rd			
Course teacher	PhD, Branka Andričić, prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining of basic theoretical and practical knowledge on origin and properties of polymeric materials, their structure, properties and application.					
Course enrolment requirements and entry competences required for the	Enrolled in or passed the course Exercises in Polymeric Materials					

<table>
<tr><td>course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">- be able to explain temperature dependent behaviour of polymers
- distinguish dissolving of polymers vs. low molecular substances
- be acquainted with common thermoplastics and thermoset materials
- distinguish synthetic and natural polymers
- be able to prepare simple polymer blend or composite
- explain the factors influencing degradation of polymers</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Introduction. World consumption of plastics. Historical development of plastic materials. Basic terms and classification of polymers.
2nd week: Molecular and supermolecular structure of polymers: configuration and conformations of polymers. Supermolecular structure and morphology.
3rd week: Physical and deformational states of polymers. Thermomechanical curve. Mechanical properties of polymers. Stress-elongation curves. Temperature dependence of elongation.
4th week: Dissolving of polymers. Swelling of polymers. Polyelectrolytes and ionomers.
5th week: Classification of polymers based on origin. Synthetic organic polymers: application based classification, abbreviations, pyramid of thermoplastic materials.
6th week: PE, PP, EVA, PVC: properties and application.
7th week: PS and copolymers (HIPS, ABS, SAN, MBS): properties and application. First test.
8th week: Principles of impact strength modification by styrene copolymers and terpolymers. PET, PA: properties and application. Thermosets: epoxide resins, unsaturated polyester resins, vinyl-ester resins).
9th week: Phenol-formaldehide resins. Curing reaction of thermosets. Elastomers, thermoplastic elastomers. Naturally occurring polymers. Cellulose and derivates.
10th week: Starch and other polysaccharides. Protein structure. Natural caoutchouc and derivates. Vulcanization and mastication. Rubber.
11th week: Inorganic polymeric materials. Liquid crystalline polymers. Biodegradable polymers. High temperature polymers.
12th week: Cellulose fibres. Protein fibres. Synthetic fibres. Behaviour of fibres on burning. Adhesives. Polymer coatings.
13th week: Additives for polymers. Degradation of polymers: heat and UV stabilizers. Antioxidants. Plasticizers. Anti-static agents.
14th week: Polymer blends. Composites with polymer matrix. Recycling and reuse of plastics and rubber.
15th week: An overview. Second test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
X multimedia
☐ laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td>Screening student work(name the proportion of ECTS</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training (report on exp. work)</td><td></td></tr>
</table>

credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)	Experimental work		Report		Tests before experimental work	
	Essay		Seminar essay		(Other)	
	Tests	0.8	Oral exam	0.6	(Other)	
	Written exam	0.6	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The complete exam can be passed through two tests during semester. The passing score is 60 % and the fraction of each test is 50%. In the exam period the student has to attend to written and oral exam (passing score is 60%). Written exam is 50% and oral exam is 50%. Grades: successful (60% – 70%), good (71% – 80%), very good (81% – 90%), excellent (91% – 100%).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	1. Z. Janović, Polimerizacije i polimeri, HDKI-Kemija u industriji, Zagreb, 1997. 2. B. Andričić, Polimerni materijali, lecture.ppt 3. B. Andričić, Prirodni polimerni materijali, Sveučilište u Splitu, Split, 2008.	5 1 1	 KTF web library KTF web library
Optional literature (at the time of submission of study programme proposal)	T. A. Oswald, G. Menges, Material Science of Polymers for Engineers, Hanser Publ., Munich, 1995.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Exercises in Polymeric Materials

NAME OF THE COURSE	**Exercises in Polymeric Materials**					
Code	KTA318	Year of study	3rd			
Course teacher	PhD, Sanja Perinović Jozić, assistant prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	12	3
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gain the skills on working with routine methods of characterization of polymers as well as the preparation of polymer blends.					
Course enrolment requirements and entry competences	Enrolled in or passed the course Polymeric Materials					

required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- be able to identify the polymers according density measurement - distinguish dissolving of polymers and low molecular substances - measure of polymer properties using routine procedures - prepare simple polymer blend or composite - distinguish natural and synthetic polymer according burning characteristics					
Course content broken down in detail by weekly class schedule (syllabus)	1. Density determination of polymeric materials (1.5 hours) 2. Swelling of polymers (2.5 hours) 3. Determination of melting point and glass transition temperature by DSC (2 hours) 4. Modification of PVC and determination of extrudate properties. (3 hours) 5. Identification of polymer fibres by burning tests (1 hour) 6. Preparation of thermoplastic starch (2 hours)					
Format of instruction	☐lectures ☐seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning **x** field work			☐independent assignments ☐multimedia **x** laboratory ☐work with mentor ☐ (other)		
Student responsibilities						
Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training (report on exp. work)	0.3
	Experimental work	0.5	Report		Tests before experimental work	0.2
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Before each lab. exercise min. knowledge about it should be presented and it is graded 2-5. After the lab work students write the report and it is graded 2-5. Students skills during the work is recorded, too.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	Internal guide book for laboratory exercises is ensured for each student.					
Optional literature (at the time of submission of study programme proposal)						
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.					

Other (as the proposer wishes to add)	

Processing of Plastics and Rubber

NAME OF THE COURSE	**Processing of Plastics and Rubber**					
Code	KTA319	Year of study	3rd			
Course teacher	PhD, Matko Erceg, associate prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	- Understanding the modern methods of plastics and rubber processing - Understanding the modern methods of recovery of plastic and rubber waste - Implementation of the adopted basic knowledge in finding optimal solutions in the processing and recycling of plastics and rubber					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Processing of Plastics and Rubber					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to be able to: - identify and compare the properties and behavior of the polymers during processing and application - explain the importance of polymer additives - explain the most important methods of polymer processing - explain the difference between plastic and rubber - choose the optimal method for recovery of plastic and rubber waste					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Historical development plastics and rubber processing methods. The nomenclature of the polymer. Introduction to the structure and processing of polymers. 2nd week: Types of polymers: thermoplastics, thermosets, elastomers, thermoplastic elastomers. 3rd week: Mechanical and thermal properties of polymers. 4th week: The rheological properties of the polymers. 5th week: Additives to polymers. Processing procedures. 6th week: Primary shaping procedures. Continuous processes: calendering, continuous coating. 7th week: Primary shaping procedures. Continuous processes: extrusion. coextrusion. 8th week: Primary shaping processes. Discontinuous: casting, sintering, compression molding, transfer molding. 9th week: Primary shaping processes. Discontinuous: injection molding. Specific injection molding procedures (gas assisted injection moulding, inserts in plastic mouldings, structural foam, pultrusion). 10th week: Secondary shaping procedures: warm and cold secondary shaping, blowing, drawing, shrinkage. 11th week: Bonding, welding. Surface improvement of plastics. 12th week: Production of foamed and reinforced (composite) plastics. 13th week: Methods of recovery of plastic waste: material (mechanical, chemical, a solvent) and energy. Disposal of plastic waste.					

<table>
<tr><td></td><td colspan="6">14th week: Rubber, elastomeric material, vulcanisate. Natural and synthetic rubber. Methods of rubber processing: mastication, vulcanization.
15th week: Design and manufacture of rubber tires. Recycling of tires and rubber regeneration.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
x multimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending lectures in the 80% amount of the total number of lessons.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.7</td><td>Oral exam</td><td>0.6</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.7</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation:
The entire exam can be passed over two colloquium during the semester. Pass threshold for each colloquium is 50%. Each colloquium participates with 45% in a final grade while attending lectures in 80-100% amount is 10% of a final grade.
Final evaluation:
One passed colloquium (previous activity) is recognized as 10% of a final grade. The remaining part is taken on written and oral exam at prescribed examination terms. Written exam accounts for 40% and oral exam for 50%, respectively.
Students who did not take or pass colloquiums take written and oral exam at prescribed examination terms. Passing threshold is 50%. Written exam accounts for 50% and oral exam for 50% of a final grade, respectively.
Grades definitions and percentages: sufficient (50-61%), good (62-74%), very good (75-87%), excellent (88-100%).</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">A. Rogić, I. Čatić, D. Godec, Polimeri i polimerne tvorevine, Društvo za plastiku i gumu, Zagreb, 2008.</td><td>2</td><td></td></tr>
<tr><td colspan="3">I. Čatić, Uvod u proizvodnju polimernih tvorevina, Društvo plastičara i gumaraca, Zagreb, 1990.</td><td>1</td><td></td></tr>
<tr><td colspan="3">M. Šercer, D. Opsenica, G. Barić, Oporaba plastike i gume, mtg topograf d.o.o., Zagreb, 2000.</td><td>1</td><td></td></tr>
<tr><td colspan="3">A. Azapagic, A. Emsley, I. Hamerton, Polymers, The Environment and Sustainable Development, Wiley, 2003.</td><td>1</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">H. F. Gilles, Jr., J. R. Wagner, Jr., E. M. Mount, III., Extrusion: The Definitive Processing Guide and Handbook, William Andrew, Inc., New York, 2005.; I. Čatić, F. Johannaber, Injekcijsko prešanje polimera i ostalih materijala, DPG i Katedra za preradu polimera Fakulteta strojarstva i brodogradnje Sveučilišta u Zagrebu, Zagreb, 2004.; Z. Janović, Polimerizacije i polimeri, Hrvatsko društvo kemijskih inženjera i tehnologa, Zagreb, 1997.</td></tr>
<tr><td>Quality assurance</td><td colspan="6"></td></tr>
</table>

methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level, (2) Faculty Level by Quality Control Committee, (3) Lecturer's Level.
Other (as the proposer wishes to add)	

Exercices in Processing of Plastics and rubber

NAME OF THE COURSE	**Exercices in Processing of Plastics and Rubber**							
Code	KTA320	Year of study	3rd					
Course teacher	PhD, Matko Erceg, associate prof.	Credits (ECTS)	1.0					
Associate teachers		Type of instruction (number of hours)	L	S	E	F		
			0	0	10	5		
Status of the course	Elective	Percentage of application of e-learning						
COURSE DESCRIPTION								
Course objectives	Through laboratory and field classes introduce students to the most important methods of processing and recycling plastics and rubber.							
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Processing of Plastics and Rubber							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to be able to: - select appropriate procedure for plastic and rubber processing depending on the desired product - define the basic parameters of plastics and rubber processing - monitor the parameters during the processing and recovery - sort plastic and rubber waste							
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1. Extrusion. Exercise 2. Separation and identification of additives in polymer materials. Exercise 3. Classification of plastic waste (manual method, float-sink method, by infrared spectroscopy). Field work: Visit to factories AD Plastik Inc. Solin, Fornix Ltd., Dugi Rat, GUMIIMPEX Inc., Varaždin							
Format of instruction	☐lectures ☐seminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning x field work	☐ndependent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)						
Student responsibilities	Attending laboratory exercices in the 100% amount.							
Screening student work*(name the proportion of ECTS credits for each activity so that the*	Class attendance		Research		Practical training			
	Experimental work	0.4	Report	0.1	Preparation for experimental work	0.2		

total number of ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		Field lecture	0.2
	Tests	0.1	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Oral examination is done before each laboratory exercise. The student activity in the laboratory is monitored and evaluated as well as the reports from exercises. Oral examination, laboratory work and report account for 40%, 30% and 30% of the final grade, respectively. Rating: sufficient (50-61%), good (62-74%), very good (75-87%), excellent (88-100%).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	M. Erceg, Oporaba plastike, Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2014.		Department of Organic Technology
	T. Kovačić, B. Andričić, Struktura i svojstva polimera, Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2007.		Department of Organic Technology
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level, (2) Faculty Level by Quality Control Committee, (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Process of Precipitation and Crystallization

NAME OF THE COURSE	**Process of Precipitation and Crystallization**					
Code	KTA321	Year of study	3rd			
Course teacher	PhD, Dražan Jozić, associate prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students acquire the basics of the different crystalline states and their arrangements as well as the fundamentals of the processes of nucleation, precipitation and crystallization under different experimental conditions (water solution and melts). The knowledge acquired to allow students applying acquired knowledge in composing reaction mixtures as well as control of the experimental					

	conditions for obtaining the final materials required physical and chemical properties.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Process of Precipitation and Crystallization
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student will be able to: - Able to choose on the base of the physical and chemical properties suitable solvent - Can choose a suitable precipitant agent for providing the process of precipitation - Know the basic methods and procedures of dissolutions, precipitation and crystallization - Known procedures and methods of recrystallization and purification of the product - Basic knowledge about the industrial equipment for the crystallization process
Course content broken down in detail by weekly class schedule (syllabus)	1. Week. The crystalline state (Liquids crystals, Crystalline solids, Crystal symmetry, Crystal systems, Miller indices) 2. Week. Space lattice, Solid state bonding, Isomorphs and polymorphs, Enentiomorphs and chirality, 3. Week. Cristal habit, Dendrites, Composite crystals and twins, Imperfections in crystals 4. Week. Physical and thermal properties (Density, Viscosity, Surface tension, Diffusivity, Refractive index, Electrolytic conductivity), 5. Week. Physical and thermal properties (Crystal hardness, Unit of heat, Heat capacity, Thermal conductivity, Boiling freezing and melting points, Enthalpies of phase change, Heats of solution and crystallization, Size classification of crystals) 6. Week. Solution and solubility (Solutions and melts, Solvent selection, Expression of solution composition, Solubility correlations, Theoretical crystal yield, Ideal and non-ideal solutions, Particle size and solubility,), 7. Week. Solution and solubility (Effect of impurities on solubility, Measurement of solubility, Prediction of solubility, Solubility data sources, Supersolubility), Phase equilibria (The phase rule, One-component systems, Two-component systems, Enthalpy-composition diagrams, Phase change detection) 8. Week. The First colloquium 9. Week. Phase equilibria (Three-component systems, Four-component systems, Dynamic phase diagrams) 10. Week. Nucleation (Primary nucleation, Secondary nucleation, Metastable zone widths, Effect of impurities, Induction and latent periods, Interfacial tension, Ostwald's rule of stages), 11. Week. Crystal growth (Crystal growth theories, Growth rate measurements, Crystal growth and dissolution, Crystal habit modification, Polymorphs and phase transformations, Inclusions), 12. Week. Recrystallization (Recrystallization schemes, Resolution of racemates, Isolation of polymorphs, Recrystallization from supercritical fluids, Zone refining, Single crystals), 13. Week. Industrial techniques and equipment (Precipitation, Crystallization from melts, Sublimation, Crystallization from solution), 14. Week. Crystallizer design and operation (Crystal size distribution, Kinetic data measurement and utilization, Crystallizer specification, Fluid-particle suspension)

<table>
<tr><td></td><td colspan="6">15.Week. The Second colloquium</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
x exercises
☐*on line*in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
☐multimedia
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Class attendance at the lecture in the amount of 70% to 100%, and to experimental work of 100% from total hours.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Independent work</td><td>0,3</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0,6</td><td>Oral exam</td><td>0,6</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0,5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The exam can be finished over the two tests during the semester. Minimum for successful tests is the limit of the 50% resolved test. Each test in assessing participates with a share of the 40% of the final grade. Presence at lectures 70-100% participates with a share of the 5% of the final grade while the presence of the laboratory exercises from 100% participates with a share of the 15% of the final grade. The examination periods there is a written and oral exam. Minimum for successful written exam is the limit of the 50% resolved test. Passing one test (previous activity) is valuable in the summer semester examination period with a share of the 15% of the final grade. Written exam has a share of the 25% and verbal has a share of the 40% of the final grade. Students who have not passed any tests during the semester they take the examination through written and oral exams in the regular examination period. Minimum for successful tests the limit of the 50% resolved test. Written part of exam and oral part of exam participates with a share of the 50% of the final grade.
The final grade: 50%-61% - sufficient, 62%-74% - good, 75%-87% very good, 88%-100% - excellent.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">2. J.W.Mullin, Crystallization, Fourth Edition, University of London, Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford, 2001.</td><td></td><td></td></tr>
<tr><td colspan="3">3. van V. Markov, Crystal growth for beginners, Fundamentals of Nucleation, Crystal Growth and Epitaxy, Word Scientific Publishing Co.Pte.Ltd. London, 1995</td><td></td><td></td></tr>
<tr><td colspan="3">4. C.M.Van t Land, Industrial Crystallization of Melts, Marcel Dekker, New York, 2005.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study</td><td colspan="6">Selected articles from journals recommended by lecturer</td></tr>
</table>

programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	Tracking suggestions and reactions of students throughout the semester Student survey
Other (as the proposer wishes to add)	

Exercises in Process of Precipitation and Crystallization

NAME OF THE COURSE	**Exercises in Process of Precipitation and Crystallization**					
Code	KTA322	Year of study	3rd			
Course teacher	PhD, Dražan Jozić, associate prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students acquire the basics of the different crystalline states and their arrangements as well as the fundamentals of the processes of nucleation, precipitation and crystallization under different experimental conditions (water solution and melts).					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Process of Precipitation and Crystallization					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student will be able to: - Able to choose on the base of the physical and chemical properties suitable solvent - Can choose a suitable precipitant agent for providing the process of precipitation - Know the basic methods and procedures of dissolutions, precipitation and crystallization - Known procedures and methods of recrystallization and purification of the product - Basic knowledge about the industrial equipment for the crystallization process					
Course content broken down in detail by weekly class schedule (syllabus)	1. Exercise. The processes of dissolution of inorganic salts. 2. Exercise. Funding for the precipitation and separation. 3. Exercise. Deposition processes in heterogeneous reaction systems. 4. Exercise. Separation and removal of salt. 5. Exercise. Crystallization from the melt. 6. Exercise. Crystallization from the gaseous phase.					
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line* in entirety	☐ndependent assignments ☐multimedia x laboratory ☐work with mentor				

	☐partial e-learning ☐field work			☐ (other)		
Studentresponsibilities	Class attendance at the lecture in the amount of 70% to 100%, and to experimental work of 100% from total hours.					
Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	0,5	Report	0,2	(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0,3	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam						

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Perry's Chemical Engineers' Handbook Seventh Edition, The McGraw-Hill Companies, Inc., New York, 1997.		
	A. Mersmann, Crystallization tchnology handbook, Marcell Dekker, New York, 2001		

Optional literature (at the time of submission of study programme proposal)	Selected articles from journals recommended by lecturer
Quality assurance methods that ensure the acquisition of exit competences	Tracking suggestions and reactions of students throughout the semester Student survey
Other (as the proposer wishes to add)	

Mathematical Tools

NAME OF THE COURSE	**Mathematical Tools**					
Code	KTA310	Year of study	3rd			
Course teacher	PhD, Davor Rušić, prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						

<table>
<tr><td>Course objectives</td><td colspan="6">To familiarize students with the mathematical tools and their meaning in chemistry and chemical engineering.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercises in Mathematical Tools</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">To analyze the problem, conduct calculations, to conclude the possibilities of a mathematics software program used.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1: Convert text from Word into MathCad and editing text in this tool.
Week 2: Introduction to mathematical tools and application of text from MathCad
Week 3: Data input and graphical display
Week 4: 2D graphics
Week 5: 3D Graphics
Week 7: Mathematical functions and zero point
Week 8: First colloquium
Week 9: The intersection of the curve
Week 10: Derivatives and integrals
Week 11: Matrix algebra
Week 12: Equations
Week 13: The flow function
Week 14: A correlational-regression analysis
Week 15: Second colloquium</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
☐exercises
☐*on line* in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Regular attendance and active participation at lectures, seminars and exercises</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two partial tests during the semester. Students who do not pass the partial exams have to take an exam in the regular examination term. During the examination terms students take written and oral exam.
Scoring: <55% insufficient;55-66% sufficient (2); 67-79% good (3); 80-92% very good (4); 93-100% excellent (5)</td></tr>
</table>

Required literature (available in the library and via other media)	Title	Number of copies in the library	Availability via other media
	D.Rušić, E. Bacci, MATEMATIČKI ALATI		
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	**Quality assurance methods that ensure the acquisition of exit competences:** Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Exercises in Mathematical Tools

NAME OF THE COURSE	**Exercises in Mathematical Tools**					
Code	KTA310	Year of study	3rd			
Course teacher	PhD, Davor Rušić, prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	To familiarize students with the mathematical tools and their meaning in chemistry and chemical engineering.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Mathematical Tools					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	To analyze the problem, conduct calculations, to conclude the possibilities of a mathematics software program used.					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: Convert text from Word into MathCad and editing text in this tool. Week 2: Introduction to mathematical tools and application of text from MathCad Week 3: Data input and graphical display Week 4: 2D graphics Week 5: 3D Graphics Week 7: Mathematical functions and zero point Week 8: First colloquium Week 9: The intersection of the curve Week 10: Derivatives and integrals Week 11: Matrix algebra					

<table>
<tr><td></td><td colspan="6">Week 12: Equations
Week 13: The flow function
Week 14: A correlational-regression analysis
Week 15: Second colloquium</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">: Regular attendance and active participation at lectures, seminars and exercises</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two partial tests during the semester. Students who do not pass the partial exams have to take an exam in the regular examination term. During the examination terms students take written and oral exam.
Scoring: <55% insufficient;55-66% sufficient (2); 67-79% good (3); 80-92% very good (4); 93-100% excellent (5)</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">D.Rušić, E. Bacci, MATEMATIČKI ALATI</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality assurance methods that ensure the acquisition of exit competences:
Quality of the teaching and learning, monitored at the level of the
(1) teachers, accepting suggestions of students and colleagues, and
(2) faculty, conducting surveys of students on teaching quality.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Renewable Energy Sources

NAME OF THE COURSE	Renewable Energy Sources					
Code	KTA325	Year of study	3rd			
Course teacher	PhD, Senka Gudić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	Students will recognize the global importance of renewable energy sources and meet the possibilities of their exploitation. The knowledge gained will be applied to solve practical problems in the implementation of renewable energy sources.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Renewable Energy Sources The condition for taking the exam: Completed the course "Exercises in Renewable Energy Sources“
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After the successfully passed exam student is able to: - describe the basic principles of renewable energy technologies - be familiar with the legislation of renewable energy - define the energy potential and economy application of certain renewable energy sources - identify problems related to the implantation of each technology in existing energy systems - apply the knowledge gained in the development and scientific research in this field of science.
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Introduction. Energy sources and forms. Characteristics of renewable energy sources. The current state of renewable energy. 2nd week: Renewable energy regulations. EU Directives. 3rd week: Renewable energy sources and Croatian energy legislation. Administrative barriers and incentives. 4th week: Solar energy. Solar energy conversion into heat and electricity: solar panels, photovoltaic cells, solar energy collectors. 5th week: Wind energy. Wind energy and power. Wind power plants. 6th week: Biomass. Types and properties of biomass. Energy production from biomass - technologies. 7th week: Use of biomass in cogeneration plants. Biogas, alcohol fuels and biodiesel. The impact of biomass on the environment. The price of energy from biomass. 8th week: First test. Hydropower. Potential of small hydropower plants. 9th week: Geothermal energy. Nature of geothermal energy. Direct use of geothermal energy for heating. Geothermal power plants. Heat pumps. 10th week: Wave power. Tidal power. 11th week: Energy storage technologies: primary batteries, accumulators, super capacitors, flywheel energy storage. 12th week: Hydrogen technologies and fuel cells. Hydrogen production. Hydrogen storage. 13th week: Use of hydrogen. Fuel cell: history, principles of operation. Fuel cells

<table>
<tr><td></td><td colspan="6">batteries. Types of fuel cells, operation temperatures, fuels.
14th week: Fuel cell cogeneration systems. Applications: stationary fuel cell power systems and portable fuel cell power systems. Hybrid systems.
15th week: Second test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">× lectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
× multimedia
☐work with mentor
☐(other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.4</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.8</td><td>Oral exam</td><td>1.0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.8</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The complete exam can be passed through two tests during semester. The passing score is 60 % and the fraction of each test is 50 %. In the exam period the student has to attend to written and oral exam. Grades: < 60% insufficient, 60-70% sufficient, 71-80% good, 81-92% very good, 93-100% excellent.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">V. Potočnik, V. Lay, Obnovljivi izvori energije i zaštita okoliša u Hrvatskoj, MZOPU, Zagreb, 2003.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Twidell, T. Weir, Renewable Energy Resources, Taylor & Francis, New York, 2006.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">M. Kalea, Obnovljivi izvori energije - Energetski pogled, Kiklos, Zagreb, 2014.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">B. Labudović, Osnove primjene biomase, Energetika marketing d.o.o., Zagreb, 2012.</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Optional literature</td><td colspan="6">Lj. Majdandžić, Obnovljivi izvori energije, Graphis, Zagreb, 2008.
A.J. Appleby, Fuel Cells: Trends in Research and Applications, Hemisphere Publishing Corporation, New York, 1987.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- monitoring of students suggestions and reactions during semester
- students evaluation organized by University</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Exercises in Renewable Energy Sources

NAME OF THE COURSE	Exercises in Renewable Energy Sources					
Code	KTA326	Year of study	3rd			
Course teacher	PhD, Ivana Smoljko, assistant prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	P	S	V	T
			0	0	15	0
Status of the course	Elective	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	The course will allow students to complete five experimental studies of renewable energy technologies. In addition to the knowledge gained concerning the specific technologies studied, students will develop practical laboratory skills and key skills of analysis concerning alternative/renewable energy sources and the issues associated with implementing them in existing energy networks.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Renewable Energy Sources
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	By the end of this course, students will be able to: - use theory to understand/predict experimental observations - describe the underpinning scientific principles of renewable energy technologies - plan and perform experiments - identify and demonstrate the safe and correct use of measurement and laboratory equipment - perform measurements, analysis and testing in the laboratory with the appropriate lab equipments and software - provide quantitative information concerning the real world performance of each technology - discuss the fundamental and practical factors that limit performance and be aware of the research efforts underway to make improvements - identify of the issues associated with implementing each technology in existing energy networks - document scientific information and experimental data and write scientific reports, with graphical presentation of data - demonstrate teamwork skills.
Course content broken down in detail by weekly class schedule (syllabus)	Five laboratory exercises to accompany the course of lectures on Electrochemistry. Ex. 1 Determining the characteristic curve of a wind generator Ex. 2 The effectiveness of an anode material for Al/air sources of energy Ex. 3 Quantitative analysis of the hydrogen and oxygen evolution rate using the photovoltaic converter Ex. 4 Determination of efficiency of water electrolysis using the photovoltaic converter Ex. 5 Efficiency of proton exchange membrane fuel cell
Format of instruction	☐lectures ☐seminars and workshops **x** exercises ☐*on line*in entirety	**x** independent assignments ☐multimedia **x** laboratory ☐work with mentor

	☐partial e-learning ☐field work			☐(other)		
Studentresponsibilities	Laboratory exercises attendance: 100 %.					
Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	0.25	Report	0.5	(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	0.25	(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The mean (average grade) is the arithmetic of all positive grades obtained in examinations (Pre-Lab oral exam 45%, Experimental work 5%, and Lab report 50%).					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Laboratorijske vježbe iz obnovljivih izvora energije (interna skripta), Kemijsko-tehnološki fakultet u Splitu, Split.		
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1)University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)			

Preparation of Technological Waters

NAME OF THE COURSE	**Preparation of Technological Waters**					
Code	KTA327	Year of study	3rd			
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	3.0			
Associate teachers	PhD, Damir Barbir, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining knowledge about the processes and procedures used for preparing water for specific technological applications.					
Course enrolment	Enrolled in or passed the course Exercises in Preaparation of Technological Waters					

<table>
<tr><td>requirements and entry competences required for the course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After passing the exam, students acquire knowledge of
- the properties of natural waters
- classification of pollution in water
- possible processes and
- procedures for preparing water for specific technological applications.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1: The importance of water in production processes.
Week 2: Physico-chemical and thermodynamic properties of water.
Week 3: Usage and quality requirements for specific technological applications.
Week 4: Classification of pollution in the water. Origin and dispersion state of the natural waters.
Week 5: Processes and procedures for the preparation of water on the classification of ingredients.
Week 6: Physical and physico-chemical processes and processes based on ion exchange.
Week 7: Assessment (first colloquium).
Week 8: The coagulation and flocculation of colloids and chemical fining water.
Week 9: Ion exchangers in the process of preparing water.
10th week: Choice of ion exchange resin and the budget column ion exchange.
11th week: equipment and quality control of treated water.
Week 12: demineralization and deionization with decarbonization.
13th week: Membrane processes and procedures. Reverse osmosis and electrodialysis.
Week 14: Other methods of preparing water.
Week 15: Assessment (second colloquium).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
x field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending lectures in the 80% amount of the total number of lessons.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.8</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.2</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation:
The entire test can be applied over the two exams during the semester. Pass rate threshold is 60%. Each colloquium in assessing participates with 45%. The presence of trainers mechanism in 80-100% amount is 10% of the grade.
Final evaluation:
Students who have passed one colloquium, it is recognized as part of the exam</td></tr>
</table>

	(45% score). The remaining part is laid in the regular examination periods. Students who did not pass any colloquim, written exam in the regular examination periods laid the whole subject matter. Pass rate threshold is 60%. Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. T. Powell, Water Conditioning for Industry, McGraw-Hill, New York-Toronto, 1980.	1	
	The NALCO Water Handbook, McGraw-Hill, New York, 1995.	1	
	Water Treatment Handbook, Degremont, Rueil-Malmaisons, 1991.	1	
	G. Belfort, Synthetic Membrane Processes, Findamentals and Water Applications, Academic Press, New York, 1984.	1	
Optional literature (at the time of submission of study programme proposal)	J. Mallevialle, P. E. Odendaal, M. R. Wiesner, Water treatment membrane processes, McGraw-Hill, New York, 1996.; A. P. Sincero, G. A. Sincero, Physical-Chemical Treatment of Water and Wastewater, CRC Press, New York, 2002.; J. Bartram, R. Ballance, Water Quality Monitoring, E & FN SPON, London, 1996.;R. Helmer, I. Hespanhol, Water Pollution Control, E & FN SPON, London, 1997.		
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Teacher level.		
Other (as the proposer wishes to add)			

Exercises in Preparation of Technological Waters

NAME OF THE COURSE	**Exercises in Preparation of Technological Waters**					
Code	KTA328	Year of study	3rd			
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	1.0			
Associate teachers	PhD, Damir Barbir, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining knowledge about the processes and procedures used for preparing water for specific technological applications.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Preaparation of Technological Waters					
Learning outcomes	After passing exercises student will be able to:					

<table>
<tr><td>expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">- Self-determination of process parameters
- Determination of properties of substances
- Classification of pollutants in water
- Implementation of the water preparation process as required for specific technological applications.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Chemical sedimentation with coagulation and decarbonization.
Water treatment processes of decarbonization with lime (fast reactor).
Decarbonization with lime and ion exchange with neutral Na-exchanger in the preparation or softening water.
Demineralization and deionization of water using ion exchangers.
The choice of ion exchange resin and calculation of column ion exchange.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
☒exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
☒laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attendance at 100% of the total number of lessons.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.8</td><td>Report</td><td>0.1</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.1</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Exercises can be activated after passing oral exams for every exercise. The assessment exercises included knowledge of oral exams (10%), report writing (10%) and commitment during the experimental work in the laboratory (80%). Laboratory work involved in assessing a share of 20%. Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">P. Krolo, P. Dabić D. Barbir, Practicum in technological processes of inorganic industry, Handouts, Split, 2014</td><td>1</td><td colspan="2">Web site KTF</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Monitoring of quality assurance will be performed at three levels:
(1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Teacher level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Safety at Work

NAME OF THE COURSE	Safety at Work					
Code	KTA 329	Year of study	3rd			
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Elective	Percentage of application of e-learning				

COURSE DESCRIPTION		
Course objectives	- Knowledge of the potential hazards when working in a laboratory and plant. - The basics of working in a safe manner, safeguards and protective devices and agents at work	
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Safety at Work	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to know: - Rules of conduct and work in a chemistry lab - The primary hazards in a chemistry lab - Ways of substances, meaning chemical cards (data on physico-chemical, physiological and toxicological properties of the substance) - Self-interpretation and compilation of chemical cards - Assessment of the potential dangers of certain chemicals and safly working with the apparatuses and methods	
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: introductory lecture, legislation, codes of conduct in the laboratory Week 2: safety devices in a chemistry lab Week 3: Security and physico-chemical properties of the substance Week 4: Classification of substances with similar properties and functional groups Week 5: labeling of the substance - labels, graphic symbols, diamond hazard label at transport Week 6: effect of pollutants on human health - basic concepts of toxicology and physiological properties of matter, MDK, LD50 Week 7: chemical card harmful and dangerous substances Week 8: assessment (first colloquium); Week 9: effect of pollutants on human health - the distribution and characteristics of the substance to physiological properties Week 10: processes of burning and fire danger Week 11: appliances and equipment for fire fighting Week 12: types of harmful atmosphere and breathing apparatus Week 13: protection from electric shock Week 14: dangerous products - formation, classification according to UN figures, storage, recycling and waste Week 15: assessment (2nd colloquium).	
Format of instruction	x lectures ☐seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning	☐independent assignments x multimedia ☐laboratory ☐work with mentor ☐ (other)

	x field work					
Student responsibilities	Attending lectures in the amount of 80 %, and laboratory exercises in the amount of 100 % of the total number of lessons.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2.0	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam	1.0	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Continuous evaluation: The entire test can be laid across two exams during the semester. Pass rate threshold is 60%. Each colloquium in assessing participates with 45%. The presence of lectures in 80 -100% amount is 10% of the grade. Final evaluation: Students who have passed one colloquium, it is recognized as part of the exam (45% score). The remaining part is laid in the regular examination periods. Students who did not pass any colloquium, written exam in the regular examination periods laid the whole subject matter. Prague passing is 60% and a written examination form part of the assessment with the 90%. Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	P. Dabić, Safty at work, Autorized lectures for undergraduate, 2013.	1	Web site KTF
	R. H. Hill, D.C. Finster, Laboratory Safety for Chemistry Students, John Wiley & Sons, Hoboken, New Jersey, 2010.	1	Web site KTF
	P. Dabić, Vježbe iz kolegija sigurnost pri radu, KTF, Split, 2010.	1	Web site KTF

Optional literature (at the time of submission of study programme proposal)	- B. Uhlik, Zaštita od požarno opasnih, toksičnih i reaktivnih tvari (I-IVI), Hrvatsko društvo kemijskih inženjera, Zagreb, 1998., 2000., 2003. i 2013. - Zakon o zaštiti na radu, Zavod za istraživanje i razvoj sigurnosti, Zagreb, 2010.
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Annual Performance analysis Examination - Monitoring suggestions and reactions of participants during the semester - Student survey
Other (as the proposer wishes to	

add)	

Exercises in Safety at Work

NAME OF THE COURSE	Exercises in Safety at Work					
Code	KTA330	Year of study	3rd			
Course teacher	PhD, Pero Dabić, prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Elective	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	- Practical knowledge of the methods of determining the basic properties and identification of harmful and hazardous substances - Assessment of potential health, fire and reactive hazards of certain substances
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Safety at work
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exercise, students may: - Independently designate specific properties of matter - important safety parameters - Estimate based on certain measures of potential health, fire and reactive risk of certain substances
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1 Persistence of alkali metal Exercise 2 Flammability of test material Exercise 3 Determination of flash point by Marcusson Exercise 4 Determination of the physico-chemical properties of the solution with the aim of assessing potential hazards
Format of instruction	☐lectures ☐seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning x field work ☐independent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)
Student responsibilities	Laboratory exercises were done in 100%.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	0.6	Report	0.1	Preparation for the exam in the lab. exercises	0.2
	Essay		Seminar essay		(Other)	
	Tests	0.1	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Continuous evaluation: Exercises can be activated after passing exams for each exercise. The exercises should be completed in 100% of the estimated amount of lessons. Once implemented exercise is necessary to write a report from exercises (paper). Final evaluation: The assessment exercises included knowledge of exams (20%), success of the experimental part (60%) and quality reports with exercise (calculations and conclusions) 20%. Overall rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	P. Dabić, Vježbe iz kolegija sigurnost pri radu, KTF, Split, 2010.	1	Web site KTF
Optional literature (at the time of submission of study programme proposal)	P. Dabić, Safty at work, Autorized lectures for undergraduate, 2013.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Annual Performance analysis Examination - Monitoring suggestions and reactions of participants during the semester - Student survey		
Other (as the proposer wishes to add)			

Water Protection

NAME OF THE COURSE	**Water Protection**					
Code	KTA 331	Year of study	3rd			
Course teacher	PhD, Nediljka Vukojević Medvidović, associate prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Elective	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	Students will become familiar with the types, distribution and quality of water in nature, the properties of aquatic ecosystems, and the methods and legislation to preserve their quality.					
Course enrolment requirements and entry competences required for the course	-					
Learning outcomes	It is expected that the outcome of learning to provide knowledge about:					

expected at the level of the course (4 to 10 learning outcomes)	- understanding the concepts ecosystem, biotope, biocenose, food chain - cycling of matter and energy in the ecosystem - abiotic and biotic ecological factors - importance of water and its physico-chemical properties - characteristics of fresh water and seawaters - physical, chemical and biological indicators of water quality - water resource management - sustainable use of water - water protection through preservation of good water condition, preventing the devastation of waters that are under risk, and remediation of degraded water status in order to preserve human health and the environment - point and nonpoint sources of pollution - protection from the harmful effects of water - classification of fresh waters and coastal sea - reuse of treated wastewater - guidelines for water reuse - legislation for wastewater and treated water - final disposal of sludge generated in the wastewater treatment plant.
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Ecosystem. Biotope. Ecological factors. 2nd week: Fresh waters. Seawater. Physicochemical properties of water. 3rd week: Water quality indicators. 4th week: Seminar. Checking the accuracy of the chemical analyzes. 5th week: Disorders in aquatic ecosystems quality. Eutrophication. (I written evaluation). Autopurification of water systems. 6th week: Water management. Water legislation. Classification of fresh waters and coastal seas. 7th week: Seminar: Water quality assessment in Dalmatia (part 1). 8th week: Seminar: Water quality assessment in Dalmatia (part 2). 9th week: The state plan for water protection. Planning and environment management. 10th week: Conservation and improvement of water quality. 11th week: Monitoring of natural waters quality. Legislation for effluent disposal. 12th week: Seminar. Monitoring of migration and distribution of pollution in the environment through pollution index (part 1). 13th week: Seminar. Monitoring of migration and distribution of pollution in the environment through pollution index (part 2). 14th week: Wastewaters treatment. 15th week: Waste management and conservation of aquatic environment.
Format of instruction	**x** lectures **x** seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐field work ☐independent assignments **x** multimedia ☐laboratory ☐work with mentor ☐ (other)
Student responsibilities	Attending lectures is 80%, while seminars 100% of the total hours.

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is*	Class attendance	1.5	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay	1.5	(Other)	
	Tests	0.5	Oral exam	0.5	(Other)	

equal to the ECTS value of the course)	Written exam	0.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The entire exam can be applied over the three written evaluation during the semester. Passing threshold is 60%. Students who have not passed written evaluation during the semester should attend at the final exam in the regular examination period. Final exam will include written and oral exam. Passing threshold is also 60%. Rating: 60%-70% - satisfactory, 70%-80% - good, 80%-90% very good, 90%-100% - excellent.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Tedeschi, Zaštita voda, HDGI, Zagreb, 1997.	1	-
	Strategija upravljanja vodama, Hrvatske vode, AKD Zagreb, 2009.	1	-
	D. Mayer, Kvaliteta i zaštita podzemnih voda, HDZVM, Zagreb, 1993.	1	-
	B. Tušar, Ispuštanje i procišcavanja otpadne vode, Croatia knjiga, Zagreb, 2004.	1	-
	D. Dikić et al., Ekološki leksikon, Ministarstvo zaštite okoliša i prostornog uređenja RH, O.P. Springer (ur.), Zagreb, 2001.	1	-
	Laboratorijske vježbe iz Zaštite voda (interna skripta).	-	at course teacher
Optional literature (at the time of submission of study programme proposal)	H.D. Sharma and S.P. Lewis, Waste Containment System, Waste Stabilization, and Landfills, John Wiley & Sons Inc., New York, 1994; D. Mayer, Voda od nastanka do upotrebe, Prosvjeta, Zagreb, 2004.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)	Suggestions and reactions of participants during the semester. Student survey.		

General Biology

NAME OF THE COURSE	**General Biology**					
Code	KTJ111	Year of study	1.			
Course teacher	PhD, Nada Bezić, prof.	Credits (ECTS)	4.0			
Associate teachers	PhD, Valerija Dunkić, associate prof.	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning	0			
COURSE DESCRIPTION						
Course objectives	Students learn to:					

	• Introduce students to the relationships of animate and inanimate nature • Understand the basic principles of cell biology • mastering the basics of genetics and ecological relationships among organisms
Course enrolment requirements and entry competences required for the course	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will after the course unit power: • Recognize the importance of living organisms in relation to the environment • To master the basic knowledge of cell biology and evolution of organisms • Know the basic genetic principles • Know how environmental changes affect the ecosystem changes

Course content broken down in detail by weekly class schedule (syllabus)

Content - hours	L	S
Animate and inanimate nature.	3	1
Prokaryotes, eukaryotes, relationships between plants-animals	3	1
Membranes and transport through the membrane, nucleus, nucleolus	3	1
DNA, RNA, CD-biology, Endoplasmic reticulum, Golgi apparatus, lysosomes	3	1
Mitochondria - breathing, chloroplasts - photosynthesis, peroxisomes	3	1
Cell cycle, mitosis, meiosis (spermatogenesis, oogenesis), fertilization	3	1
The embryonic development model operon differentiation in plants and animals	3	1
Aging and death, viruses (HIV), tumors	3	1
The basics of inheritance, Mendel's laws, mutations	3	1
Ecological concepts and relationships of organisms in the biocenosis	3	1

Format of instruction		
	☐ **lectures**	☐ independent assignments
	☐ **seminars and workshops**	☐ multimedia
	☐ exercises	☐ laboratory
	☐ *on line*in entirety	☐ work with mentor
	☐ partial e-learning	☐ (other)
	☐ field work	
Studentresponsibilities	Admission to the lectures of at least 70%, as well as seminars and seminar work in 100% of scheduled classes.	

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		**Seminar essay**	1.0	(Other)	
	Tests		Oral exam		(Other)	
	Written exam	3.0	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The obligation is to the students during the course of hearing preparation seminar that also must know the present. Upon completion of the lecture can be the time to take the entire test period courses in writing.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Literatura the Webb Science		
	G. M. Cooper, The Cell: A Molecular Approach, ASM Press. Washington , D.C. 2004.		
Optional literature (at the time of submission of study programme proposal)	A.Delić i N. Vijtiuk, Prirodoslovlje, Školska knjiga, Zagreb, 2004.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Unit Operations in Environmental Engineering

NAME OF THE COURSE	**Unit Operations in Environmental Engineering**					
Code	KTJ201	Year of study	2nd			
Course teacher	PhD, Marija Ćosić, assistant prof.	Credits (ECTS)	3.5			
Associate teachers	Renato Stipišić, senior lecturer Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students gain knowledge about the basic unit operations in the environmental engineering through theoretical expressions based on the mass and energy balances. Students are also acquainted with the working principles of the most used devices and selection of their optimum working conditions regarding minimization of energy consumption and environmental protection.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Unit Operations in Environmental Engineering Enrolled in or passed the course Exercises in Transport Phenomena Enrolled in or passed the course Transport Phenomena					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: – fundamental principles of mechanical and of heat and mass transfer operations, – explain the laws that follow ***performance of individual operation,*** – explain the influence of operating variable on individual operation applied in the environment protection,					

<table>
<tr><td></td><td colspan="6">– explain the working principle of the most common used equipment for particular operation,
– bring up possible operating problems that may occur during operation performance.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Introduction unit operations in environmental engineering. Fluid transport.
2nd week: Centrifugal pumps. Characteristic curves of a centrifugal pump.
3rd week: Coarse dispersion. Classification.
4th week: Separation. Classification and separation equipment.
5th week: Filtration. General Consideration. Filtration equipment.
6th week: Mixing of Newtonian and non-Newtonian fluids. Power consumption.
7th week: Mixing of particulate solids. Selection of mixing equipment.
8th week: Heat and mass transfer operations. Heat-exchange equipment.
9th week: Evaporation. Types of evaporators.
10th week: Gas absorption. Packings and packed tower design.
11th week: Principles of absorption.
12th week: Principle of drying. Use of psychometric charts.
13th week: Drying equipment.
14th week: Zeotropic and azeotropic mixtures Phase equilibrium. Batch distillation; flash and vacuum distillation.
15th week: Continuous distillation with reflux. Rectification and stripping.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
x multimedia
☐ laboratory
☐ work with mentor
x seminars
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lecture and seminar attendance: 80 %.</td></tr>
<tr><td rowspan="5">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>1.25</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.75</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester student may take the exam by two theoretical (oral) and two calculation (written) tests. Test passing score is 55%. After passing all tests the average score for oral and written parts is calculated and the grade of each part is determined by the following criteria: 55%-66% - satisfactory, 67%-78% - good, 79%-89% - very good, 90%-100% - excellent.
In the final grade theoretical part constitutes 67% of grade while written part 33%.
Students who do not pass the partial exams have to take exam in the regular examination periods. Final grade is determined by previously notated criteria.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">W. L. McCabe, J. C. Smith, P. Harriot, Unit Operations of Chemical Engineering, 7th ed., McGraw-Hill, New York, 2004.</td><td>2</td><td colspan="2"></td></tr>
<tr><td colspan="3">C. J. Geankoplis, Transport Prosesses and</td><td>1</td><td colspan="2"></td></tr>
</table>

	Separation Process Principles (Includes Unit Operations), 4th ed., Pearson Eucation, Inc.,New Jersey, 2007.		
	Hraste, Mehaničko procesno inženjerstvo, 2. izdanje, HINUS, Zagreb, 2003.	5	
Optional literature (at the time of submission of study programme proposal)	J. Welty, J. W. Wicks, R. E. Wilson, G. L. Rorrer, Fundamentals of Momentum, Heat and Mass Transfer, 5th ed., J. Wiley and Sons Inc., New York, 2007. R.H. Perry, D.W. Green, J.O. Maloney, Perry's Chemical Engineer's Handbook, 7th ed., McGraw-Hill, New York, 1999.		
Quality assurance methods that ensure the acquisition of exit competences	- monitoring of students suggestions and reactions during semester, - students evaluation organized by University.		
Other (as the proposer wishes to add)			

Exercises in Unit Operations in Environmental Engineering

NAME OF THE COURSE	**Exercises in Unit Operations in Environmental Engineering**					
Code	KTJ202	Year of study	2nd			
Course teacher	PhD, Marija Ćosić, assistant prof.	Credits (ECTS)	2.0			
Associate teachers	Renato Stipišić, senior lecturer Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students will be practically acquainted with functional dependence of process variables during the performance of individual experiment. They will acquire the sense of selection of the optimal process operating conditions. To educate students how to determine unknown process variables applying the theoretical expressions and values of process variables measured during the experiments.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Operations in Environmental Engineering					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After finishing the laboratory exercises, student is expected to know: - explain the purpose and the aim of each of experiment (exercise) conducted, - describe the elementary parts of apparatus used during individual experiments, - bring up the variable needed to be measured in order to determine specific (demanded) process variables or parameters, - explain the functional dependence of measured process variables and their					

<table>
<tr><td></td><td colspan="6">influence on the final result of the experiments,
- explain the main resistance and driving force for each of experiment conducted.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Exercise 1: Classification of the particulate solids.
Exercise 2: Mixing - power consumption determination.
Exercise 3: Filtration - determination of filtration coefficient and filtration cake resistance.
Exercise 4: Heat exchanger - determination of partial overall heat transfer coefficient.
Exercise 5: Gas absorption- determination of pressure drop and limiting flow rates.
Exercise 6: Drying rate determination.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
x exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Laboratory exercises attendance: 100 %.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.5</td><td>Report</td><td>0.4</td><td>Exercises tests study (Other)</td><td>0.4</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Field work (Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">After each exercise, student is obligated to write a report. It consists of calculations based on an application of theoretical expressions and the values of process variables measured during the experiments. Beside calculation, student needs to draw the diagrams of process variable dependence, specific for individual operation. Upon completion of all exercises, a final (written) test will be held. Minimum score is 55%. Final grade from the exercise consists of grade from the practical work, report and final test.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">Tehnološke operacije, priručnik za vježbe (for internal use only)</td><td></td><td colspan="2">Faculty web site</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">E. Mitrović-Kessler: Prijenos tvari i energije, Tehnološki fakultet Split, Split, 1991.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- monitoring of students suggestions and reactions during semester
- students evaluation organized by University</td></tr>
<tr><td>Other (as the</td><td colspan="6"></td></tr>
</table>

proposer wishes to add)	

General Microbiology

NAME OF THE COURSE	General Microbiology					
Code	KTJ 203	Year of study	2nd			
Course teacher	PhD, Mirjana Skočibušić, associate prof.	Credits (ECTS)	2.50			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	This course is designed to give students understanding of basic concepts in microbiology including various microorganisms their physiology, morphology, genetics, pathogenicity, ecology, and application of microbes in biotechnology and environmental engineering.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in General Microbiology					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students completing this course should be able to: • better *understanding* of the evolutionary relationships between structure, diversity and replication of different groups of microorganisms. • learn about genetic mechanisms of adaptation of prokaryotic microorganisms in a variety of environmental conditions. • applied methods of physiological and biochemical tests for the identification of the different groups of microorganisms. • identify the mechanisms of pathogenicity of microorganisms that cause diseases in humans and animals as well as the mechanisms used by the hosts to defend themselves against pathogens.					
Course content broken down in detail by weekly class schedule (syllabus)	1. Introduction. Historical development of microbiology. (*2 hours*) 2. The distribution of microorganisms and their role in biogeochemical processes in nature. (*2 hours*) 3. Eukaryotes, Archaea and Bacteria; structure and function. Morphology, nomenclature and classification of microorganisms. (*2 hours*) 4. Basic structure and function of prokaryotic and eukaryotic cells. (*2 hours*) 5. Microbial genetics, genome organization, mobile genetic elements. (*2 hours*) 6. The growth of microorganisms and the basic growth factors, nutrients, temperature, oxygen, pH and osmotic pressure. (*2 hours*) 7. Metabolic activity of microorganisms. Identification of microorganisms using various physiological and biochemical tests. (*2 hours*) 8. Microorganisms and diseases, resistance, relationship microorganisms and host immune responses to infection. (*2 hours*) 9. Mechanisms of antimicrobial resistance to antibiotics and other chemical substances. (*2 hours*) 10. Basic morphological characteristics of fungi, yeasts and molds and their pathogenicity. Diseases caused by fungi, and their toxins. (*2 hours*) 11. Application of microorganisms in biotechnology. (*2 hours*) 12. Basic morphological characteristics and development cycles of parasites. 13. The role of microorganisms in the biodegradation of heavy metals, nitrate,					

<table>
<tr><td></td><td colspan="6">and chlorinated hydrocarbons. (2 hours)
14. Basic morphological characteristics of viruses, viroids and prions. Classification and nomenclature of viruses. Methods of studying properties of the viruses. (2 hours)
15. Control the growth of microorganisms by physical and chemical methods. (2 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒lectures
☒seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☒independent assignments
☒multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Admission to the lectures in the amount of at least 70% of the times scheduled. Completed all planned laboratory exercises and seminar essay.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The final grade of the student is compiled from the combination of lecture, seminar, laboratory. Final course grade will be based on: Mid-term exam 30%; End of term exam 35%; Seminar 10%; Lab course 15%. Course grade will be based upon a percentage of total points obtained using the following scale: <60% insufficient; 60-70% sufficient (2); 70-80% good (3); 80-90% very good (4); 90-100% excellent (5).</td></tr>
<tr><td rowspan="8">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">S. Duraković, S.Redžepović, Uvod u opću mikrobiologiju, Kugler, Zagreb, 2002.</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3">S. Kalenić, E. Mlinarić-Missoni i sur., Medicinska bakteriologija i mikologija, Merkur A.B.D., Zagreb, 2005.</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3">Z. Brudnjak, Medicinska virologija, Merkur A.B.D., Zagreb, 2002</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">R.A. Harvey, P.C. Champe, B.D. Fisher, Microbiology, 2th ed., Lippincott, Williams and Wilkins, Philadelphia, 2007.
R.M. Patrick, S.R. Ken, A.P. Michael, Medical Microbiology, 5th ed. Elsevier/Mosby, Philadelphia, 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the</td><td colspan="6">Quality assurance will be performed at different levels: Keeping records of his attendance; Annual performance analysis examination; Student surveys in order to evaluate teachers; Self-evaluation of teachers; Feedback from students who have</td></tr>
</table>

acquisition of exit competences	already graduated from the relevance of content items.
Other (as the proposer wishes to add)	

Exercises in General Microbiology

NAME OF THE COURSE	**Exercises in General Microbiology**					
Code	KTJ204	Year of study	2nd			
Course teacher	PhD, Mirjana Skočibušić, associate prof.	Credits (ECTS)	1.5			
Associate teachers	PhD, Ana Maravić, assistant prof.	Type of instruction (number of hours)	L	S	E	F
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The laboratory component of the course provides hands-on experience with microbiology techniques, including aseptic technique, microbial growth, and diagnostic procedures. Evaluate how physical and chemical methods can be used to control microbial growth.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course General Microbiology					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students completing this course should be able to: • Applied methods of physiological and biochemical tests for the identification of the different groups of microorganisms. • Analyse the properties of microorganisms in terms of cellular anatomy and physiology. • Summarize the properties of microorganisms in terms of biochemistry and genetics and correlate these concepts to applications in biotechnology. • Demonstrate proper microbiology laboratory techniques involving microscopy, biochemical tests and diagnostic media to characterize microorganisms of significance to human health. • Evaluate how physical and chemical methods can be used to control microbial growth. • Determine the number of microorganisms in the sample and calculate the growth of microorganisms in controlled laboratory conditions.					
Course content broken down in detail by weekly class schedule (syllabus)	1. Laboratory Safety. The use and care of the microscope. Microscopic measurements. (2 hours) 2. Introduction to principles and laboratory methods in microbiology.(2 hours) 3. Techniques in aseptic conditions, methods of preparation and staining of various preparations.(2 hours) 4. Bacterial culture characteristics. The use of general media for isolating pure cultures. (2 hours) 5. Pour plate and streak plate methods. The use of selective and differential media. (2 hours) 6. Isolation of pure cultures of microorganisms, preparation of culture media, and use of different methods of isolation and identification.(2 hours) 7. Biochemical activities - Carbohydrate fermentation, Triple sugar iron (TSI)					

<table>
<tr><td></td><td colspan="6">agar, IMViC test, API strip.(2 hours)
8. Basic macro and micro morphological characteristics and yeasts and molds. Cultivation of yeasts and molds on nutrient media, isolation and identification. (2 hours)
9. The main morphological features of the parasite. Sampling and preparation of samples for identification of parasites. (2 hours)
10. The effect of temperature and pH on microorganisms.(2 hours)
11. Atmospheric oxygen requirements. Cultivation of anaerobes.(2 hours)
12. The inhibitory action of heavy metals*. The inhibitory action of disinfectants. (2 hours)
13. Antibiotic susceptibility testing: The antibiogram.(2 hours)
14. Methods for determining the number of bacteria in different samples of food, dilution method, the spectrophotometric method and membrane filtration. (2 hours)
15. Methods for determining the number of bacteria in different samples of water and wastewater dilution method, the spectrophotometric method and membrane filtration. (2 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
☒exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☒independent assignments
☒multimedia
☒laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Admission to the planned laboratory exercises in the amount 100% of the times scheduled.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1.0</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The final grade of the student is compiled from the combination of lecture, seminar, laboratory. Final course grade will be based on: Mid-term exam 30%; End of term exam 35%; Seminar 10%; Lab course 15%. Course grade will be based upon a percentage of total points obtained using the following scale: <60% insufficient; 60-70% sufficient (2); 70-80% good (3); 80-90% very good (4); 90-100% excellent (5).</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">S. Duraković, S.Redžepović, Uvod u opću mikrobiologiju, Kugler, Zagreb, 2002.</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3">S. Kalenić, E. Mlinarić-Missoni i sur., Medicinska bakteriologija i mikologija, Merkur A.B.D., Zagreb, 2005.</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3">Z. Brudnjak, Medicinska virologija, Merkur A.B.D., Zagreb, 2002</td><td>5</td><td colspan="2"></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	R.A. Harvey, P.C. Champe, B.D. Fisher, Microbiology, 2th ed., Lippincott, Williams and Wilkins, Philadelphia, 2007. R.M. Patrick, S.R. Ken, A.P. Michael, Medical Microbiology, 5th ed. Elsevier/Mosby, Philadelphia, 2005.		
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at different levels: Keeping records of his attendance; Annual performance analysis examination; Student surveys in order to evaluate teachers; Self-evaluation of teachers; Feedback from students who have already graduated from the relevance of content items.		
Other (as the proposer wishes to add)			

Chemistry and Air Protection

NAME OF THE COURSE	**Chemistry and Air Protection**					
Code	KTJ205	Year of study	2rd			
Course teacher	PhD, Marina Trgo, prof. PhD, Marija Bralić, associate prof.	Credits (ECTS)	4.0			
Associate teachers	PhD, Marin Ugrina, assistant PhD, Maša Buljac, assistant prof. Nenad Periš, assistant	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The students get insight into the basic knowledge about the atmosphere; structure, chemical cycles, and pollution, and the means for preventing the emission of harmful substances into the environment.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Chemistry and Air Protection					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: - Explain the cycle processes of substances in the atmosphere - Identify and explain the sources of air pollution - Explain the reactivity of pollutants in the atmosphere - Present the methods and process equipment to prevent emissions from industrial sources into the atmosphere.					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: Basic characteristics of the atmosphere. The structure of the atmosphere. The composition of the atmosphere. Week 2: The atmosphere of a photochemical system. Incoming radiation - solar spectrum. The absorption coefficients of atmospheric gases. Week 3: Reemisijska radiation - cooling the Earth's surface. Chemical cycles in the					

	atmosphere. Week 4: Temperature inversions. The atmospheric content and cycles of carbon, sulfur and nitrogen. Week 5: The kinetics and thermodynamics of formation of oxides and control their emissions. Week 6: Sources of emissions of SOx, NOx and CO_2. Chemical and photochemical reactions in the atmosphere. Acid-base reactions in the atmosphere. Week 7: Acid rain. Greenhouse gases and global warming. Week 8: The particles in the atmosphere. The processes of formation of particles. Week 9: organic air pollution. Reactivity of hydrocarbons. Organohalidni, organosulfur compounds and organodušicni. 10th week: The destruction of the ozone layer. Anthropogenic changes to the atmosphere. 11th week: The most important industrial polluters of the atmosphere. Week 12: Distribution of sources of pollution, secondary and primary pollutants. 13th week: Devices to prevent the emission of harmful substances into the air. Week 14: Electrostatic precipitators, incinerators. Week 15: Gravity precipitators, bag filters. Seminar works: numerical problem solving based on the measurement parameters (calculation of the concentration of SO_x, NO_x, CO_2, NH_4^+, PM, metals and ozone, the statistical analysis of the data obtained)
Format of instruction	x lectures x seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐field work ☐independent assignments ☐multimedia ☐laboratory ☐work with mentor ☐ (other)
Student responsibilities	

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	0.5	Research		Practical training	
	Experimental work		Report		Field work	
	Essay		Seminar essay	0.5	(Other)	
	Tests	1.0	Oral exam	1.0	(Other)	
	Written exam	1.0	Project		(Other)	

Grading and evaluating student work in class and at the final exam	Overall assessment can be applied over three written tests and one oral assessment. Written tests are related to material adopted on lectures. Ratings on the written exams: 60-69% is sufficient, 70-79% good, 80-89% is very good, 90-100% excellent. Students who have not passed the exam through the assessment should have the regular exam. Regular exam means written test and oral exam. The rating, which is entered in the index, is the mean score of written tests.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	R.W.Boubel, D.L.Fox, D.B. Turner, A.C. Stern, Fundamentals of air pollution, AP, 1994.		One copy in the Department
	N. P. Cheremisinoff, Handbook of air pollution		One copy in the

	prevention and control, Elsevier Science (USA), 2002.		Department
	Mar Viana, Urban Air Quality in Europe, Springer-Verlag Berlin Heidelberg 2013		One copy in the Department
	D.J. Jacob, Introduction to Atmospheric Chemistry, Princeton University Press, New Jersey, 1999.		One copy in the Department
Optional literature (at the time of submission of study programme proposal)	C. Baird, Environmental Chemistry, W. H. Freeman and Company, New York, 1999. R.M. Harrison, Understanding Our Environment: An Introduction to Environmental Chemistry and Pollution, Second Edition, The Royal Society of Chemistry, Cambridge, 1992.		
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous writing assessment - Results on the written knowledge tests - Student's questionnaire.		
Other (as the proposed wishes to add)			

Exercises in Chemistry and Air Protection

NAME OF THE COURSE	**Exercises in Chemistry and Air Protection**					
Code	KTJ206	Year of study	2^{th}			
Course teacher	PhD, Marina Trgo, prof. PhD, Marija Bralić, associate prof.	Credits (ECTS)	2.0			
Associate teachers	PhD, Marin Ugrina, assistant PhD, Maša Buljac, assistant prof. Nenad Periš, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	24	6
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The students get insight into the basic laboratory methods of identification of atmospheric pollution.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Chemistry and Air Protection					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: 1. sampled air 2. Determine the content of ozone in the air 3. Determine the content of the gaseous pollutants in the air 4. Determine the content of particulate matter in the air 5. Determine the metal content in particulate matter 6. Assess the impact of waste incineration air pollution. 7. Develop network pollution examined areas					
Course content broken down in detail by weekly	Exercise 1: Determination of SO_2 in the flue gas (emission). Exercise 2: Determination of CO_2 in the flue gas (emission).					

class schedule (syllabus)	Exercise 3: Determination of NO_2 in the flue gas (emission). Exercise 4: Determination of ozone in the air Exercise 5: Determination of metals in particulate matter Exercise 6: Determination of PM_{10} and $PM_{2.5}$ Exercise 7: Determination of immission of pollutants depending on the distance from industrial plants. Exercise 8: Determination of heavy metals in the flue gas resulting from the incineration of solid waste.

Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line* in entirety ☐partial e-learning **x** field work	☐ndependent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)
Student responsibilities		

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	1.5	Report	0.2	Field work	0.1
	Essay		Seminar essay		(Other)	
	Tests	0.2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	The requirement for admission of laboratory exercises is passed oral exam for exercise. Overall rating of laboratory practice includes evaluating oral exams, exercise performance, and report writing. Guest exercises are: 60-69% - sufficient, 70-79% - good, 80-89% - very good, 90-100% -excellent.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Internal material for laboratory exercises		

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous oral assessment - Student's questionnaire.
Other (as the proposed wishes to add)	

Analytical Environmental Chemistry

NAME OF THE COURSE	Analytical Environmental Chemistry					
Code	KTJ207	Year of study	2st			
Course teacher	PhD, Marija Bralić, associate prof.	Credits (ECTS)	4.0			
Associate teachers	PhD, Maša Buljac, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The basic objective of the course is the application of analytical methods and techniques in environmental analysis.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Analytical Environmental Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After course students will be able to : 1. to know and explain the interactions that occur between different phases in the environment (water-to-air, ground-to-air, water-soil) 2. independently sampling plan (accidentally uozkovanje, stratified sampling, systematic sampling, intuitive sampling) 3. to sample (air, water, soil, sediment and biological samples). 4. prepare samples for analysis, use of modern methods of sample preparation 5. Use a variety of techniques for environmental analysis (classical methods, instrumental methods, the technique, other techniques. 6. exert biological control (environmental indicators, biomarkers) 7. process the results of analysis					
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1:** Introduction - environmental science and environmental analytical chemistry **Lecture 2:** Chemical Principles in the environment. Sampling from the environment **Lecture 3:** analytical separation, sample preparation for analysis **Seminar 1 (2 hours):** interpretation and data processing. Standard deviations, errors **Lecture 4:** The application of analytical methods and techniques in environmental analysis. Elektoroanalytical methods (potentiometry) **Seminar 2 (2 hours):** Quantitatively the composition of solutions - expressing concentration **Lecture 5:** Voltammetry, coulometry **Seminar 3 (2 hours):** Calculating the pH of water of different composition and nature (sea, river, rain) **Lecture 6:** Conductometry, spectrometric techniques **Lecture 7:** Absorption Spectrometry, induced absorption spectrometry, emission spectrometry **Lecture 8:** Instrumental separation techniques, gas chromatography **Seminar 4 (2 hours):** Calculations data spectrometric measurements **Lecture 9:**. Liquid chromatography, the state and development of chromatographic techniques **Seminar 5 (2 hours):** Calculations of trace metals in the environment **Lecture 10:** Other techniques (thermal techniques, radiochemical techniques)					

	Seminar 6 (2 hours): The calculation of the concentration of particulate matter in the environment and display the result **Lecture 11:** Trace elements in the environment: natural level and chemical form of pollution **Seminar 7 (2 hours):** Statistical analysis of the results of the analysis of environmental samples (air, water, soil) **Lecture 12:** Determination of trace organic compounds **Lecture 13:** Biological indicators and methods **Lecture 14:** The radiation and radioactivity in the environment. contamination of soil **Lecture 15:** Evaluation and interpretation of analytical data from the environment. specific applications **Seminar 8 (1 hour):** Correlations (Spearman, Pearson,)

Format of instruction	×lectures ×seminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning ☐field work	☐ndependent assignments ☐multimedia ☐aboratory ☐work with mentor ☐ (other)
Studentresponsibilities		

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	1	Research		Practical training	
	Experimental work	0	Report		(Other)	
	Essay		Seminar essay	0.5	(Other)	
	Tests	0.5	Oral exam	1	(Other)	
	Written exam	1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester, the two partial test to check if the knowledge of students from courses included material. During the semester students will be selected from the lecture topic to make a seminar that will affect the final grade. After completion of the semester, students take a written exam courses included material from the seminar. If the student meets at one of the partial tests during the semester, material from passing the test does not need to take the written exam. After passing the written part of the exam, the oral exam. For all aspects of teaching evaluation will be conducted according to the following criteria: <55% inadequate; 55% -65% is sufficient; 66% -75% good; 76% -85% very good;> 86% excellent. The final grade will be the arithmetic average of ratings from exercises, written assessment and oral examination.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	D. Ašperger et al, Analitika okoliša, HINUS&FKIT, Zagreb 2013.		1
	F.W. Fifield, P.J. Haines, Environmental Analytical Chemistry, Blackie academic& professional, London, 1996		1
	E. P. Popek Sampling and analysis of environmental		1

	chemical pollutants, AP, 2003.		
Optional literature (at the time of submission of study programme proposal)	C.E. Kupchella, M. C. Hyland, Enviromental science, Massachusetts, 1989		
Quality assurance methods that ensure the acquisition of exit competences	Methods Quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Level.		
Other (as the proposer wishes to add)			

Exercises in Analytical Environmental Chemistry

NAME OF THE COURSE	**Exercises in Analytical Environmental Chemistry**					
Code	KTJ208	Year of study	2st			
Course teacher	PhD, Marija Bralić, associate prof.	Credits (ECTS)	2.0			
Associate teachers	PhD, Maša Buljac, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The basic objective of the course is the application of analytical methods and techniques in environmental analysis.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Analytical Environmental Chemistry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After performed laboratory exercises the learner is expected to know: 1. Properly to sample 2. Conduct analysis of samples from the environment: spectrometry, potencijometrijski, voltammetry 3. Determine the phosphorus in plant environmental samples 4. Determine the chemical characteristics of the soil					
Course content broken down in detail by weekly class schedule (syllabus)	**Lab course 1 (5 hours):** Potentiometric determination of fluoride and chloride. Determination of iron in drinking water. **Lab course 2 (5 hours):** Determination of the pH of various types of water (river, rain) **Lab course 3 (5 hours):** Determining the concentration of transition metal in the pure aqueous solutions of UV-VIS spectrophotometry **Lab course 4 (5 hours):** Determination of nitrate, nitrite and ammonium in wastewater by spectrophotometry **Lab course 5 (5 hours):** Determination of phosphorus in the solid plant **Lab course 6 (5 hours):** Voltammetric determination of ascorbic acid in					

<table>
<tr><td></td><td colspan="6">multivitamins</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ectures
☐seminars and workshops
×exercises
☐*on line* in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
☐multimedia
×laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1.0</td><td>Report</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Prior to joining the laboratory exercises, students' knowledge of material from the respective exercise will be verified by tests. All exercises must be passed all preliminary exams and completed all the exercises. The student has the right to be absent one exercise, but you will catch up at the end of the semester. For all aspects of teaching evaluation will be conducted according to the following criteria: <55% inadequate; 55% -65% is sufficient; 66% -75% good; 76% -85% very good;> 86% excellent.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3">Vježbe iz Analitičke kemije okoliša (interna skripta u pripremi), Kemijsko-tehnološki fakultet, Split, 201X</td><td></td><td>1</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Methods Quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Waste management

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Waste management</td></tr>
<tr><td>Code</td><td>KTJ301</td><td>Year of study</td><td colspan="4">3rd</td></tr>
<tr><td>Course teacher</td><td>PhD, Ladislav Vrsalović, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">To introduce students to the basic principles of waste management and train them for solving problems in waste management in practice. Students will learn about modern concept of sustainable waste management with measures to avoid waste generation, based on material and energy recovery.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Enrolled in or passed the cours Exercises in Waste Management
The condition for taking the exam: Passed the course "Exercises in Waste Management”</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After passing the exam, students will be able to:
1. Define the basic concepts in the area of waste, name the main problems related to waste, their causes and significance of the impact on the environment.
2. Describe procedures for the treatment of solid waste and landfills.
3. Maintain documentation related to waste management.
4. Manage with the regulations for the purpose of proper and timely implementation of the legislation.
5. Understand the hierarchy of waste management in accordance with the principles of sustainable development.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Week 1: Waste classification by origin, type, physico-chemical and biological characteristics.
Week 2: Municipal, industrial, metallurgical waste, waste from mining, agricultural waste, medical waste.
Week 3: Hazardous waste. The impacts of waste on the environment.
Week 4: Basic questions concerning removal of solid waste, environmental aspects and legislation in the field of waste management.
Week 5: Sustainable development and waste management. The hierarchy of waste management in accordance with the principles of sustainable development.
Week 6: Waste management: prevention and reduction of waste, processing, recycling, energy recovery, final disposal.
Week 7: Measures and procedures to waste reduction.
Week 8: Systems and organization of collection, transportation and treatment of solid waste. I. partial knowledge test.
Week 9: Technologies and waste treatment procedures.
Week 10: The procedures for solid waste disposal: sanitary disposal, composting, thermal processing.
Week 11: Biological, chemical and physical methods of processing of solid waste. New technologies.
Week 12: The collection and evaluation of secondary raw materials, recycling.
Week 13: Disposal methods for solid waste. Disposal on landscaped landfields. Types of landfills. Criteria for selection of landfill site. The construction of the landfill. Treatment of certain types of waste prior to disposal.
Week 14: The impact of landfills on the environment and environmental protection measures. Procedures for landfill remediation.
Week 15: Strategic planning of waste management in Croatia. II. partial knowledge</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">×lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
×multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Lectures, tests</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.0</td><td>Oral exam</td><td>1.0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking two partial tests during the semester. Students who do not pass the partial exams have to take an exam in the regular examination term. During the examination terms students take written and oral exam.
Scoring: <55% insufficient; 55-66% sufficient (2); 67-78% good (3); 79-90% very good (4); 91-100% excellent (5)</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">S. Kalambura, T. Krička, D. Kalambura, Gospodarenje otpadom, Veleučilište Velika Gorica, Velika Gorica 2011.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3">G. Tchobanoglous, F. Kreith, Handbook of Solid Waste Menagement, 2nd edition, McGraw-Hill, New York, 2002.</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">R. Chandrappa, D. B. Das, Solid waste management, Principles and practice, Springer, UK, 2012.
M. K. Hill, Understanding Environmental Pollution, 2nd edition, Cambridge, University Press, 2004.
F. R. McDougal, P. R. White, M. Frenke, P. Hindle, Integrated solid waste management: a life circle inventory, Blackwell Publishing, UK, 2001.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Keeping record of students attendance; annual analysis of the exam results; students survey in order to evaluate teachers; self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Exercises in Waste management

NAME OF THE COURSE	Exercises in Waste Management				
Code	KTJ302	Year of study	3rd		
Course teacher	PhD, Ladislav Vrsalović, associate prof.	Credits (ECTS)	1.0		
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	10	5
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	Students will be introduced with the basic principles of waste management and enable them to independently solve the problem of waste management in practice. Students will learn practically procedures for getting new products from the corresponding organic waste, and calculate the yield of the process. In the field works students will learn about work of landfills and waste treatment in a waste treatment companies.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Waste Management
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the training, students are expected to know: • Classified solid waste in appropriate category. • Select appropriate treatment of solid waste. • Calculate the efficiency of the waste treatment processes in order to obtain useful products. • Describe different procedures for the solid waste treatment and characteristics of landfills.
Course content broken down in detail by weekly class schedule (syllabus)	7. Beneficial use of citrus peel 8. Ethanol production by distillation of fermenting grape pomace. 9. Production of Ca-tartarate. 10. Processing of recycling paper 11. Field work in the landfill Carepovac 12. Field work in the company Cijan d.d.
Format of instruction	☐lectures ☐seminars and workshops ×exercises ☐*on line* in entirety ☐partial e-learning ×field work ☐independent assignments ☐multimedia ×laboratory ☐work with mentor ☐ (other)
Student responsibilities	laboratory exercises, field work, writing reports

Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	0.5	Report	0.25	(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0.25	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Preliminary exams, writing reports.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	M. Kliškić, kruti otpad i recikliranje, Upute za vježbe, Kemijsko-tehnološki fakultet, 2000.		
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Keeping records of student attendance; student survey in order to evaluate teachers, self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.		
Other (as the proposer wishes to add)			

Disposal of Hazardous Waste

NAME OF THE COURSE	**Disposal of Hazardous Waste**					
Code	KTJ303	Year of study	3rd			
Course teacher	PhD, Damir Barbir, assistant prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	- Acquiring knowledge about the sources, types and amounts of hazardous waste materials - The possibility of permanent and environmentally safe management of hazardous wastes - Recycling and getting of new products					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Disposal of Hazardous Waste					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to know: - Substances that make hazardous waste, - Definitions and law prescribed limits - Sources, types and amounts of hazardous wastes - Recycling and getting of new products - Permanent and environmentally safe disposal					

<table>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1: introduction, legislation on hazardous waste, environmental impact
Week 2: sources, types and labeling of hazardous waste, the UN numbers
Week 3: transportation of hazardous waste, road, rail, ship and air
Week 4: technological processes which produce harmful waste products
Week 5: production, storage, installation and remains inorganic binders and building materials
Week 6: oily waste, types, options for reuse or safe disposal methods
Week 7: construction waste, recycling and disposal opportunities
Week 8: assessment (1st colloquium);
Week 9: technological processes using industrial waste as raw material
Week 10: technological processes of solidification and stabilization of industrial waste materials
Week 11: physico-chemical methods of characterization of wastes
Week 12: hydration and optimization of additives in cement matrix
Week 13: test methods for new construction products with addition of industrial waste - use value
Week 14: methods of testing new products with industrial waste-ecological acceptability - leaching tests (leaching)
Week 15: Final comments, discussion, conclusions. assessment (2nd colloquium).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
x field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending lectures in the amount of 80%, and laboratory exercises in 100% of the total number of lessons.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.0</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation:
The entire test can be laid across two exams during the semester. Pass rate threshold is 60%. Each colloquium in assessing the worth 45%. The presence of lectures in 80-100% amount is 10% of the grade.
Final evaluation:
Students who have passed one colloquium, it is recognized as part of the exam (45% score). The remaining part is laid in the regular examination periods.
Students who did not pass any colloquium, written exam in the regular examination periods laid the whole subject matter. Prague passing the 60% and a written examination form part of the assessment with 90%.
Rating: sufficient (60-70%), good (71-80%), very good (81-90%), excellent (91-100%).</td></tr>
<tr><td>Required literature (available in the</td><td colspan="3">Title</td><td>Number of copies in</td><td>Availability via other media</td></tr>
</table>

library and via other media)		**the library**	
	K-Y. Show, X. Guo, Industrial Waste, InTech, Rijeka, 2012.	1	
	L. K. Wang, Y.-T. Hung, H.H. Lo, C. Yapijakis, Handbook of Industrial and Hazardous Wastes Treatment, Marcel Dekker Inc., New York, 2004.	1	
	R. D. Spence, C. Shi, Stabilization and Solidification of Hazardous, Radioactive and Mixed Wastes, CRC Press, Boca Raton, 2005.	1	
Optional literature (at the time of submission of study programme proposal)	- A. Al-Tabbaa, Stabilisation/Solidification Treatment and Remediation, Advances in S/S for Waste and Contaminated Land, A.A. Ballkema Publishers, London, 2005. - I. Kisić, Sanacija onečišćenog tla, Sveučilište u Zagrebu, Zagreb, 2012. - *R. Siddique*, Waste Materials and By-Products in Concrete, Springer, Berlin, 2008.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Annual Performance analysis Examination - Monitoring suggestions and reactions of participants during the semester - Student survey		
Other (as the proposer wishes to add)			

Exercises in Disposal of Hazardous Waste

NAME OF THE COURSE	**Exercises in Disposal of Hazardous Waste**					
Code	KTJ304	Year of study	3rd			
Course teacher	PhD, Damir Barbir, assistant prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	- Practical knowledge of the methods of determining the basic properties and identification of hazardous substances - Evaluation of group					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Disposal of Hazardous Waste					
Learning outcomes expected at the level of the course	After passing the exam, the student is expected to know: - Substances that constitute hazardous waste					

<table>
<tr><td>(4 to 10 learning outcomes)</td><td colspan="6">- Definitions and law prescribed limits
- Sources, types and quantities of hazardous waste
- Recycling and getting of new products
- Permanent and environmentally safe disposal</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Laboratory exercises:
Exercise 1 Leaching tests of hazardous solid waste
Exercise 2 Analysis of cement kiln dust and usability.
Exercise 3 Determination of heavy metals in the waste engine oil
Exercise 4 Recovery of solid materials - saturated zeolite. concrete, brick and glass
Exercise 5 Solidification and stabilization of mud with hazardous waste</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
x field work</td><td colspan="3">☐independent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Presence at all laboratory exercises.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.6</td><td>Report</td><td>0.1</td><td>Preparation for tests from a lab. exercises</td><td>0.2</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.1</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous evaluation:
Exercises can be activated after passing exams for each exercise. The exercises should be completed in 100% of the estimated amount of lessons. Once implemented exercise is necessary to write a report with exercises (paper).
Final evaluation:
The assessment exercises included knowledge of prelim (20%), success of the experimental part (60%) and quality reports with exercise (calculations and conclusions) 20%.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">R. D. Spence, C. Shi, Stabilization and Solidification of Hazardous, Radioactive and Mixed Wastes, CRC Press, Boca Raton, 2005.</td><td>1</td><td></td></tr>
<tr><td colspan="3">G.R. Woolley, J.J.J. Goumans, P. J. Wainwright, Waste Materials in Construction, Pergamon Press, Amsterdam, 2000.,Industrial Waste, USEPA, 2012.</td><td>1</td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Annual Performance analysis Examination - Monitoring suggestions and reactions of participants during the semester - Student survey		
Other (as the proposer wishes to add)			

Analysis and Optimization of Water Use

NAME OF THE COURSE	**Analysis and Optimization of Water Use**					
Code	KTJ305	Year of study	3rd			
Course teacher	PhD, Marina Trgo, prof.	Credits (ECTS)	3.0			
Associate teachers	PhD, Ivona Nuić, assistant	Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The students get insight water treatment and preparation depending of uses as well as the methods for multi uses of water in industrial process.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Analysis and Optimization of Water Use					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: - Explain the methods and techniques to reduce water consumption in the industrial process - Apply methods of water conditioning in industry - Implement the "Water Pinch" technique in analyzing water network flows - Explain the application of physico-chemical water treatment in the industry.					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: Aquifers in nature, surface water and groundwater. Week 2: The quality of drinking water and quality requirements depending of application. Week 3: Overview of water use in various industrial processes. Week 4: Methods and techniques to reduce water consumption, graphical and analytical methods. Week 5: Application of "Water Pinch 'technique for the analysis of network flows - Part 1. Week 6: Application of "Water Pinch 'technique for the analysis of network flows - Part 2. Week 7: Multiple use of water in the process, reduce the use of fresh and minimal generation of wastewater. Critical points of wastewater production in industry. Week 8: The procedures and processes in the preparation of fresh water as well as					

<table>
<tr><td></td><td colspan="6">for the regeneration and reuse of wastewater.
Week 9: Removing turbidity by coagulation / flocculation.
10th week: Organic pollutants, nutrients, metal ions and dissolved gases in the drinking water.
11th week: Methods of removal of dissolved metal ions.
12th week: Iron removal and manganese removal.
13th week: Disinfection of water; thermal, chemical, and irradiation methods
Week 14: Application of natural ion exchangers.
Week 15: Application of adsorbent in the processes of removing harmful substances from the water.

Seminar tasks:
Application of optimization of water use in the food industry, chemical industry, metal processing, industrial production of pulp and paper, aluminum industry, steel production.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
x seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td>0.7</td><td>Field work</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.2</td><td>Oral exam</td><td>0.1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Overall assessment can be applied over three written tests and one oral assessment. Written tests are related to material adopted on lectures and seminars. Ratings on the written exams: 60-69% is sufficient, 70-79% good, 80-89% is very good, 90-100% excellent. Students who have not passed the exam through the assessment should have the regular exam. Regular exam means written test and oral exam. The rating, which is entered in the index, is the mean score of written tests.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">Internal script for lectures</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">D. Mayer, Voda od nastanka do upotrebe, Prosvjeta, Zagreb, 2004.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. G. Mann, Y. A. Liu, Industrial water reuse and wastewater minimization, Wiley and Sons Ltd., Chichester, 2005.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">D. Hendricks, Fundamentals of Water Treatment Unit Processes: Physical, Chemical, and Biological, CRC Press, 2010.</td><td></td><td colspan="2"></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous writing assessment - Results on the written knowledge tests - Student's questionnaire.
Other (as the proposed wishes to add)	

Exercises in Analysis and Optimization of Water Use

NAME OF THE COURSE	**Exercises of Analysis and Optimization of Water Use**					
Code	KTJ306	Year of study	3rd			
Course teacher	PhD, Marina Trgo, prof.	Credits (ECTS)	3.0			
Associate teachers	PhD, Ivona Nuić, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	15	0
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION		
Course objectives	The students get insight determination of the water quality in environment, methods and techniques for preparation of water depending of its purpose.	
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Analysis and Optimization of Water Use	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam the student is expected to know: - To evaluate natural water quality - To propose water use in particular industrial process - To perform removal of iron and manganese from natural water in order to apply in industry -To optimize flocculation and coagulation in water conditioning and evaluate costs in industrial purposes. -To optimize all costs in industrial use of natural water.	
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1: Determination of turbidity in natural water (from the source to the mouth of the river Jadro) removal of turbidity, process optimization. Exercise 2: Iron and manganese removal in natural waters. Exercise 3: Application of synthetic and natural adsorbents in water conditioning procedure. Field work: Visit station for preparation of drinking water.	
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line* in entirety	☐ndependent assignments ☐multimedia x laboratory ☐work with mentor

	☐partial e-learning ☐field work			☐ (other)		
Student responsibilities						
Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	0.7	Report	0.1	Field work	
	Essay		Seminar essay		(Other)	
	Tests	0.2	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The requirement for admission of laboratory exercises is passed oral exam for exercise. Overall rating of laboratory practice includes evaluating oral exams, exercise performance, and report writing. Ratings of oral exercise exams are: 60-69% - sufficient, 70-79% - good, 80-89% - very good, 90-100% -excellent.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Internal material for laboratory exercises		

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Consultation with students - Continuous oral assessment - Student's questionnaire.
Other (as the proposed wishes to add)	

Construction Materials and Protection

NAME OF THE COURSE	**Construction Materials and Protection**					
Code	KTJ316	Year of study	3rd			
Course teacher	PhD, Maja Kliškić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	0	0	0
Status of the course	Mandatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						

Course objectives	The objective of this course is to achieve a knowledge and understanding of a wide variety of construction materials and their properties and their importance of practical applications; f*undamentals* of *corrosion* processes and *corrosion protection, and* methods of corrosion testing and prevention. This course will provide student to acquire an orderly pattern of thought in solving practical corrosion problems in a critical and creative manner.	
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Construction Materials and Protection The condition for taking the exam: Passed the course "Exercises in Construction Materials and Protection"	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	By the end of this course, students will be able to: - differentiate of various types of structural materials due to their composition, properties and applications - explain the advantages and disadvantages of the main structural materials - evaluate the resistance of materials for any given conditions - define and classify the corrosion processes - perform the corrosion tests - *ascertain and select* the most effective *corrosion protection system* for any given conditions – project related and on-site if appropriate – and *evaluate its durability*	
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Materials as the basis for the development of modern civilization. Economic and technological aspects. Distribution of construction materials with regard to the composition, properties and application. 2nd week: Structure of materials. 3rd week: Physical and chemical properties of construction materials. 4th week: Mechanical properties. Norms. 5th week: Behavior of materials under different conditions of exploatation. 6th week: The main metal materials and their applications. Iron, carbon and low alloy high alloyed steels. Non-ferrous metals and alloys. 7th week: Inorganic non-metallic materials. The organic construction materials. Composite materials. 8th week: First test 9th week: The definition of the economic importance of corrosion. Chemical corrosion of metals and alloys. 10th week: The types of corrosion attack. 11th week: Corrosion under specific conditions: in the atmosphere, water, soil, sea water, melt, biocorrosion, corrosion by stray currents. 12th week: Methods of protection. Ecological approach to the design of corrosion protection. Changing the properties of corrosion environment. 13th week: Protection by changing the electrode potential. Surface protection. Corrosion tests. 14th week: Classification and standardization of methods. Methods of testing in the laboratory. Tests on the model, the ongoing exploatation of the field. 15th week: Second test. Monitor of atmospheric corrosion, Polarization of iron in sulphuric acid solution, Determination of efficiency of corrosion inhibitors by thermometric method, Cathodic protection of metal by protector, Investigation of oxide films formed on stainless steel, Field work in the laboratories of the Quality Insurance of Shipbuilding Industry Split, Field work in the company AD Plastik Split, Field work at the Institute IGH d.d.	
Format of	xlectures	☐ndependent assignments

<table>
<tr><td>instruction</td><td>☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
xfield work</td><td>xmultimedia
☐laboratory
☐work with mentor
☐(other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Lecture attendance: 80 %. Exercises attendance: 100 %.</td></tr>
<tr><td>Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td colspan="2">
<table>
<tr><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="2">The entire course can be passed by two partial exams during the semester. Passing threshold is 60%. Each partial exam in assessing participates with 40% and exercises with 20%. On examination shedule students will have oral exam. Scoring: <60% insufficient, 61 - 69% - sufficient (2), 70 - 79% - good (3), 80-89% very good (4), 90 - 100% - excellent (5).</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="2">
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>T. Filetin, F. Kovačiček, J. Indof, Svojstva i primjena materijala, Fakultet strojarstva i brodogradnje,Zagreb, 2007.</td><td></td><td></td></tr>
<tr><td>T. Filetin, Pregled razvoja i primjene suvremenih materijala, Hrvatsko društvo za materijale i tribologiju, Zagreb, 2000.</td><td></td><td></td></tr>
<tr><td>T. Filetin, Izbor materijala pri razvoju proizvoda, Fakultet strojarstva i brodogradnje, Zagreb, 2006.</td><td></td><td></td></tr>
<tr><td>J.R. Davis, Corrosion – understanding the basic, ASM International, 2000.</td><td></td><td></td></tr>
<tr><td>B. Jarić, A. Rešetić, Korozija i katodna zaštita, Korexpres, Zagreb, 2003.</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="2">Uhlig's Corrosion Handbook, 2nd edition, R.W. Revie (ed.), Pennington, New Yersey, 2000.
I. Esih, Osnove površinske zaštite, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, Zagreb, 2003.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="2">- Tracking suggestions and reactions of participants during the semester
- Student survey</td></tr>
<tr><td>Other (as the</td><td colspan="2"></td></tr>
</table>

proposer wishes to add)	

Exercises in Construction Materials and Protection

NAME OF THE COURSE	**Exercises in Construction Materials and Protection**					
Code	KTA317	Year of study	3rd			
Course teacher	PhD, Ladislav Vrsalović, associate prof.	Credits (ECTS)	2.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	18	12
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	Presentation of various types of construction materials and their properties relevant to their practical application; the fundamental processes of corrosion and protection of materials as well as methods for testing and control of corrosion processes. The course will teach students to acquire creative approach to solving the problems caused by corrosion in order to protect the environment.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Construction Materials and Protection
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the training, students are expected to know: • Select appropriate methods of testing mechanical properties of materials • Distinguish practical methods to protect metals from corrosion • Calculate the velocity of corrosion • Graphic display test results, correctly interpret them and draw appropriate conclusions.
Course content broken down in detail by weekly class schedule (syllabus)	13. Monitor of atmospheric corrosion 14. Polarization of iron in sulphuric acid solution 15. Determination of efficiency of corrosion inhibitors by thermometric method. 16. Cathodic protection of metal by protector 17. Investigation of oxide films formed on stainless steel 18. Field work in the laboratories of the Quality Insurance of Shipbuilding Industry Split 19. Field work in the company AD Plastik Split. 20. Field work at the Institute IGH d.d.
Format of instruction	☐lectures ☐seminars and workshops ×exercises ☐*on line*in entirety ☐partial e-learning ×field work ☐independent assignments ☐multimedia ×laboratory ☐work with mentor ☐ (other)
Student responsibilities	laboratory exercises, field work, writing reports

Screening student work*(name the*	Class attendance		Research		Practical training	

proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)	Experimental work	1.0	Report	0.5	(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Preliminary exams, writing reports.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Lj. Aljinović, Vježbe iz konstrukcijskih materijala i zaštite, Tehnološki fakultet, Split, 1991.		

Optional literature (at the time of submission of study programme proposal)	S. Martinez i I. Štern, Korozija i zaštita – eksperimentalne metode, Hinus, Zagreb 1999. I Esih, Osnove površinske zaštite, Udžbenik Sveučilišta u Zagrebu, Zagreb 2003. M. Kliškić, L. Vrsalović, Vježbe iz tehnologije površinske zaštite, Kemijsko-tehnološki fakultet, Split, 2005.
Quality assurance methods that ensure the acquisition of exit competences	Keeping records of student attendance; student survey in order to evaluate teachers, self-evaluation of teachers, feedback from students who have already graduated to relevance of curriculum.
Other (as the proposer wishes to add)	

Polymers and the Environment

NAME OF THE COURSE	**Polymers and the Environment**					
Code	KTJ307	Year of study	3rd			
Course teacher	PhD, Branka Andričić, prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30			
Status of the course	Mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	Rational view of the influence of polymeric materials on the environment and vice versa.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Polymers and the Environment
Learning outcomes expected at the	- distinguish commodity plastics and their application - recognition of the structure and properties of polymers

<table>
<tr><td>level of the course (4 to 10 learning outcomes)</td><td colspan="6">- knowledge of the signs on plastic packaging and their meaning
- recognition of possible impact of polymerization processes on the environment
- recognition of environmental impact on polymers
- distinguish biodegradable poloymers
- perception of importance of plastic waste management toward lowering environmental pollution</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: Historical overview and world consumption of polymeric materials. Basic terms principles of polymer chemistry.
2nd week: Molecular and supermolecular structure of polymers. Physical and phase states. Thermomechanical curve. Classification of polymers (thermoplastic, elastomeric and thermosetting).
3rd week: Commodity polymers (PE, PP, PVC, PS, PET) and their properties and application. Symbols on the plastics packaging and their importance.
4th week: Polymers and the environment, global and local importance. Environmental impact during production and processing oh polymers. Air emissions.
5th week: Waste waters, hazardous materials, other waste. Emission prevention and control in polymerization processes (PVC and PE polymerization)..
6th week: Process improvement by implementation of “green” chemistry. Polymers and energy consumption.
7th week: First test.
8th week: Environmental impact on polymers (insolation, temperature, moisture, oxygen, atmospheric pollutants). Degradation mechanisms in polymers.
9th week: Thermal degradation. Oxidative degradation. Atmospheric pollutants. Ageing of polymer in the environmental and laboratory conditions.
10th week: Flammability and burning of polymers. Burning mechanisms. Burning test methods. Toxic emission from plastics burning.
11th week: Polymers in marine environment. Biodegradable polymers from renewable resources and petrochemicals (PHB, PLLA) production, properties and application.
12th week: Biodegradable water soluble polymers (PEO, PVA), properties and application. Improvement of polymers (bio)degradability by modification. Standard biodegradability tests.
13th week: Plastic and rubber waste management system.
14th week: Recycling and regeneration of plastic and rubber.
15th week: Second test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐ field work</td><td colspan="3">☐independent assignments
X multimedia
☐ laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attendance on lectures at least 80 %.</td></tr>
<tr><td rowspan="2">Screening student work(name the proportion of ECTS credits for each activity so that the total number of</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training (report on exp. work)</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Tests before experimental work</td><td></td></tr>
</table>

ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		Field work	
	Tests	1.0	Oral exam	0.5	(Other)	
	Written exam	0.5	Project		(Other)	
Grading and evaluating student work in class and at the final exam	The complete exam can be passed through two tests during semester. The passing score is 60 % and the fraction of each test is 50%. Correction of the one test can be performed in the first term of exam period. In the exam period the student has to attend to written and oral exam (passing score is 60%). Written exam is 35% and oral exam is 35%. Grades: successful (60% – 70%), good (71% – 80%), very good (81% – 90%), excellent (91% – 100%).					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	1. A. L. Andrady, Plastics and the Environment, John Wiley and Sons, Inc., New Jersey, 2003.; 2. J. D. Hamilton and R. Sutclife, Ecological Assessment of Polymers, Van Nostrand Reinhold, New York, 1997	1 1	

Optional literature (at the time of submission of study programme proposal)	1. A. Azapagic, A. Emsley, I. Hamerton, Polymers, The Environment and Sustainable Development, John Wiley & Sons Ltd, Chichester, 2003.; 2. W. Tötsch and H. Gaensslen, Polyvinylchloride Environmental Aspects of a Common Plastics, Elsevier Science Publishers Ltd, Barking, 1992. 3. članci iz znanstvenih i stručnih časopisa.
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.
Other (as the proposer wishes to add)	

Exercises in Polymers and the Environment

NAME OF THE COURSE	**Exercises in Polymers and the Environment**					
Code	KTJ308	Year of study	3rd			
Course teacher	PhD, Sanja Perinović Jozić, assistant prof.	Credits (ECTS)	1.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			0	0	12	3
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Through laboratory and field classes introduce students to the importance of recycling plastics and how recycling affects the properties of the polymer.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Polymers and the Environment					

Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to be able to: - sort mixed polymer waste - identify the components of polymer waste - determine the effect of multiple recovery on the properties of polymers - explain the complexity of the process of recovery of the polymer - write a report					
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1. Identification of polymers: primary tests, infrared spectroscopy. Exercise 2. Influence of aging on properties of polymers. Exercise 3. Sorting of plastic waste. Exercise 4. Influence of multiple recycling on the thermal properties of polymers. Field work: Visit to factories AD Plastik Inc. Solin, Fornix Ltd., Dugi Rat, GUMIIMPEX Inc., Varaždin					
Format of instruction	☐lectures ☐seminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning x field work		☐ndependent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)			
Student responsibilities	Attending laboratory exercices and field work in the 100% amount.					
Screening student work*(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	0.5	Report	0.1	Preparation for exp. work	0.2
	Essay		Seminar essay		Field work	0.1
	Tests	0.1	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Oral examination is done before each laboratory exercise. The student activity in the laboratory is monitored and evaluated as well as the reports from exercises. Oral examination, laboratory work and report account for 40%, 30% and 30% of the final grade, respectively. Rating: sufficient (50-61%), good (62-74%), very good (75-87%), excellent (88-100%).					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	M. Erceg, Oporaba plastike, Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2014.		Department of Organic Technology
	T. Kovačić, B. Andričić, Struktura i svojstva polimera Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2007.		Department of Organic Technology
Optional literature (at the time of submission of study programme proposal)	J. Scheirs, Polymer Recycling: Science, Technology and Applications, John Wiley&Sons, Chichester, 1998.		
Quality assurance methods that ensure the	Quality assurance will be performed at three levels: (1) University Level, (2) Faculty Level by Quality Control Committee, (3) Lecturer's Level.		

acquisition of exit competences	
Other (as the proposer wishes to add)	

Wastewaters Treatment

NAME OF THE COURSE	Wastewaters Treatment					
Code	KTJ309	Year of study	3rd			
Course teacher	PhD, Nediljka Vukojević Medvidović, associate prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students get to know the types of wastewaters, the indicators of their quality, wastewater treatments and the methods of wastewater sludge disposal.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Wastewaters Treatment					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	It is expected that the outcome of learning to provide knowledge about: - the impact of pollution on developments in aquatic ecosystems - the necessity of wastewater treatment and relationship with sustainable development - calculating the state of oxygen in the ecosystem - sources and characteristics of wastewater, pollution indicators - calculation of wastewater loading by harmful substances and the number of population equivalent ES - selection procedures and methods for wastewater treatment - mechanical procedures for wastewater treatment - physical and chemical processes for wastewater treatment - mechanism and kinetics of biological wastewater treatment - calculatin of basic parameters of process control with activated sludge - methods of processing biological sludge and biogas production.					
Course content broken down in detail by weekly class schedule (syllabus)	1 week: Introduction. Pollution of natural waters. 2 week: Pollution indicators: physical, chemical, biological, radiological. Specific and nonspecific quality indicators. Sampling methodology. 3 week: Autopurification process and carrying capacity. Oxygen levels in the water . The kinetics of the aerobic decomposition of organic matter in water. Numerical examples . 4 week: Quantity and quality of wastewater. Urban wastewater. Industrial effluents. Specifics of industrial wastewater . 5 week: Cooling wastewaters. Storm wastewater. Landfills leachate. 6 week: Loading of wastewater with harmful substances and the number of population equivalent ES. Numerical examples. 7 week: Wastewater treatment. Selection process and processing methods. Numerical examples. Mechanical methods of wastewater treatment.					

	8 week: Physico-chemical processes and practices for wastewater treatment: sedimentation, coagulation and flocculation, filtration, neutralization, chemical precipitation, oxidation, reduction, disinfection, membrane processes. 9 week: Physico-chemical processes for wastewater treatment. Numerical examples (part 1). 10 week: Physico-chemical processes for wastewater treatment. Numerical examples (part 2). 11 week: Biological processes for wastewater treatment. The factors of the biological activity of microorganisms. The types of microorganisms. The mechanism and kinetics of aerobic biological wastewater treatment. 12 week: Performance) of aerobic treatment processes: bioreactors, biofilters (biological trickling filters or rotating biodiscs), lagoons or stabilization ponds. 13 week: Technological performance of anaerobic wastewater treatment processes. The efficiency. 14 week: The parameters controlling the process of activated sludge. Numerical examples . 15 week: Treatment of sludge generated in the wastewater treatment: thickening , stabilization, dewatering, composting, conditioning, heat treating. Biogas production. Numerical examples.
Format of instruction	**x** lectures **x** seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐ field work ☐independent assignments **x** multimedia ☐laboratory ☐work with mentor ☐ (other)
Student responsibilities	Attending lectures is 80%, while seminars 100% of the total hours.

Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	1.5	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay	1.0	(Other)	
	Tests	0.5	Oral exam	0.5	(Other)	
	Written exam	0.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The entire exam can be applied over the three written evaluation during the semester. Passing threshold is 60%. Students who have not passed written evaluation during the semester should attend at the final exam in the regular examination period. Final exam will include written and oral exam. Passing threshold is also 60%. Rating: 60%-70% - satisfactory, 70%-80% - good, 80%-90% very good, 90%-100% - excellent.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	D. Hendricks, Water treatment unit processes, Taylor and Francis Group, Boca Raton, 2006.	1	
	Metcalf & Eddy, Wastewater Engineering, Irwin McGraw-Hill, New York, 1991.	1	
	L. D. Benefield, et al., Process Chemistry for Water and Wastewater Treatment, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1982;	1	
	L. D. Benefield, et al., Process Chemistry for Water	1	

	and Wastewater Treatment, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1982.		
	S. Tedeschi, Zaštita voda, HDGI, Zagreb, 1997.	1	
	B. Tušar, Ispuštanje i pročišćavanje otpadne vode, Croatiaknjiga, Zagreb, 2004.	1	
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.		
Other (as the proposer wishes to add)	Suggestions and reactions of participants during the semester. Student survey.		

Exercises in Wastewaters Treatment

NAME OF THE COURSE	**Exercises in Wastewaters Treatment**					
Code	KTJ310	Year of study	3rd			
Course teacher	PhD, Nediljka Vukojević Medvidović, associate prof.	Credits (ECTS)	2.0			
Associate teachers	PhD, Ivona Nuić, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	27	3
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Students get to know the types of wastewaters, the indicators of their quality, wastewater treatments and characterization of bioactive sludge.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Wastewaters Treatment					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	It is expected that the outcome of learning to provide knowledge about: - methods and techniques of identification of harmful substances in waste water - selection procedures and methods for wastewater treatment - the impact of various factors on the efficiency of the treatment process wastewater - the calculation of unit capacity - monitoring of biological treatment of wastewater sludge through the sudge index.					
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1. Determination of optimal pH for the precipitation of $Zn(OH)_2$. The construction of solubility diagrams for the system $Zn(OH)_2$-H_2O. Exercise 2. Removal of zinc from wastewater by chemical precipitation. Calculation of addition of hydrated lime and material balance. Exercise 3. Testing of coagulation / flocculation of dispersed colloidal particles in water JAR-test. Determination of the optimal addition of coagulant / flocculant. Exercise 4. Characterization of waste water using oxygen as an indicator. Determination of chemical oxygen demand (COD) using Dichromate method.					

<table>
<tr><td></td><td colspan="6">Exercise 5. Characterization of waste water using oxygen as an indicator. Determination of biochemical oxygen demand (BOD) using Winkler method.
Exercise 6. Sedimentation of bioactive sludge in Imhofe and determination of mixed liquor suspended solids (MLSS) of active sludge.
Fieldtrips for visiting of wastewater treatment plants.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
x field work</td><td colspan="3">☐independent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending laboratory exercises and field work 100% of the total hours.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>1.0</td><td>Report</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Every laboratory exercises include oral exam before exercise and writing of final report. Passing threshold is also 60%. Rating: 60%-70% - satisfactory, 70%-80% - good, 80%-90% very good, 90%-100% - excellent.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Laboratory exercises in Wastewater treatment (internal script)</td><td></td><td>At course teacher</td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">D. Hendricks, Water treatment unit processes, Taylor and Francis Group, Boca Raton, 2006.; Metcalf & Eddy, Wastewater Engineering, Irwin McGraw-Hill, New York, 1991; L.D. Benefield, et al., Process Chemistry for Water and Wastewater Treatment, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1982; S. Tedeschi, Zaštita voda, HDGI, Zagreb, 1997.; B. Tušar, Ispuštanje i pročišćavanje otpadne vode, Croatiaknjiga, Zagreb, 2004.; R.T. Wright and B.J. Nebel, Environmental Science, 9th edition, Prentice Hall Inc, New Jersey, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Quality assurance will be performed at three levels:
(1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6">Suggestions and reactions of participants during the semester.
Student survey.</td></tr>
</table>

Environmental Menagment Systems

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Environmental Menagment Systems</td></tr>
<tr><td>Code</td><td>KTJ311</td><td>Year of study</td><td colspan="5">3rd</td></tr>
<tr><td>Course teacher</td><td>PhD, Marijo Buzuk, assistant prof.</td><td>Credits (ECTS)</td><td colspan="5">3.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Maša Buljac, assistant prof.</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The main objective of this course is an introducing students to the steps and processes during the implementation of the ISO 14001 standard in business subjects and in possible problems that arising from the implementation process and to resolve issue. Furthermore, one of the goals of this course is to introduce students to the development and future trends in the development of international norms that it is needed for understanding and applying them in various systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Students will understand the concept of integrated environmental protection, sustainable development, and will have ability to measure and proceed for the protection of the environment.
2. Based on the previous point, students will be able to participate in area planning, according to principles of sustainable development and to be able to estimate the impact on the environment (either Strategic Impact Assessment or any estimation of the environmental impact).
3. Students will have the ability to estimate risk and to manage it, as well as its the quantitative and qualitative representation.
4. Students will be able to participate in the process of planning and management of environment, relating to the study of the environmental impact, and therefore in the Commission for Strategic Studies and Environmental Strategy.
5. By discussing about the Regulations on Environmental Impact Estimation and the steps in the preparation of studies, students will gain knowledge that is inevitable in implementation of various Estimation and Environmental Programme.
6. Students will acquire the competencies that will provide them as experts in selecting the best available technique for a specific activity according to the European guidelines . They will be able to identify and resolve nonconformities that occur during this process .
7. Students will be able to apply the knowledge in organizations that have implemented an Environmental Management System ISO 14001 , and in the segment with its maintenance and improvement.
8. Students will acquire knowledge that will enable them to be an important subjects and managers to establish the system of ISO 14001 in various subjects.
9. Students will be able to apply the knowledge for implementation,</td></tr>
</table>

	maintenance and development of EMS.
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1:** The definition of technology ; similarities and differences ; historical development of the term . Impacts and Challenges of technology . The separations technology. **Lecture 2:** Definition ecosystem, classification. Environment Protecting the environment. Pollution and contamination. Legal provisions in the RH. **Lecture 3:** Sustainable Development; concepts, vision, future. Sustainable development laws of thermodynamics. The path towards sustainable development. **Lecture 4:** Types of Environmental Protection. Integrated approach. The measures and procedures to protect the environment. The political and sociological approach, legal measures. **Lecture 5:** Planning and management of the area. Basic documents of Environmental Protection. The environmental impact assessment. Risk management. Cost-benefit analysis. **Seminar 1 (2 hours):** Consideration and discussion of objectives and approach strategies, programs, studies on the process of planning and environment management. **Lecture 6:** A study of the environmental impact - steps in the preparation . Legal provisions. **Seminar 2 (2 hours):** Consideration and discussion of goals and approach to the study of the environmental impact. The debate about the roles of various professionals, overlapping powers and competencies, and suggestions dismissal of the non-compliance! The interest of the community vs. capital interest. **Lecture 7:** Methodology of the best available techniques. **Seminar 3 (2 hours):** A critical review of the methodology for the assessment of best available techniques - debates , discussions, debates , proposals . Development of algorithms and schemes for assessing best available techniques. **Seminar 4 (2 hours):** Evaluating and choosing the best available techniques for different procedures with the help of the guidelines . Landfills, waste gases , waste incinerators , cement industry , etc .... **Lecture 8:** Systems - definition. Standards and Standardization. Croatian Standards Institute. Accreditation and certification. Types of norms. **Lecture 9:** ISO. ISO 14001 Environmental Policy. Plan. **Seminar 5 (2 hours):** Development of ISO 14001 on examples of different organizations. Environmental policy. Plan. **Lecture 10:** ISO 14001 Implementation and operational phases. Testing and verification. **Seminar 6 (2 hours):** Development of ISO 14001 on examples of different organizations. Implementation and operational phases. Testing and verification. **Lecture 11:** The definition of quality. Family 9001 standard procedure of introducing a system of quality. **Lecture 12:** General requirements of quality management systems and requirements relating to documentation. **Lecture 13:** ISO 9001 Document Control and inspection records. Management responsibility and quality policy. **Lecture 14:** Planning Quality Management System. Resource management. Control and improve the system. Self-evaluation. **Lecture 15:** Integration of standards 14001 and 9001 in a joint management system. Similarities and differences . **Seminar 7 (3 hours):** Integration of standards 14001 and 9001 in a joint

<table>
<tr><td></td><td colspan="6">management system for the various economic operators.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">×lectures
×seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">×independent assignments
☐multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During semester two exams will be performed. Final examinations will be administered during formal examination periods. The following percentage equivalents apply to final grade: <55% Failure; 56%-66% (2); 67%-78% (3); 79%-90% (4);> 90% (5). After written exam, student will attend to oral exam. Lecturers do not give grades. Students earn grades.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">M. Buzuk, Sustavi upravljanja okolišem (u pripremi), Kemijsko-tehnološki fakultet, Split, 201X</td><td>0

X</td><td colspan="2">personal</td></tr>
<tr><td colspan="3">Tonći Lazibat, Poznavanje robe i upravljanje kvalitetom, Sinergija, Zagreb, 2005.</td><td></td><td colspan="2">by mail</td></tr>
<tr><td colspan="3">Smjernice za najbolje raspoložive tehnike MZOIP</td><td></td><td colspan="2">www</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6"></td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

Sustainable Development in Coastal Area

NAME OF THE COURSE	Sustainable Development in Coastal Area					
Code	KTJ312	Year of study	3rd			
Course teacher	PhD, Nediljka Vukojević Medvidović, associate prof.	Credits (ECTS)	3.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Elective	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	Students will learn about the sustainable development of coastal activities with purpose to achieving a balance between economic, social and environmental requirements to meet the needs of present generations without compromising the ability of future generations to realize them for yourself.					
Course enrolment requirements and entry competences required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	It is expected that the outcome of learning to provide knowledge about: - meaning and understanding of the term "sustainable development" - indicators of sustainable development - sources of pressures on resources and the quality of life in coastal areas - importance of implementation of sustainable development in coastal area - implementation of Integrated Coastal Zone Management - implementation of sustainable development in different braches of economy in coastal area.					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: The history of sustainable development. Legal basis. The principles of sustainable development. 2nd week: The meaning of sustainable development in the coastal area. The impact of public education on the implementation of sustainable development. Preparation of environmental impact studies. 3rd week: Local Agenda 21. Integrated Coastal Zone Management (ICZM). Mediterranean Action Plan. 4th week: The principle of carrying capacity of the environment. Fresh water as a basic resource. Sustainable management of water resources and energy, ensuring the reproducibility. 5th week: Rationalization of energy consumption through the use of renewable sources. 6th week: Sustainable transport management. (I written evaluation) 7th week: Sustainable Tourism. Solving the problem of increased pressure in the tourist season. 8th week: Sustainable Agriculture and Rural Development. Sustainable Urban Development. 9th week: Sustainable management of the sea, coastal zone and marine resources. 10th week: Assessment of the success of Coastal Zone Management. Croatian coast and islands, the current state. (II written evaluation) 11th week: Seminar - Case study of good and bed practice. Seminar with examples of good and bed practice is given to student. 12th week: Seminar - Case study of good and bed practice.					

<table>
<tr><td></td><td colspan="6">13th week: Seminar - Case study of good and bed practice.
14th week: Seminar - Case study of good and bed practice.
15th week: Seminar: Oral presentation of student seminars (III oral evaluation)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
x seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">x independent assignments
x multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending lectures is 80%, while seminars 100% of the total hours.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1.0</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The entire exam can be applied over the two written evaluation and one oral evaluation of seminar during the semester. Passing threshold is 60%. Students who have not passed evaluation during the semester should attend at the final exam in the regular examination period. Final exam will include written and oral exam. Passing threshold is also 60%. Rating: 60% -70% - satisfactory, 70% -80% - good, 80% -90% very good, 90% -100% - excellent.</td></tr>
<tr><td rowspan="8">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">Strategija održivog razvitka RH, NN 110/07</td><td>1</td><td colspan="2">web</td></tr>
<tr><td colspan="3">L. Pavičić-Rogošić, Održivi razvoj, Odraz, 2010.</td><td>1</td><td colspan="2">-</td></tr>
<tr><td colspan="3">Ekološki leksikon, Ministarstvo zaštite okoliša i prostornog uređenja RH, O.P. Springer (ur.), Zagreb, 2001.</td><td>1</td><td colspan="2">-</td></tr>
<tr><td colspan="3">V. Jelić-Muck, L. Pavić-Rogošić, Pregled i ocjena napretka provedbe Agende 21 u Hrvatskoj, Ministarstvo zaštite okoliša i prostornog uređenja, 2002.</td><td>1</td><td colspan="2">web</td></tr>
<tr><td colspan="3">Strategija razvoja hrvatskog turizma do 2010. godine, Ministarstvo razvoja Hrvatskog turizma, 2003.</td><td>1</td><td colspan="2">-</td></tr>
<tr><td colspan="3">D. Damić, Pomorski promet i održivi razvoj u prometnoj politici, Naše more 56, 2009, 99-107.</td><td>1</td><td colspan="2">web</td></tr>
<tr><td colspan="3">Hrvatska i održivi razvitak, Gospodarstvo - Stanje i procjena mogućnosti, Ministarstvo razvitka i obnove, Republika Hrvatska, Zagreb, 1998.</td><td>1</td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td></td><td colspan="2"></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">Scientific and professional paper</td></tr>
</table>

Quality assurance methods that ensure the acquisition of exit competences	Quality assurance will be performed at three levels: (1) University Level; (2) Faculty Level by Quality Control Committee; (3) Lecturer's Level.
Other (as the proposer wishes to add)	Records of lecture attendance. Annual performance analysis evaluation. Student questionnaire. Selfevaluation of teacher. Feedback from students who have already graduated about the relevance of content items.

Chemistry and Marine Protection

NAME OF THE COURSE	**Chemistry and Marine Protection**					
Code	KTJ313	Year of study	3rd			
Course teacher	PhD, Marija Bralić, associate prof.	Credits (ECTS)	2.0			
Associate teachers	PhD, Maša Buljac, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			30	0	0	
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining knowledge of the sea; chemical composition and contamination, and the ways to prevent pollution of the marine environment.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Chemistry and Marine Protection					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to know: 1. fundamental properties of seawater 2. basic physical properties of the sea 3. chemical composition of seawater 4. marine pollution, sources and types of pollution 5. interactive impact of pollutants on the marine environment 6. chemicals in the sea and the manner of their removal					
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1:** Introduction to marine chemistry. The fundamental properties of sea water, the origin of water and salt. **Lecture 2:** The composition of the oceans and marine sediments. **Lecture 3:** The basic physical properties of the sea. **Lecture 4:** Chemical composition of seawater. Salinity and density. **Lecture 5:** The chemical species in the sea (macro-constituents and micro-constituents). **Lecture 6:** Gases in the sea. **Lecture 7:** Dissolved organic matter in seawater. **Lecture 8:** Marine pollution, sources and types **Lecture 9:** Metals in the sea. **Lecture 10:** Biodegradable and durable organic compounds. **Lecture 11:** The impact of pollutants on the marine environment (persistence in the					

<table>
<tr><td></td><td colspan="6">marine environment, toxicity and other adverse effects, accumulation in marine organisms and sediments, adverse effects on the oxygen content in the sea)
Lecture 12: The chemicals in the sea and ways to remove them.
Lecture 13: Plant Protection (cleaning) must
Lecture 14: Preventing contamination / pollution from vessels.
Lecture 15: Legal regulations on marine environmental protection.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
☐seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐ndependent assignments
☐multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.5</td><td>Oral exam</td><td>1.0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester, the two partial test to check if the knowledge of students from courses included material. During the semester students will be selected from the lecture topic to make a seminar that will affect the final grade. After completion of the semester, students take a written exam courses included material from the seminar. If the student meets at one of the partial tests during the semester, material from passing the test does not need to take the written exam. After passing the written part of the exam, the oral exam. For all aspects of teaching evaluation will be conducted according to the following criteria: <55% inadequate; 55% -65% is sufficient; 66% -75% good; 76% -85% very good;> 86% excellent. The final grade will be the arithmetic average of ratings from exercises, written assessment and oral examination.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">M. Buljan, M. Zore-Armanda: Osnovi oceanografije i pomorske meteorologije, Institut za oceanografiju i ribarstvo-Split, Split, 1971.</td><td></td><td colspan="2">1 copy in Department</td></tr>
<tr><td colspan="3">R.B. Clark: Marine Polution, Clarenddon Press, Oxford, 1986.</td><td></td><td colspan="2">1 copy in Department</td></tr>
<tr><td colspan="3">B.A. Duxbury, A.C. Duxbury, Fundamental of oceanography, WCB, Melbourn, Oxford, 1993.</td><td></td><td colspan="2">1 copy in Department</td></tr>
<tr><td colspan="3">Z. Bičanić: Zaštita mora i morskog okoliša; Z. Bičanić-vlastita naklada, Split, 2004</td><td></td><td colspan="2">1 copy in Department</td></tr>
<tr><td>Optional literature (at the time of submission of study programme</td><td colspan="6">E Prohić: Geokemija, Targa, Zagreb, 1998.
Stumm, J.J. Morgan, Aquatic Chemistry: Chemical Equilibria and Rates in Natural Waters, John Wiley&Sons, New York, 1995.</td></tr>
</table>

proposal)	
Quality assurance methods that ensure the acquisition of exit competences	Methods Quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Level.
Other (as the proposer wishes to add)	

Exercises in Chemistry and Marine Protection

NAME OF THE COURSE	**Exercises in Chemistry and Marine Protection**					
Code	KTJ314	Year of study	2st year of undergraduate study			
Course teacher	PhD, Marija Bralić, associate prof.	Credits (ECTS)	1.0			
Associate teachers	PhD, Maša Buljac, assistant prof.	Type of instruction (number of hours)	L	S	E	F
			0	0	15	
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining knowledge of the sea; chemical composition and contamination, and the ways to prevent pollution of the marine environment.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Chemistry and Marine Protection					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Assuming the exercise of the students are expected to know: - determination of salinity of sea water and chlorinity - methods for the determination of heavy metals in marine sediments - determination of organic matter in marine sediments - determination of pH and oxygen in the sea -. determination of nutrients in the sea - determination of carbonate in marine sediments					
Course content broken down in detail by weekly class schedule (syllabus)	1. Determination of the salinity and chlorinity of seawater. 2. Determination of the pH and alkalinity. 3. Scoping oxygen. 4. Determination of nutrients. 5. Designation of metals in marine sediments. 6. Determination of organic matter in marine sediments. **7.** Determination of carbonate in marine sediments.					
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line* in entirety ☐partial e-learning	☐ndependent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)				

	☐field work					
Studentresponsibilities						
Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance		Research		Practical training	
	Experimental work	0.5	Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The requirement for access to a laboratory exercise is passing an oral colloquium for exercise. Overall rating laboratory practice includes evaluating oral tests exercise performance and writing papers. Guest exercises are:<55% inadequate; 55% -65% is sufficient; 66% -75% good; 76% -85% very good;> 86% excellent. The final grade will be the arithmetic average of ratings from exercises, written assessment and oral examination.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Kemija i zaštita mora – interna skripta, Kemijsko-tehnološki fakultet, Split, 201X		

Optional literature (at the time of submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	Methods Quality assurance will be performed at three levels: (1) University; (2) Faculty Level by Quality Control Committee of teaching; (3) Level.
Other (as the proposer wishes to add)	

Selected Processes of Chemical Industry

NAME OF THE COURSE	**Selected Processes of Chemical Industry**					
Code	KTJ318	Year of study	3rd			
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	6.0			
Associate teachers	PhD, Miće Jakić, assistant	Type of instruction (number of hours)	L	S	E	F
			45	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Qualifying students for the adoption and application of the fundamental principles					

	of chemical processes in technological processes of inorganic and organic industry with special emphasis on techno-economic and environmental aspects.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Exercises in Selected Processes of Chemical Industry
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course the student will be able to: 1. Classify and apply the basic principles of chemical processes in technological processes of inorganic and organic industry. 2. To explain the process and apply methods for the preparation of process water. 3. Categorize energy sources for inorganic processes and describe the processes of combustion of solid fuels. 4. Describe catalytic processes and influential factors in production processes basic inorganic chemical industry (ammonia, sulfuric acid, nitric acid). 5. Explain the basic processes (hydration, sintering) and the influential factors in the production of ceramic materials. 6. Distinguish metallurgical, electrothermical and electrochemical processes in relation to the implementation of the process, equipment, quality assurance, the possibility of using secondary raw materials and by-products of inorganic processes. 7. Compute important parameters for the phases of the production process. 8. Explain the basic processes (primary and secondary) of the processing of petroleum. 9. Distinguish and explain processes for production of components for organic synthesis (alkanes, alkenes, acetylene, aromatic hydrocarbons, synthesis gas) from the petrochemical sources (natural gas, petroleum). 10. Describe technological processes in organic synthesis. 11. Explain the processes of polymerisation.
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Introduction. Elementary principles of chemical processes. 2nd week: Water in the technological processes. The precipitation agents, ion exchangers and membranes in the waters-treatment process (basic processes and reactions, equipment and process control). 3rd week: Energy sources for inorganic processes. Fuels and burning processes of solid fuels. Gas generator. 4th week: The most important examples of catalytic processes of the basic inorganic chemical industry (synthesis of ammonia, production of nitric and sulphuric acids). The written knowledge tests (I Colloquium). 5th week: The high-temperatures reaction in the solid state and sintering processes in the production of ceramic materials. 6th week: Forming processes of dispersion systems with water. Clay-water system. 7th week: Hydration processes and hardening of mineral binders. 8th week: Metallurgical and electrothermical processes. Electrochemical industrial processes, electrolyses of aqueous solutions and melting salts. The written knowledge tests (II Colloquium). 9th week: Primary and secondary processes of the processing of petroleum. 10th week: Processes for production of components for organic synthesis (alkanes, alkenes, acetylene, aromatic hydrocarbons, synthesis gas) from the petrochemical sources (natural gas, petroleum). 11th week: Alternative (no conventional) methods for raw materials production for organic synthesis. 12th week: Technological processes in organic synthesis according the criteria of similar chemical reactions (thermodynamics and kinetics, catalysts). The written knowledge tests (III Colloquium). 13th week: The production of fine chemicals. The processes of hydrogenation and dehydrogenation, hydroformilation and oxidation reactions. 14th week: The production of fine chemicals. The processes of alkylation, esterification and nitration.

<table>
<tr><td></td><td colspan="6">15th week: The production of fine chemicals. The processes of sulfonation and sulphating, hydrolysis and polymerisation. The written knowledge tests (IV Colloquium).

SEMINARS:
During the semester are processed numerical examples (tasks) from lectures and the flow diagram presentation of selected technological processes (physical and chemical base processes, equipment and environmental impact), which together with lectures seems a whole.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">xlectures
xseminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">xindependent assignments
☐multimedia
☐laboratory
☐work with mentor
☐(other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.0</td><td>Oral exam</td><td>1.5</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">A student can pass a part or the entire exam by taking four (4) partial tests during the semester, i.e., two (2) partial tests from the inorganic part, and two (2) partial tests from the organic part. Test passing score is 60%. Students who do not pass the partial exams have to take an exam in the regular examination periods. The exam consists of theoretical (oral) and written part. Exam passing score is 60%. Grades depending on the test score: 60% - 70% - satisfactory, 71% -81% - good, 82% -92% very good, and 93% 100% - excellent.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">R. Krstulović, Technological Processes of Inorganic Industry/Tehnološki procesi anorganske industrije, (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 1986.</td><td>5</td><td></td></tr>
<tr><td colspan="3">J. Zelić, Practicum in the processes of inorganic industry /Praktikum iz procesa anorganske industrije (in Croatian), Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials), http:// www.ktf-split.hr/bib/nm/Procesi _anorganske_ industrije.pdf</td><td>1</td><td>www.ktf-split.hr</td></tr>
<tr><td colspan="3">Z. Janović, Polimerizacije i polimeri, Hrvatsko društvo kemijskih inženjera i tehnologa, Zagreb, 1997.</td><td>6</td><td></td></tr>
<tr><td colspan="3">I. Klarić, Technological Processes of Organic Industry (1st part) / Tehnološki procesi organske industrije (I. dio), Faculty of Chemistry and Technology in Split, Split, 2008 (reviewed and</td><td></td><td>www.ktf-split.hr</td></tr>
</table>

	edited teaching materials), https://www.ktf-split.hr/index.php/nastavni-materijali-knjiznice/repozitorij-265?start=20		
	Z. Janović, Naftni i petrokemijski procesi i proizvodi, Hrvatsko društvo za goriva i maziva, Zagreb, 2011.	15	
Optional literature (at the time of submission of study programme proposal)	1. J. Zelić, Z. Osmanović, Čvrstoća i trajnost cementnih kompozita /Strength and Durability of the Cement Composites, (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 2014, ISBN 978-953-7803-01-8. 2. Z. Osmanović, J. Zelić, Proizvodnja Portland-cementa /Production of Portland Cement, Manualia Universitatis Studiorum Tuzlaensis, University of Tuzla, B&H, Tuzla, 2010., ISBN 978-9958-897-04-7. http://www.knjiga.ba/proizvodnja_portlandj_cementa-k7412.html		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) Faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Exercises in Selected Processes of Chemical Industry

NAME OF THE COURSE	**Exercises in Selected Processes of Chemical Industry**					
Code	KTJ319	Year of study	3rd			
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	2.0			
Associate teachers	PhD, Miće Jakić, assistant PhD, Mario Nikola Mužek, assistant	Type of instruction (number of hours)	L	S	E	F
			0	0	30	0
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Qualifying students how to implement experiments in the laboratory and semi-industrial scale, and how to analysis the chemical and/or physical process in particular phases of technological processes of selected inorganic and organic industry.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the cours Selected Processes of Chemical Industry					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course the student will be able to: 1. Conduct experiments in the laboratory and industry. 2. Perform measurements independently and teamwork. 3. Interpret the collected data and measurement results using the methodology of chemical engineering. 4. To analyze the chemical and / or physical processes according to present conditions and material properties. 5. Recommendation of process parameters in order to optimize processes in particular phases of production and application of selected inorganic and polymeric materials.					
Course content broken down in	1. Water treatment. Water softening processes. Lime-Soda process. Ion-exchange process.					

<table>
<tr><td>detail by weekly class schedule (syllabus)</td><td colspan="6">2. Electrochemical processes. Electrolysis of sodium chloride solution.
3. Catalytic processes. Contact oxidation of sulphur dioxide.
4. Hydration processes. Physical and chemical properties of silicate cement (density, specific surface area, normal consistency, sitting time, heat of hydration).
5. Chemical resistance of soda-lime-silica glass.
6. Physical and chemical properties of petroleum products (fuels and lubricants).
7. Dehydration of ethanol to acetaldehyde.
8. Esterification of phthalic anhydride with n-butanol (Synthesis of di-butyl phthalate).
9. Manufacture of soap.
10. Synthesis of azo dyes.
11. The sulphonation of styrene / divinyl benzene.
12. Step polymerization (synthesis of polyester or polyamide).
13. The radical chain polymerization (suspension polymerization of styrene emulsion polymerization of vinyl acetate).
For the proposed exercises pertaining to organic part of the student will make four (4).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ectures
☐seminars and workshops
xexercises
☐*on line*in entirety
☐partial e-learning
☐ield work</td><td colspan="3">**x**independent assignments
☐multimedia
xlaboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Implementation and analysis of selected processes according to preset conditions. Each student is required to do the entire exercises planned program. On completion of all exercises the final written exam is obligated.</td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.6</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>0.5</td><td>Report</td><td>0.4</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Successful completion of laboratory works has share 60% and the final written exam 40% score. Exam passing score is 60%. Grades: 60% - 70% - satisfactory, 71% -81% - good, 82% -92% very good, and 93% -100% - excellent.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">J. Zelić, Practicum in the Processes of Inorganic Industry /Praktikum iz procesa anorganske industrije (in Croatian), Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials), http:// www.ktf-split.hr/bib/nm/Procesi _anorganske_ industrije.pdf</td><td>1</td><td colspan="2">www.ktf-split.hr</td></tr>
<tr><td colspan="3">I. Klarić, A Practical Course in Polymerisation/ Vježbe iz polimerizacije (printed course materials), Faculty of Technology in Split, Split, 1990.</td><td>10</td><td colspan="2"></td></tr>
<tr><td colspan="3">I. Klarić, A Practical Course in the Processes of Organic Industry /Vježbe iz tehnoloških procesa</td><td></td><td colspan="2"></td></tr>
</table>

	organske industrije (printed course materials), Faculty of Technology in Split, Split, 1990.	10	
Optional literature (at the time of submission of study programme proposal)	1. R. Krstulović, Technological Processes of Inorganic Industry/Tehnološki procesi anorganske industrije, (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 1986.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) Faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

Basic Biotechnology

NAME OF THE COURSE	**Basic Biotechnology**					
Code	KTJ315	Year of study	3rd			
Course teacher	PhD, Branka Andričić, prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	0
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Gaining of basic theoretical knowledge in biotechnology as well as the role and application of microorganisms and enzymes in different areas.					
Course enrolment requirements and entry competences required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- definition of term biotechnology - differentiate the primary and secondary cell metabolism and its application in biotechnology - explain of microbe cell growth diagram - explain the advantages of isolated enzymes in biotechnology - describe of basic bioreactor design - describe the basic methods of intracellular products isolation - outline some examples of biotechnological processes					
Course content broken down in detail by weekly class schedule (syllabus)	1st week: Description and overview of the course. Definitions of biotechnology, interdisciplinary of the field, history development, application areas. 2nd week: Perception of biotechnology in society. Metabolism and control of metabolic processes; primary and secondary metabolism, substrates. 3rd week: Anaerobic and aerobic metabolism. Microorganisms in biotechnology (bacterial, fungi (yeasts and moulds). Microbial growth kinetics. Determination of					

<table>
<tr><td></td><td colspan="6">specific growth rate and Monod constant.
4th week: Enzyme technology (enzyme characteristics as the biocatalysts, advantages and disadvantages compared to whole cells). Enzyme kinetics.
5th week: Enzyme sources. Selection, production and immobilization of enzymes.
6th week: Biocatalysts in non-conventional processes. Bioreactors, photo-bioreactors, design.
7th week: Oxygen transfer and oxygen concentration determination. Heat transfer in bioreactor. An overview of the previous lecture for the test.
First test.
8th week: Extracellular, periplasmic and extracellular products of metabolism. Down-stream processing: separation solid-liquid, isolation of intracellular products.
9th week: Concentration and purification of products from bioreactor. Purification process control.
10th week: Process economy: cost estimation and an example of process design. An overview of biotechnological processes – basic scheme of biotechnological process.
11th week: Alcohol fermentation and its application in industry.
12th week: Lactic acid fermentation and its application in industry. Anaerobic biomass fermentation.
13th week: Biotechnology in pharmacy. Bacterial polymers.
14th week: Biotechnology in environmental protection and waste water treatment. Biosensors.
15th week: An overview of the previous lecture for the test. Second test.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
x seminars and workshops
☐exercises
☐on line in entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
X multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Screening student work(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.6</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0.8</td><td>Oral exam</td><td>0.8</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.8</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The complete exam can be passed through two tests during semester. The passing score is 60 % and the fraction of each test is 45%. Attendance on lectures (80-100%) and seminar report make 10% of final grade. In the exam period the student has to attend to written and oral exam (passing score is 60%). Previous activity (one passed test) is valid in summer exam period with fraction of 10%. Written exam is 40% and oral exam is 50%. Students without any successful previous activity attend to written and oral exam (passing score is 60%) both with fraction of 50%.
Grades: successful (60% – 70%), good (71% – 80%), very good (81% – 90%), excellent (91% – 100%).</td></tr>
<tr><td>Required literature (available in the</td><td colspan="4">Title</td><td>Number of copies in</td><td>Availability via other media</td></tr>
</table>

library and via other media)		**the library**	
	1. C. Ratlege, B. Kristiansen, Eds. Basic Biotechnology, Cambridge University Press, Cambridge, 2006.	1	
Optional literature (at the time of submission of study programme proposal)	J.E. Smith, Biotechnology, Cambridge University Press, Cambridge, 2000.		
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.		
Other (as the proposer wishes to add)			

3. STUDY PERFORMANCE CONDITIONS

3.1. Places of the study performance

Buildings of the constituent part (name existing, under construction and planned buildings)	
Identification of building	Three faculties building
Location of building	Ruđera Boškovića 35
Year of completion	2015.
Total square area in m^2	29500
Identification of building	Kaštel Sućurac building, z.k. 1053/1 i 1053/7
Location of building	Braće Radić 1, Kaštel Sućurac
Year of completion	1950.
Total square area in m^2	1542

3.2. List of teachers and associate teachers

Course	Teachers and associate teachers
Analysis and Optimization of Water Use	PhD, Marina Trgo, prof. PhD, Ivona Nuić, assistant
Analytical Chemistry	PhD, Ante Prkić, assistant prof.
Analytical Environmental Chemistry	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Basic Biotechnology	PhD, Branka Andričić, prof.
Catalysis	PhD, Branka Andričić, prof. PhD, Matko Erceg, associate prof.
Chemistry and Air Protection	PhD, Marina Trgo, prof., PhD, Marija Bralić, associate prof. PhD, Marin Ugrina, assistant, PhD, Maša Buljac, assistant prof., Nenad Periš, assistant
Chemistry and Marine Protection	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Computer Application	PhD, Dražan Jozić, associate prof.
Construction Materials	PhD, Maja Kliškić, prof.
Construction Materials and Protection	PhD, Maja Kliškić, prof.
Disposal of Hazardous Waste	PhD, Damir Barbir, assistant prof.
Electrochemistry	PhD, Senka Gudić, prof.
Electrodeposition	PhD, Ladislav Vrsalović, associate prof.
Environmental Menagment Systems	PhD, Marijo Buzuk, assistant prof. PhD, Maša Buljac, assistant prof.
Exercises in Analytical Chemistry	PhD, Ante Prkić, assistant prof.
Exercises in Analytical Environmental Chemistry	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Exercises in Chemistry and Air Protection	PhD, Marina Trgo, prof., PhD, Marija Bralić, associate prof. PhD, Marin Ugrina, assistant, PhD, Maša Buljac, assistant prof., Nenad Periš, assistant
Exercises in Chemistry and Marine Protection	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Exercises in Construction Materials	PhD, Ladislav Vrsalović, associate prof.

Exercises in Construction Materials and Protection	PhD, Ladislav Vrsalović, associate prof.
Exercises in Disposal of Hazardous Waste	PhD, Damir Barbir, assistant prof.
Exercises in Electrochemistry	PhD, Ivana Smoljko, assistant prof.
Exercises in Electrodeposition	PhD, Ladislav Vrsalović, associate prof.
Exercises in General Chemistry	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
Exercises in General Microbiology	PhD, Mirjana Skočibušić, associate prof. PhD, Ana Maravić, assistant prof.
Exercises in Industry and the Environment	PhD, Marina Trgo, prof. Ph.D, Ivona Nuić, assistant
Exercises in Inorganic Chemistry	PhD, Zoran Grubač, prof., PhD, Slobodan Brinić, associate prof.
Exercises in Inorganic Materials	PhD, Jelica Zelić, prof. PhD, Mario Nikola Mužek, assistant
Exercises in Mathematical Tools	PhD, Davor Rušić, prof.
Exercises in Measurement and Process Control	Renato Stipišić, senior lecturer
Exercises in Mineral Raw Materials from Seawater	PhD, Miroslav Labor, associate prof.
Exercises in Organic Chemistry	PhD, Ivica Blažević, associate prof.
Exercises in Physical chemistry	PhD, Vesna Sokol, associate prof.
Exercises in Polymeric Materials	PhD, Sanja Perinović Jozić, assistant prof.
Exercises in Polymers and the Environment	PhD, Sanja Perinović Jozić, assistant prof.
Exercises in Preaparation of Technological Waters	PhD, Pero Dabić, prof. PhD, Damir Barbir, assistant prof.
Exercises in Process of Precipitation and Crystallization	PhD, Dražan Jozić, associate prof.
Exercises in Processing of Plastics and Rubber	PhD, Matko Erceg, associate prof.
Exercises in Pysics I	PhD, Magdy Lučić Lavčević, associate prof.
Exercises in Pysics II	PhD, Magdy Lučić Lavčević, associate prof. PhD, Mirko Marušić, senior lecturer, Lucija Matković, assistant
Exercises in Reaction Engineering	PhD, Sandra Svilović, associate prof.
Exercises in Renewable Energy Sources	PhD, Ivana Smoljko, assistant prof.
Exercises in Safety at Work	PhD, Pero Dabić, prof.
Exercises in Selected Processes of Chemical Industry	PhD, Jelica Zelić, prof. PhD, Miće Jakić, assistant
Exercises in Technological processes in organic industry	PhD, Nataša Stipanelov Vrandečić, prof.
Exercises in Technological Processes of Inorganic Industry	PhD, Pero Dabić, prof. PhD, Damir Barbir, assistant prof.
Exercises in Transport Phenomena	PhD, Nenad Kuzmanić, prof. Antonija Kaćunić, assistant
Exercises in Unit Operations	PhD, Marija Ćosić, assistant prof. Renato Stipišić, senior lecturer, Antonija Kaćunić, assistant
Exercises in Unit Operations in Environmental Engineering	PhD, Marija Ćosić, assistant prof.; Renato Stipišić, senior lecturer, Antonija Kaćunić, assistant
Exercises in Waste Management	PhD, Ladislav Vrsalović, associate prof.
Exercises in Wastewaters Treatment	PhD, Nediljka Vukojević Medvidović, associate prof. PhD, Ivona Nuić, assistant
Exercises of Analysis and Optimization	PhD, Marina Trgo, prof.

of Water Use	PhD, Ivona Nuić, assistant
Fundamentals of Mechanical Engineering	PhD, Zeljko Domazet, prof. PhD, Lovre Krstulović-Opara, prof.
General Biology	PhD, Nada Bezić, prof. PhD, Valerija Dunkić, associate prof.
General Chemistry	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
General Microbiology	PhD, Mirjana Skočibušić, associate prof.
Industry and the Environment	PhD, Marina Trgo, prof.
Inorganic chemistry	PhD, Zoran Grubač, prof., PhD, Slobodan Brinić, associate prof.
Inorganic Materials	PhD, Jelica Zelić, prof.
Mass and Energy Balances	PhD, Marija Ćosić, assistant prof. PhD, Nenad Kuzmanić, prof.
Matematics I	Branka Gotovac, lecturer Lucija Ružman, assistant
Mathematical Tools	PhD, Davor Rušić, prof.
Mathematics II	Branka Gotovac, lecturer Lucija Ružman, assistant
Measurement and Process Control	PhD, Jadranka Marasović, prof.
Mineral Raw Materials from Seawater	PhD, Vanja Martinac, prof.
Organic Chemistry	PhD, Ivica Blažević, associate prof.
Physical Chemistry	PhD, Vesna Sokol, associate prof.
Physics I	PhD, Magdy Lučić Lavčević, associate prof. Lucija Matković, assistant
Physics II	PhD, Magdy Lučić Lavčević, associate prof. Lucija Matković, assistant
Polymeric Materials	PhD, Branka Andričić, prof.
Polymers and the Environment	PhD, Branka Andričić, prof.
Preaparation of Technological Waters	PhD, Pero Dabić, prof. PhD, Damir Barbir, assistant prof.
Process of Precipitation and Crystallization	PhD, Dražan Jozić, associate prof.
Processing of Plastics and Rubber	PhD, Matko Erceg, associate prof.
Reaction Engineering	PhD, Davor Rušić, prof. PhD, Sandra Svilović, associate prof.
Renewable Energy Sources	PhD, Senka Gudić, prof.
Safety at Work	PhD, Pero Dabić, prof.
Selected Processes of Chemical Industry	PhD, Jelica Zelić, prof. PhD, Miće Jakić, assistant, PhD, Mario Nikola Mužek, assistant
Sustainable Development in Coastal Area	PhD, Nediljka Vukojević Medvidović, associate prof.
Technological Processes in Organic Industry	PhD, Nataša Stipanelov Vrandečić, prof.
Technological Processes of Inorganic Industry	PhD, Pero Dabić, prof.
Thermodynamics	PhD, Vanja Martinac, prof. PhD, Miroslav Labor, associate prof., PhD, Jelena Jakić, assistant
Transport Phenomena	PhD, Nenad Kuzmanić, prof. Renato Stipišić, senior lecturer, Antonija Kaćunić, assistant
Unit Operations	PhD, Marija Ćosić, assistant prof. Renato Stipišić, senior lecturer, Antonija Kaćunić, assistant
Unit Operations in Environmental Engineering	PhD, Marija Ćosić, assistant prof. Renato Stipišić, senior lecturer, Antonija Kaćunić, assistant

Waste management	PhD, Ladislav Vrsalović, associate prof.
Wastewaters Treatment	PhD, Nediljka Vukojević Medvidović, associate prof.
Water Protection	PhD, Nediljka Vukojević Medvidović, associate prof.

3.3. Curriculum vitae of the course teacher

First and last name and title of teacher	**PhD, Branka Andričić, prof.**
The course he/she teaches in the proposed study programme	Catalysis Polymers and the Environment Polymeric Materials Basic Biotechnology
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	++385 21 329 469
E-mail address	branka@ktf-split.hr
Personal web page	
Year of birth	1965
Scientist ID	188492
Research or art rank, and date of last rank appointment	Scientific advisor- November 14th, 2008
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor, - December 23rd, 2010
Area and field of election into research or art rank	Technical Sciences, Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	February 19th, 1991
Name of position (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Chemical Engineering in Materials Development
Function	Head of Department of Organic Technology
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	December 19th, 2001
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (2)
Foreign language and command of	

foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Polymeric Materials – undergraduate study of Chemical Technology and Vocational study of Chemical Technology 2. Naturally Occuring Polymeric Materials - graduate study of Chemical Technology and graduate study of Chemistry 3. Composite Polymeric Materials – graduate study of Chemical Technology 4. Polymeric Materials and the Environment- phD study Chemical Engineering in materials development and Environmental Protection 5. Biotechnological Processes - graduate study of Chemical Technology
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. I. Banovac, M. Erceg, **B. Andričić,** Usporedba utjecaja litijevog i natrijevog montmorilonita na kristalnost i toplinska svojstva poli(etilen glikola), *MATRIB 2013, International Conference on Materials, Tribology, Recycling, 27-29 June 2013, Vela Luka, p. 17-28.* 2. I. Banovac, M. Erceg, B. Andričić, M. Kursan, An investigation of the effect of lithium montmorillonite on the structure and thermal properties of poly(ethylene oxide), *13th Ružička days, Vukovar, september, 13-15, 2012, p. 100-107* 3. S. Perinović, B. Andričić, Influence of different processing techniques on the thermal properties of poly(L-lactide)olive stone flour composites, *15th European Conference on Composite Materials, Venice, 24-28 June 2012, p. 1-8* 4. S. Perinović, **B. Andričić**, Modifikacija svojstava poli(l-laktida), *Polimeri,* 33(2012) 3-4, 100-105
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Polymer Blends with Biodegradable Components (011-1252971-2249)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS	

Prizes and awards for teaching and scholarly/artistic work	

First and last name and title of teacher	**Ph. D. Damir Barbir, Assistant prof.**
The course he/she teaches in the proposed study programme	Disposal of hazardous waste Exercises in Disposal of Hazardous Waste
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 460
E-mail address	dbarbir@ktf-split.hr
Personal web page	-
Year of birth	1983
Scientist ID	307703
Research or art rank, and date of last rank appointment	Research associate (06 March 2014)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor (06 July 2015)
Area and field of election into research or art rank	Scientific area of technical sciences, scientific filed chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	01 February 2008
Name of position (professor, researcher, associate teacher, etc.)	assistant professor
Field of research	inorganic binders, stabilization/solidification processes of hazardous waste
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. (chemical engineering)
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	03 July 2013
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	-

where it is/was offered, and level of study programme)	
Authorship of university/faculty textbooks in the field of the course	-
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	• D. Barbir, P. Dabić, A. Lisica, Assessment of the leachability and mechanical stability of mud from a zinc-plating plant and waste zeolite binding with portland cement, International journal of research in engineering and technology 3, Special Issue 13 (2014) 37-42 • D. Barbir, P. Dabić, P. Krolo, Hydration Study of Ordinary Portland Cement in the Presence of Lead(II) Oxide, Chemical and Biochemical Engineering Quarterly 27 (2013) 95-99. • D. Barbir**,** P. Dabić, P. Krolo, Stabilization of chromium salt in ordinary portland cement, Sadhana – Academy Proceedings in Engineering Sciences 37 (2012) 731**-**737. • D. Barbir, P. Dabić, P. Krolo, Evaluation of leaching behavior and immobilization of zinc in cement-based solidified products, Hemijska Industrija, 66 (5)(2012) 781-786.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Associate at research project “Cementni kompoziti i stabilizacija štetnih otpada” (Nbr. 011-1252970-2254) in the period 2008. – 2013., which is funded by the Ministry of Science, Education and Sports of the Republic Croatian.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Successfully passed and completed the seminar: Develop and enhance pedagogical competencies at Faculty of Philosophy in Split
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Nada Bezić, prof.**
The course he/she teaches in the proposed study programme	General Bology
GENERAL INFORMATION ON COURSE TEACHER	
Address	Rendićeva 17. Split
Telephone number	+385(0)384-861
E-mail address	bezic@pmfst.hr

Personal web page	http://www.pmfst.hr
Year of birth	1953
Scientist ID	105170
Research or art rank, and date of last rank appointment	Scientific Advisor, 22. 05. 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Professor, 28. 06. 2013.
Area and field of election into research or art rank	Natural Science, Biology
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Natural Science, Split
Date of employment	1981.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Botany- secondary metabolites, plant viruses
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Natural Science, University of Zagreb
Place	Zagreb
Date	1991.
INFORMATION ON ADDITIONAL TRAINING	
Year	1997. i 1998 godine.
Place	Glasgow UK (Scotland) i Prag (Republka Češka)
Institution	University of Glasgow, Division of Enviromental and Evolutionary Biology i Charles University, Department of Plant Physiology
Field of training	Plant anatomy
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 4/5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Cell biolgy, General Botany, Botany, Flavour and Aromatic Plants, Virology Biology and chemistry and Nutrition on Faculty of Natural Science, University of Split
Authorship of university/faculty textbooks in the field of the course	Lectures of cours Cell biolgy and General Botany on websites of Faculty of Natural Sciences University of Split
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Kremer, Dario; Dragojević, Müller Ivna; Edith, Stabentheiner; Vitali, Dubravka; Kopričanec, Martina; Ruščić, Mirko; Kosalec, Ivan; **Bezić, Nada**; Dunkić, Valerija: Phytochemical and micromorphological traits of endemic *Micromeria pseudocroatica* Šilić (Lamiaceae). Natural Product Communications. **7.**

	2012. 166**7-**1670. 2. Dunkić, Valerija; Kremer, Dario; Dragojević Müler, Ivna; Stabentheiner, Edith; Kuzmić, Sunčica; Jurišić Grubešić, Renata; Vujić, Lovorka; Kosalec, Ivan; Randić, Marko; Srečec, Siniša; **Bezić, Nada**. Chemotaxonomic and micromorphological traits of Satureja montana L. and S. subspicata Vis. (Lamiaceae). Chemistry & biodiversity. 9. 2012. 2825 – 2842. 3. Dario, Kremer; Ivna, Dragojević, Müller; Valerija, Dunkić; Dubravka, Vitali; Edith, Stabentheiner; Andreas, Oberländer; **Nada, Bezić**; Ivan, Kosalec. Chemical traits and antimicrobial activity of endemic Teucrium arduini L. from Mt Biokovo (Croatia). Central European Journal of Biology. 7**.** 2012. 941**-**947. 4. **Bezić, Nada;** Elma, Vuko; Valerija, Dunkić; Mirko, Ruščić; Ivica, Blažević; Franko, Burčul. Antiphytoviral Activity of Sesquiterpene-Rich Essential Oils from Four Croatian *Teucrium* Species. Molecules 16. 2011. 8119-8129. 5. **Bezić, Nada**; Šamanić, Ivica; Dunkić, Valerija; Besendorfer, Višnja; Puizina, Jasna. Essential Oil Composition and Internal Transcribed Spacer (ITS) Sequence Variability of Four South-Croatian *Satureja* Species (Lamiaceae). Molecules 14. 2009. 925-938.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific Project MSES Republic of Croatia Xerophytes and their Secondary Metabolites (177-1191192-0830) 1. Kremer, Dario; Dragojević, Müller Ivna; Edith, Stabentheiner; Vitali, Dubravka; Kopričanec, Martina; Ruščić, Mirko; Kosalec, Ivan; **Bezić, Nada**; Dunkić, Valerija: Phytochemical and micromorphological traits of endemic *Micromeria pseudocroatica* Šilić (Lamiaceae). Natural Product Communications. **7.** 2012. 166**7-**1670. 2. Dunkić, Valerija; Kremer, Dario; Dragojević Müler, Ivna; Stabentheiner, Edith; Kuzmić, Sunčica; Jurišić Grubešić, Renata; Vujić, Lovorka; Kosalec, Ivan; Randić, Marko; Srečec, Siniša; **Bezić, Nada**. Chemotaxonomic and micromorphological traits of Satureja montana L. and S. subspicata Vis. (Lamiaceae). Chemistry & biodiversity. 9. 2012. 2825 – 2842. 3. Dario, Kremer; Ivna, Dragojević, Müller; Valerija, Dunkić; Dubravka, Vitali; Edith, Stabentheiner; Andreas, Oberländer; **Nada, Bezić**; Ivan, Kosalec. Chemical traits and antimicrobial activity of endemic Teucrium arduini L. from Mt Biokovo (Croatia). Central European Journal of Biology. 7**.** 2012. 941**-**947.

	4. **Nada, Bezić;** Elma, Vuko; Valerija, Dunkić; Mirko, Ruščić; Ivica, Blažević; Franko, Burčul. Antiphytoviral Activity of Sesquiterpene-Rich Essential Oils from Four Croatian *Teucrium* Species. Molecules 16. 2011. 8119-8129. 5. **Bezić, Nada**; Šamanić, Ivica; Dunkić, Valerija; Besendorfer, Višnja; Puizina, Jasna. Essential Oil Composition and Internal Transcribed Spacer (ITS) Sequence Variability of Four South-Croatian *Satureja* Species (Lamiaceae). Molecules 14. 2009. 925-938
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Ivica Blažević, assistant prof.**
The course he/she teaches in the proposed study programme	Organic chemistry Exercises in Organic Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split, Croatia
Telephone number	00 385 (0) 21 329 434
E-mail address	blazevic@ktf-split.hr
Personal web page	http://ivicablazevic3.wix.com/blazevic
Year of birth	1974
Scientist ID	267194
Research or art rank, and date of last rank appointment	Senior Research Associate, 17. June 2015.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 28. November 2012.
Area and field of election into research or art rank	Natural sciences, chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1. December 2003.
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor

Field of research	Organic chemistry
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	University of Zagreb, Faculty of Sciences
Place	Zagreb
Date	23. October, 2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Fundamentalys of organic chemistry - professional study of chemical technology Organic chemistry - undergraduate study of chemistry
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	**Blažević, Ivica;** Montaut, Sabine; Rosalinda De Nicola, Gina; Rollin, Patrick. Long-chain Glucosinolates from *Arabis turrita*: Enzymatic and Non-enzymatic Degradations. // Natural product communications. 10 (2015) , 6; 1043-1046. **Blažević, Ivica;** Maleš, Tomislav; Ruščić, Mirko. Glucosinolates of *Lunaria annua*: Thermal, enzymatic, and chemical degradation. // Chemistry of natural compounds. 49 (2014) , 6; 1154-1157. **Blažević, Ivica;** Burčul, Franko; Ruščić, Mirko; Mastelić, Josip. Glucosinolates, volatile constituents, and acetylcholinesterase inhibitory activity of *Alyssoides utriculata*. // Chemistry of natural compounds. 49 (2013) , 2; 374-378. **Blažević, Ivica;** Rosalinda De Nicola, Gina; Montaut, Sabine; Rollin, Patrick. Glucosinolates in Two Endemic Plants of the *Aurinia* Genus and their Chemotaxonomic Significance. // Natural product communications. 8 (2013) , 10; 1463-1466. **Blažević, Ivica;** Radonić, Ani; Skočibušić, Mirjana; De Nicola, Gina R.; Montaut, Sabine; Iori, Renato; Rollin, Patrick; Mastelić, Josip; Zekić, Marina; and Maravić, Ana. Glucosinolate Profiling and Antimicrobial Screening of *Aurinia leucadea* (Brassicaceae). // Chemistry & biodiversity. 8 (2011) , 12; 2310-

	2321.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Project leader (2013. – 2014). Bilateral Croatian-French project COGITO “Glucosinolates: novel sources and biological potential” Member of the project (2007. - 2013) Project 011-0982929-1329: "Essential oils and aromas – biologically active compounds and their modifications" under Ministry of Science, Education and Sports, in the frame of programm "Spectroscopy and modeling of bioactive molecules"
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	average grade 4.8 – 5.0

First and last name and title of teacher	**Marija Bralić, associate prof.**
The course he/she teaches in the proposed study programme	Analytical Environmental Chemistry Exercises in Analytical Environmental Chemistry Chemistry and marine protection Exercises in Chemistry and marine protection Chemistry and air protection Exercises in Chemistry and air protection
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđer Bošković 35, 21000 Split, Croatia
Telephone number	00 385 (0) 21 329 477
E-mail address	bralic@ktf-split.hr
Personal web page	
Year of birth	1956.
Scientist ID	119816
Research or art rank, and date of last rank appointment	Senior Research Associate, 05. October 2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 28. December 2012.
Area and field of election into research or art rank	Natural sciences, chemistry
INFORMATION ON CURRENT EMPLOYMENT	

Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	01. December 1982.
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Environmental analyticl chemistry
Function	Head of department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	18. July 1997.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Environmental chemistry (PS) Atmospheric chemistry (GS) Marine chemistry (GS)
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	**Bralić, Marija**; Buzuk, Marijo; Buljac, Maša; Brinić, Slobodan. Potentiometric Studies on Chemically and Electrochemically Prepared Sulfide Active Materials for Determination of Copper(II), *International Journal of Electrochemical Science* **9** (2014); 4854-4865 Buljac,Maša; Bogner, Danijela; **Bralić, Marija**; Periš, Nenad; Buzuk, Marijo; Brinić, Slobodan; Vladislavić, Nives. Cadmium and Lead Distribution in Marine Soil Sediments, Terrestial Soil, Terrestial Rock, and Atmospheric Particulate Matter around Split, Croatia, *Amalytical Letters* **47** (2014), 11; 1952-1964 **Bralić, Marija**; Buljac, Maša; Buzuk, Marijo; Brinić, Slobodan. Interference Effect of Various Ions on Determination of Iron with Flow Injection Analysis using the Potentiometric Technique, *International Journal of Electrochemical Science* **7** (2012); 4; 2928-2937 Brinić, Slobodan; Buzuk, Marijo; **Bralić, Marija**; Buljac, Maša; Jozić, Dražan. Cu(II) Ion – Selective Electrode Based on Mixed Silver – Copper Sulfide: Phase Structure and Electrochemical Properties, *International Journal of Electrochemical Science* **7** (2012); 6; 5217-5230 Brinić, Slobodan; Buzuk, Marijo; **Bralić, Marija**; Generalić, Eni.

	Solid-contact Cu(II) ion-selective electrode based on 1,2 di (o-salicylaldiminophenylthio)ethane, *Journal of solid state electrochemistry* **16** (2012); 4; 1333-1341
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Slobodan Brinić, associate prof.**
The course he/she teaches in the proposed study programme	General Chemistry Exercises in General Chemistry Inorganic Chemistry Exercises in Inorganic Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V, 21 000 Split
Telephone number	021 329 475
E-mail address	brinic@ktf-split.hr
Personal web page	Ruđera Boškovića 33, 21000 Split
Year of birth	1956.
Scientist ID	181051
Research or art rank, and date of last rank appointment	research scientist (5.10.2012.)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	associate professor (28.11. 2012.)
Area and field of election into research or art rank	Sciences, Chemistry,
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of chemistry end technology
Date of employment	14.8.1990.

Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	electrochemistry
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Chemical Engineering and Technology
Place	Zagreb
Date	19. 7. 1996.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Solid State Chemistry, graduate study of chemistry General Chemistry, undergraduate study of chemistry Inorganic Chemistry, undergraduate study of chemistry
Authorship of university/faculty textbooks in the field of the course	Lectures for courses "General Chemistry" and „Inorganic Chemistry“
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Buzuk, Marijo; Brinic, Slobodan; Vladislavic, Nives; et al. Real-time monitoring of "self-oxidation" of cysteine in presence of Cu2+: novel findings in the oxidation mechanism, Monatshefte fur Chemie, 147 (2016) 359 2. Bralić, Marija; Buzuk, Marijo; Buljac, Maša; Brinić, Slobodan, Potentiometric Studies on Chemically and Electrochemically Prepared Sulfide Active Materials for Determination of Copper(II), International Journal of Electrochemical Science. 9 (2014) 4854 3. S. Brinić, N. Vladislavić, M. Buzuk, M. Bralić, M. Šolić, Bismuth film random array carbon fiber micro electrodes for determination of cysteine and N-acetyl cysteine, Journal of Electroanalytical Chemistry, 705 (2013) 86 4. S. Brinić, M. Bralić, M. Buzuk, M. Bralić, M. Buljac, D. Jozić, Cu (II) Ion-Selective Electrode Based on Mixed Silver-Copper Sulfide: Phase Structure and Electrochemical Properties, International Journal of Electrochemical Science, 7 (6) (2012) 5217 5. S. Brinic, M. Buzuk, M. Bralić, E. Generalić, Solid-contact Cu(II) ion-selective electrode based on 1,2-di-(o-salicyladiminophenylthio)ethane, Journal of Solid State Electrochemistry, 16 (4) (2012), 1333

Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	DIATUS-Split award for the best inovation, 1987.

First and last name and title of teacher	**PhD, Marijo Buzuk, assistant prof.**
The course he/she teaches in the proposed study programme	Environmental Menagment system
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21 000 Split
Telephone number	021 329 474
E-mail address	buzuk@ktf-split.hr
Personal web page	-
Year of birth	1978.
Scientist ID	267150
Research or art rank, and date of last rank appointment	Research Associate; 17. july 2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	assistant professor, 28. november 2012.
Area and field of election into research or art rank	Natural science; Chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemsitry and Technology, University of Split, Croatia
Date of employment	1. september 2004.
Name of position (professor, researcher, associate teacher, etc.)	assistant professor
Field of research	Analytical and Bioanalytical Chemistry, Electrochemistry, Environmental Chemistry
Function	Head of Department of General and Inogranic Chemistry
INFORMATION ON EDUCATION – Highest degree earned	

Degree	PhD
Institution	Faculty of Chemical Engineering and Chemistry
Place	Zagreb, Croatia
Date	3. september 2010.
INFORMATION ON ADDITIONAL TRAINING	
Year	2008.-2009.
Place	Graz, Austria
Institution	Institute for Analytical Chemsitry
Field of training	Analytical and Bioanalytical Chemistry
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Courses: 1. General chemistry 2. General chemistry with stoichiometry 3. General and Inorganic chemistry 4. Inorganic Chemistry 5. Water Chemistry 6. Environmental Menagment system
Authorship of university/faculty textbooks in the field of the course	-
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Buzuk, Marijo; Brinić Slobodan; Vladislavić Nives; Bralić, Marija; Buljac Masa; Škugor Rončević, Ivana. Real-time monitoring of “self-oxidation” of cysteine in presence of Cu2+: Novel findings in the oxidation mechanism. // *Monatshefte fur Chemie - Chemical Monthly*. 147 (2016); 359-367 2. Bralić, Marija; Buzuk, Marijo; Buljac, Maša; Brinić, Slobodan. Potentiometric Studies on Chemically and Electrochemically Prepared Sulfide Active Materials for Determination of Copper(II). // *International Journal of Electrochemical Science*. 9 (2014); 4854-4865 3. Brinić, Slobodan; Vladislavić, Nives; Buzuk, Marijo; Bralić, Marija; Šolić, Mislav. Bismuth film random array carbon fiber micro electrodes for determination of cysteine and N-acetyl cysteine. // *Journal of electroanalytical chemistry*. 705 (2013); 86-90 4. Brinić, Slobodan; Buzuk, Marijo; Bralić, Marija; Generalić, Eni. Solid-contact Cu(II) ion-selective electrode based on 1,

	2 di (o salicylaldiminophenylthio)ethane. // *Journal of solid state electrochemistry*. 16 (2012); 1333-1341 5. Bralić, Marija; Buljac, Maša; Buzuk, Marijo; Brinić, Slobodan. Interference Effect of Various Ions on Determination of Iron with Flow Injection Analysis Using the Potentiometric Technique. // *International Journal of Electrochemical Science*. 7 (2012); 2928-2937
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Marija Ćosić, assistant prof.**
The course he/she teaches in the proposed study programme	Mass and Energy Balances Unit Operations Exercises in Unit Operations Unit Operations in Environmental Engineering Exercises in Unit Operations in Environmental Engineering
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	021/329-453
E-mail address	akrap@ktf-split.hr
Personal web page	
Year of birth	1977
Scientist ID	267161
Research or art rank, and date of last rank appointment	Scientific associate – December 7th, 2010

Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor – March 31st, 2011
Area and field of election into research or art rank	Technical sciences, chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Chemistry and Technology
Date of employment	September 1st, 2004
Name of position (professor, researcher, associate teacher, etc.)	assistant professor
Field of research	Mechanical, thermal and separation processes
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	July 24th, 2010
INFORMATION ON ADDITIONAL TRAINING	
Year	2010.
Place	Zagreb
Institution	Faculty of the Chemical Engineering and Technology
Field of training	Processes of seeded crystallization
Year	2005.
Place	Rome
Institution	L'Universita degli Studi di Roma ˝La Sapienza˝
Field of training	Batch cooling crystallization processes
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 4
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Unit Operations - undergraduate study of Chemical Technology Material and Energy Balances- undergraduate study of Chemical Technology
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	A. Kaćunić, **M. Ćosić**, N. Kuzmanić, Impact of mixing parameters on homogenization of borax solution and nucleation rate in dual radial impeller crystallizer, *International journal of chemical, molecular, nuclear, materials and metallurgical engineering,* 10 (2016) 1; 75-80. A. Kaćunić, **M. Akrap**, N. Kuzmanić, Effect of impeller position in a batch cooling crystallizer on the growth of borax decahydrate crystals, *Chemical engineering research & design*. 91, 2; (2013), 274-285. **M. Akrap**, N. Kuzmanić, J. Prlić Kardum, Impeller geometry effect on crystallization kinetics of borax decahydrate in a batch cooling crystallizer, *Chemical engineering research & design*. 90, 6; (2012), 793-802 **M. Akrap**, N. Kuzmanić, J. Prlić Kardum, Effect of mixing on the crystal size distribution of borax decahydrate in a batch cooling crystallizer, *Journal of crystal growth*, 312, 24 (2010); 3603-

	3608. **M. Akrap**, D. Bralić, N. Kuzmanić, In-line bulk concentration measurement in batch cooling crystallization of borax decahydrate, *Proceedings of the 13th Ružićka Days ˝ Today science - tomorrow industry˝*, Osijek, 2011, 115-125
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific project 011-0112247-2241: Optimization of mixing and transport phenomena in solid-liquid agitated systems Scientific project - Impact of processing conditions on kinetics of heterogeneous systems in agitated batch reactors, HRZZ-8959 (2014.-2018.)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Evaluation organizer: University of Split Courses: Unit operations: Av. Grade:>4.0 Material and energy balances: Av. Grade:>4.0 Mechanical and heat transfer operations: Av. Grade:>4.5

First and last name and title of teacher	**PhD, Pero Dabić, prof.**
The course he/she teaches in the proposed study programme	Safety at work Exercises in Safety at work Preaparation of Technological Waters Exercises in Preaparation of Technological Waters Technological Processes of Inorganic Industry Exercises in Technological Processes of Inorganic Industry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 470
E-mail address	dabic@ktf-split.hr
Personal web page	-
Year of birth	1962.
Scientist ID	181084
Research or art rank, and date of last rank appointment	Scientific adviser (26 September 2013)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor (First choice, 21 May 2015)
Area and field of election into	scientific area of technical sciences, scientific filed chemical

research or art rank	engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	19 March 1990
Name of position (professor, researcher, associate teacher, etc.)	full professor
Field of research	inorganic technology
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. (chemical engineering)
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	03 April 2004
INFORMATION ON ADDITIONAL TRAINING	
Year	1991 (Training for thermal analysis); 2007 (The 1st Croatian Synchrotron Radiation Summer School)
Place	Rapperswil, Swiss ; Rijeka-Trst, Croatia-Italy
Institution	Laboratory Perkin-Elmer ; Electra-Trst
Field of training	Thermal analysis; Synchrotron Radiation- nanostructured materials
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	- Toxicology and protection for restoration, Arts Academy Split, Integrated University Study of Conservation - Restoration - Safety in laboratory - Integrated undergraduate and graduate study of Pharmacy-Split, - Technological processes of inorganic industry (undergraduate study Chemical engineering)
Authorship of university/faculty textbooks in the field of the course	-
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	• D. Barbir, P. Dabić, A. Lisica, Assessment of the leachability and mechanical stability of mud from a zinc-plating plant and waste zeolite binding with portland cement, International journal of research in engineering and technology. 3 (2014), Special Issue 13; 37-42. • D. Barbir, P. Dabić, P. Krolo, Hydration Study of Ordinary Portland Cement in the Presence of Lead(II) Oxide, CABEQ, 27 (2013) 95-99. • D. Barbir, P. Dabić, P. Krolo, Stabilization of chromium salt in ordinary portland cement, SADHANA-Academy Proceedings in Engineering Sciences, 37 (2012) 731-737. • D. Barbir, P. Dabić, P. Krolo, Evaluation of leaching

	behavior and immobilization of zinc in cement-based solidified products, Hem. Ind. 66 (2012) 781-786. • N. Ukrainczyk, P. Dabić, T. Matusinović, Calcium aluminate cement hydration model, Kemija u industriji. 60 (2011) 1-10.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	-
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	• Rector's Award for achievement in the study of academic year 1983-84. • Acknowledgement of the Association of Engineers of Split (ZUIS) on the occasion of the 100th anniversary of the outstanding contribution development of technical profession and the economy in general
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Željko Domazet, prof.**
The course he/she teaches in the proposed study programme	Fundamentals of Mechanical Engineering
GENERAL INFORMATION ON COURSE TEACHER	
Address	R. Boškovića 32, 21000 Split, Hrvatska
Telephone number	+385 (21) 305983
E-mail address	domazet@fesb.hr
Personal web page	http://marjan.fesb.hr/~domazet/
Year of birth	-
Scientist ID	95632
Research or art rank, and date of last rank appointment	Scientific adviser
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full professor (March 2005.)
Area and field of election into research or art rank	scientific area of technical sciences, scientific filed mechanical engineering

INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split
Date of employment	
Name of position (professor, researcher, associate teacher, etc.)	full professor
Field of research	Fundaments of mechanical engineering, Fatique strength of materials, Metal structures design
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD.
Institution	Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb
Place	Zagreb
Date	1993.
INFORMATION ON ADDITIONAL TRAINING	
Year	2003.
Place	Southampton, GB
Institution	Wessex Institute of Technology,
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Undergraduate study: Dizajn industrijskih proizvoda, Inženjerska grafika, Metalne konstrukcije Graduate study: Osnove mehaničkih konstrukcija , Pogonska čvrstoća, Razvoj i menadžment prozvodima Proffesional study: Metalne konstrukcije, Računalna i inženjerska grafika, Tehničko crtanje i nacrtna geometrija
Authorship of university/faculty textbooks in the field of the course	1. Krstulović-Opara, Lovre; Domazet, Željko. Dizajn industrijskih proizvoda . Split : FESB Split, 2009. 2. Domazet, Željko; Krstulović-Opara, Lovre. Skripta iz osnova strojarstva . KTF SPLIT : KTF SPLIT, 2006. http://bib.irb.hr/datoteka/761254.osnove_strojarstva.pdf
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	Domazet, Željko; Lukša, Francisko; Bugarin, Miro. Failure of two overhead crane shafts. // Engineering failure analysis. 44 (2014) ; 125-135 Domazet, Željko; Lukša, Francisko; Stanivuk, Tatjana. An optimal design approach for calibrated rolls with respect to fatigue life. // International journal of fatigue. 59 (2014) ; 50-63 Domazet, Željko; Lukša, Francisko; Stanivuk, Tatjana.

	The influence of rolling speed on the fatigue life of rolls with grooves. // International journal of damage mechanics. 23 (2014) , 4; 523-536 Domazet, Željko; Lukša, Francisko; Šušnjar, Marko. Failure analysis of rolling mill stand coupling. // Engineering failure analysis. 46 (2014) ; 208-218 Krstulović-Opara, Lovre; Domazet, Željko; Garafulić, Endri. Detection of osmotic damages in GRP boat hulls. // Infrared physics & technology. 60 (2013.) ; 359-364
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	-
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Matko Erceg, Associate professor**
The course he/she teaches in the proposed study programme	Plastics and Rubber Processing Exercises in Plastics and Rubber Processing
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split, Croatia
Telephone number	++385 21 329 457
E-mail address	merceg@ktf-split.hr
Personal web page	https://www.ktf-split.hr/index.php/obavijesti-2/obavijesti-poslijediplomski-studij/172-djelatnici/cv/174-cv46
Year of birth	1976.
Scientist ID	243566
Research or art rank, and date of last rank appointment	Senior researcher, 26. 9. 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date	Associate professor, 17. 7. 2012.

of last rank appointment	
Area and field of election into research or art rank	Area: Technical Sciences; Field: Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1. 2. 2001.
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Polymer engineering
Function	Associate professor
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Chemistry and Technology
Place	Split
Date	17. 5. 2007.
INFORMATION ON ADDITIONAL TRAINING	
Year	2007.
Place	Lyon, France
Institution	Institut de Recherches sur le Catalyse et l'Environnement de Lyon
Field of training	Thermal analysis methods in chemical engineering
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English; 5 (excellent)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German; 2 (sufficient)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Polymerization Processes, Graduate study Chemical Technology 2. Structure and Properties of Polymers, Graduate study Chemical Technology 3. Polymer Processing, Graduate study Chemical Technology
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. M. Jakić, N. Stipanelov Vrandečić, **M. Erceg**, Kinetic analysis of the non-isothermal degradation of poly(vinyl chloride)/poly(ethylene oxide) blends, Journal of Thermal Analysis and Calorimetry 123 (2016) 1513-1522. 2. **M. Erceg**, D. Jozić, I. Banovac, S. Perinović, S. Bernstorff, Preparation and characterization of melt intercalated poly(ethylene oxide)/lithium montmorillonite, Thermochimica acta 579 (2014) 86-92. 3. **M. Erceg**, D. Jozić, Preparation and characterization of poly(3-hydroxybutyrate)/Cloisite25A nanocomposites, e-polymers 025 (2013) 1-12. 4. **M. Erceg**, T. Kovačić, S. Perinović, Isothermal degradation of poly(3-hydroxybutyrate)/organically modified montmorillonite nanocomposites, Polymer Composites 31 (2010) 272-278.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at	

most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Scientific project 'Polymer blends with biodegradable components' (011-1252971-2249) financed by the Ministry of Science, Education and Sports of Republic of Croatia 2.Scientific project 'Development of biocomposites reinforced with cellulose fibers from domestic resources, (Faculy of textile technology, University of Zagreb) 3. Innovation project: 'Possibility of waste usage in production of bitumen waterproofing ' in cooperation with Hidroizolacija Katra d.o.o. Zagreb, financed by the Croatian Agency for SMEs, Innovation and Investments (HAMAG BICRO)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Evaluation organizer: University of Split Average grade: 1. Polymerization Processes: 4.7 2. Structure and Properties of Polymers: 4.7 3. Polymer Processing: 4.7

First and last name and title of teacher	**Branka Gotovac, lecturer**
The course he/she teaches in the proposed study programme	Mathematics I Mathematics II
GENERAL INFORMATION ON COURSE TEACHER	
Address	Gorička 4, 21 000 Split
Telephone number	360-046
E-mail address	gotovac@ktf-split.hr
Personal web page	
Year of birth	1964.
Scientist ID	
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Lecturer, 23.12.2010.
Area and field of election into research or art rank	
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1.10.1994.
Name of position (professor, researcher, associate teacher, etc.)	Lecturer
Field of research	Mathematics
Function	Head of Mathematics Unit

INFORMATION ON EDUCATION – Highest degree earned	
Degree	Mr. sc.
Institution	Faculty of Science
Place	Split
Date	23.7.2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	- Mathematics I (University undergraduate study: Chemical Technology, University undergraduate study: Chemistry) - Mathematics II (University undergraduate study: Chemical Technology, University undergraduate study: Chemistry)
Authorship of university/faculty textbooks in the field of the course	• B. Gotovac, *Matematika 1*, Kemijsko-tehnološki fakultet u Splitu, Split, 2015. • B. Gotovac, *Matematički album-zbirka zadataka otvorenog tipa*, Kemijsko-tehnološki fakultet u Splitu, Split, 2015.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	• B. Gotovac, *Što funkcija je? Što funkcija nije?*, Matematika i škola, Element d.o.o., Zagreb, **17 (81)** (2015) 38-42. • B. Gotovac, *Putovanje Londonom kroz četiri zadatka*, Poučak, Hrvatsko matematičko društvo, Profil International d.o.o., Zagreb, **14 (54)** (2013) 44-55. • B. Gotovac, *Analiza grafa funkcije bez uporabe matematičkog nazivlja-primjer suradničkog učenja u sveučilišnoj nastavi*, Zbornik radova, Druga međunarodna konferencija gimnazija 3K, Pedagoško društvo Vojvodine, Gimnazija "Isidora Sekulić", Novi Sad (2011) 15-24. • B. Gotovac, *Primjena određenog integrala na računanje površine lika u ravnini - Prema nastavi usmjerenoj na studenta*, Poučak, Hrvatsko matematičko društvo, Profil International d.o.o., Zagreb, **12 (47)** (2011) 44-56.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	• B. Gotovac, *„Igra-zadatci“ u osnovnoškolskoj nastavi matematike kao metoda poticanja kreativnosti*, Sveučilište u profesionalnom usavršavanju učitelja u osnovnoj školi, Zbornik radova, Sveučilište u Splitu, Filozofski fakultet, Split, (2015) 159-169. • B. Gotovac, *Metodički postupak primjene znanstvenih metoda pri obradi eksponencijalne funkcije*, Poučak, Hrvatsko matematičko društvo, Profil International

	d.o.o., Zagreb, **15 (60)** (2014) 4-15. • B. Gotovac, *Analiza grafa funkcije bez uporabe matematičkog nazivlja - Lice i naličje nastavnog sata*, Zbornik radova, V. kongres nastavnika matematike Republike Hrvatske, Hrvatsko matematičko društvo, Ministarstvo znanosti, obrazovanja i športa RH, Zagreb, (2012) 203-220. • B. Gotovac, *Procjena usvojenosti temeljnih znanja i pristupa rješavanju zadataka u elementarnoj matematici prije i poslije uvođenja državne mature-projekcija na obrazovanje*, Poučak, Hrvatsko matematičko društvo, Profil International d.o.o., Zagreb, **12 (45)** (2011) 39-47.
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	During the graduate and postgraduate study.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Zoran Grubač, prof.**
The course he/she teaches in the proposed study programme	General Chemistry Exercises in General Chemistry Inorganic Chemistry Exercises in Inorganic Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Faculty of Chemistry and Technology, Ruđera Boškovića 33, 21 000 Split
Telephone number	091 502 0029
E-mail address	grubac@ktf-split.hr
Personal web page	http://www.ktf-split.hr/~grubac/
Year of birth	1960.
Scientist ID	126072
Research or art rank, and date of last rank appointment	Science adviser, 2. October 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor 19. December 2013.
Area and field of election into research or art rank	Natural science; Chemistry
INFORMATION ON CURRENT EMPLOYMENT	

Institution where employed	Faculty of Chemistry and Technology, University of Split, Croatia
Date of employment	1. September 1985.
Name of position (professor, researcher, associate teacher, etc.)	professor
Field of research	Electrochemistry, Inorganic chemistry
Function	Head of Department of general and inorganic chemistry
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemical Engineering and Chemistry
Place	Zagreb, Croatia
Date	12. November 1996.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Courses: General Chemistry and Inorganic Chemistry at Undergraduate Study of Chemistry and Undergraduate Study of Chemical Engineering at Faculty of Chemistry and Technology Split and Undergraduate study Marine Biology and Ecology at University Department of Marine Studies, University of Split. Inorganic Chemistry at Undergraduate study Biology and Chemistry at Faculty of Science, University of Split. General and Inorganic Chemistry at Integrated undergraduate and graduate study of Pharmacy at Faculty of Chemistry and Technology Split and School of Medicine in Split.
Authorship of university/faculty textbooks in the field of the course	1. Z. Grubač, Lectures from general chemistry, Faculty of Chemistry and Technology, Split, 2007. 2. Z. Grubač, Lectures from inorganic chemistry, Faculty of Chemistry and Technology, Split, 2007.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Z. Grubač, I. Škugor Rončević, M. Metikoš-Huković, Corrosion properties of the Mg alloy coated with polypyrrole films, Corros. Sci. 102 (2016) 310-316. 2. I. Škugor Rončević, Z. Grubač, M. Metikoš-Huković, Electrodeposition of Hydroxyapatite Coating on AZ91D Alloy for Biodegradable Implant Application, Int. J. Electrochem. Sci., 9 (2014) 5907 - 5923 3. Z. Grubač, M. Metikoš-Huković, R. Babić, Nanocrystalline and coarse grained polycrystalline nickel catalysts for the hydrogen evolution reaction, International Journal of Hydrogen Energy, 38 (2013) 4437-4444. 4. Z. Grubač, M. Metikoš-Huković, R. Babić, I. Škugor

	Rončević, M. Petravić, R. Peter, Functionalization of biodegradable magnesium alloy implants with alkylphosphonate self-assembled films, Mater. Sci. Eng. C 33 (2013) 2152-2158. 5. M. Metikoš-Huković, R. Babić, I. Škugor Rončević, Z. Grubač, Corrosion Behavior of the Filmed Copper Surface in Saline Water under Static and Jet Impingement Conditions, Corrosion 68 (2012) 025002-1-025002.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Bilateral Croatian-Slovenian project: Bioengineering metal materials and functional coatings for medical application, from 2010. to 2011. 2. Project 125-0982904-2932 “New materials and catalysts for sustainable technologies; from 2002. to 2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Senka Gudić, prof.**
The course he/she teaches in the proposed study programme	Electrochemistry Renewable energy sources
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	++385 21 329 433
E-mail address	senka@ktf-split.hr
Personal web page	
Year of birth	1965.
Scientist ID	181062
Research or art rank, and date of last rank appointment	Senior Research Scientist - May 12th, 2009.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor - July 25, 2011.
Area and field of election into research or art rank	Technical Sciences, Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	

Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	November 2nd, 1990.
Name of position (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Analysis, synthesis and management of chemical processes
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	June 21st, 2000.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Electrochemical methods and their application, Corrosion inhibitors, Direct energy conversion – graduated study of Chemical Technology (orientation: Materials) 2. Chemical sources of energy –undergraduate study of Chemical Technology (orientation: Chemical Engineering) 3. Electrochemical engineering, Direct energy conversion – professional study of Chemical Technology (orientation: Chemical Technology and Materials) 4. Electrochemical engineering, Corrosion inhibitors – postgraduate doctoral study Chemical Engineering in Materials Development and Environmental Protection
Authorship of university/faculty textbooks in the field of the course	1. **S. Gudić**, Elektrokemijski izvori struje, KTF-Split, 2011. 2. **S. Gudić**, Inhibitori korozije metala, KTF-Split, 2006.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. **S. Gudić**, L. Vrsalović, M. Kliškić, A. Radonić, M. Zekić, I. Jerković, Corrosion inhibition of AA 5052 aluminium alloy in 0.5 M NaCl solution by different types of honey, Int. J. Electrochem. Sci. 11 (2016) 998-1011. 2. L. Vrsalović, **S. Gudić**, M. Kliškić, E. Oguzie, L. Carev, Inhibition of Copper Corrosion in NaCl Solution by Caffeic Acid, Int. J. Electrochem. Sci. 11 (2015) 459-474. 3. **S. Gudić,** A. Radonić, E.E. Oguzie, L. Vrsalović, I. Smoljko, M. Kliškić, Cofeine as corrosion inhibitor for Cu in NaCl solution, Maced. J. Chem. Chem. Eng. 33 (2014) 13-25. 4. I. Smoljko**, S. Gudić**, N. Kuzmanić, M. Kliškić, Anodic behaviour of aluminium alloys in NaCl solution, J. App. Electrochem. 42 (2012) 969-977.

	5. M. Gojić, L. Vrsalović, S. Kožuh, A.C. Kneissl, I. Anžel, **S. Gudić**, B. Kosec, M. Kliškić, Electrochemical and microstructural study of Cu-Al-Ni shape memory alloy, J. Alloy. Compd. **506** (2011) 9782-9790.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Dražan Jozić, associate prof.**
The course he/she teaches in the proposed study programme	Computer application Process of Precipitation and Crystallization Exercises in Process of Precipitation and Crystallization
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V, 21000 Split
Telephone number	021-329-471
E-mail address	jozicd@ktf-split.hr
Personal web page	https://www.ktf-split.hr/index.php/odsjekzainzenjertvoitehnologije-3/zat/172-hrvatski/djelatnici/cv/155-drazanjozic
Year of birth	1974.
Scientist ID	231234
Research or art rank, and date of last rank appointment	Senior research scientist, 26.12.2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	PhD, Associated professor, 29.05.2013.
Area and field of election into research or art rank	Area: Technical Sciences, Field: Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	01.07.2003.

Name of position (professor, researcher, associate teacher, etc.)	Associated professor
Field of research	Chemical Engineering in the developing a materials
Function	Member of the Department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology
Place	Split
Date	20.07.2007.
INFORMATION ON ADDITIONAL TRAINING	
Year	2004.
Place	Monza, Italy
Institution	Perkin Elmer
Field of training	Training for maintaining, adjusting and properly operation of the instrument for thermogravimetric measurements with simultaneous differential thermal analysis (TG / DTA) model Perkin Elmer Pyris Diamond
Year	2011.
Place	Planneralm, Austria
Institution	Institut für Physik, Montanauniversität Leoben, Austria
Field of training	Application Synchrotron and Neutron radiation in the purpose of Characterization different type of materials
Year	2010.-2011.
Place	Trieste, Italy
Institution	Elettra-Sincrotrone Trieste S.C.p.A.
Field of training	Application Synchrotron radiation in the different instrumental techniques and experimental methods of recording at Austrian SAXS beamline such as of Small Angles X-ray Scattering at (SAXS), Grazing-Incidence Small-Angle X-ray Scattering (GISAXS) and Wide-Angle X-ray Scattering (WAXS, XRD). in the purpose of developing materials in engineering materials especially nanostructured materials.
Year	2014.
Place	Bari, Italy
Institution	Institute of Crystallography-CNR of Bari
Field of training	Methods of resolving structure of crystal from the powder pattern and methods for solution structure of crystal and refinement applied on monocrystal sistems by using programs SIR/EXPO 2014
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level	

of study programme)	
Authorship of university/faculty textbooks in the field of the course	D.Jozić, Predavanja iz kolegija:Primjena računala, Kemijsko-tehnološki fakultet, Interna skripta, Split, 2013.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	CEI Research Fellowship Programme (CERES) (Marie Currie/FP7)
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Maja Kliškić, prof.**
The course he/she teaches in the proposed study programme	Construction Materials Construction Materials and Protection
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V, 21000 Split
Telephone number	++385 329 435
E-mail address	mkliskic@ktf-split.hr
Personal web page	
Year of birth	1953.
Scientist ID	119820
Research or art rank, and date of last rank appointment	Senior Research Scientist - April 21st, 2006.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor - permanent position - July 25, 2011.
Area and field of election into research or art rank	Technical Sciences, Chemical Engineering

INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	December 1st, 1982.
Name of position (professor, researcher, associate teacher, etc.)	Full Professor - permanent position
Field of research	Analysis, synthesis and management of chemical processes
Function	Head of Department of Electrochemistry and Materials Protection
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	October 28th, 1994.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Construction materials - Undergraduated study of Chemical Technology, orientation: Chemical engineering; 2. Construction materials and protection - Undergraduated study of Chemical Technology, orientation: Environmental Protection.
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. L. Vrsalović, S. Gudić, M. Kliškić, Maja, E.E. Oguzie, Carev, Luka, Inhibition of Copper Corrosion in NaCl Solution by Caffeic Acid, International Journal of Electrochemical Science; 11 (2015.), 459-474. 2. S. Gudić, E.E. Oguzie, A. Radonić,L. Vrsalović, I. Smoljko, M. Kliškić, Inhibition of copper corrosion in chloride solution by caffeine isolated from black tea, Macedonian Journal of Chemistry and Chemical Engineering. **33** (2014.); 1, 13-25. 3. B. Lalić, M. Kliškić, I. Komar, Analiza korozijskog djelovanja u cilindru brodskoga sporohodnoga dvotaktnog dizelskog motora, Znanstveno-stručni časopis za more i pomorstvo "Naše more", 60 (2013.), (1/2); 8-15. 4. L. Vrsalović, S. Gudić, M. Kliškić, Salvia officinalis L. honey as corrosion inhibitor for CuNiFe alloy in sodium chloride solution, Indian journal of chemical technology, 19 (2012.); 2, 96-102.

	5. L. Vrsalović, E.E. Oguzie, M. Kliškić, S. Gudić, Corrosion inhibition of CuNi10Fe alloy with phenolic acids, Chemical engineering communications. 198 (2011.); 11, 1380-1393.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Nenad Kuzmanić, prof.**
The course he/she teaches in the proposed study programme	Transport Phenomena Exercises in Transport Phenomena
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V, 21000 Split
Telephone number	++385 21 329 468
E-mail address	kuzmanic@ktf-split.hr
Personal web page	
Year of birth	1959.
Scientist ID	120556
Research or art rank, and date of last rank appointment	Senior Research Scientist - March 27th, 2007
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor, permanent position - June 17th, 2012
Area and field of election into research or art rank	Technical Sciences, Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	December 1st, 1984
Name of position (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Mechanical, thermal and separation processes

Function	Head of Department of chemical engineering
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	December 26th, 1995
INFORMATION ON ADDITIONAL TRAINING	
Year	1991.-1992.
Place	Torino, Italy
Institution	Politecnico di Torino, Dipartimento di Scienza dei Materiali e Ingegneria Chimica, Torino, Italy
Field of training	Solid suspension in mixing vessels; wall sampling of solid suspension from mixing tank
Year	2000.-2001.
Place	Rolla, Missouri, USA
Institution	University of Missouri - Rolla, Department of Chemical Engineering, Rolla , Missouri, USA
Field of training	Mixing in multiphase systems
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Material and energy balances – undergraduated study of Chemical Technology 2. Introduction to chemical engineering– undergraduated study of Chemistry 3. Mechanical and heating operations – graduated study of Chemical Technology (orientation: Materials) 4. Environmental engineering - graduated study of Chemical Technology (orientation: Environmental protection)
Authorship of university/faculty textbooks in the field of the course	N. Kuzmanić, Tehnološke operacije, Priručnik za predavanja, Kemijsko-tehnološki fakultet u Splitu, 2008. N. Kuzmanić, Kemijsko inženjerstvo u zaštiti okoliša, Priručnik za predavanja, Kemijsko-tehnološki fakultet u Splitu, 2008. N. Kuzmanić, Osnove kemijskog inženjerstva, Priručnik za predavanja, Kemijsko-tehnološki fakultet u Splitu, 2012. N. Kuzmanić, Prijenos tvari i energije, Priručnik za predavanja, Kemijsko-tehnološki fakultet u Splitu, 2012.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	A. Kaćunić, M. Ćosić, N. Kuzmanić, Impact of Mixing Parameters on Homogenization of Borax Solution and Nucleation Rate in Dual Radial Impeller Crystallizer, *International Journal of Chemical, Molecular, Nuclear, Materials and Metallurgical Engineering,* 10 (2016) 1; 75-80. A. Kaćunić, M. Akrap, N. Kuzmanić, Effect of impeller position in a batch cooling crystallizer on the

	growth of borax decahydrate crystals, *Chemical engineering research & design*. 91 (2013) 2; 274-285. M. Akrap, N. Kuzmanić, J. Prlić Kardum, Impeller geometry effect on crystallization kinetics of borax decahydrate in a batch cooling crystallizer, *Chemical engineering research & design*. 90 (2012) 6; 793-802. I. Smoljko, S. Gudić, N. Kuzmanić, M. Kliškić, Electrochemical properties of aluminium anodes for Al/air batteries with aqueous sodium chloride electrolyte, *Journal of applied electrochemistry*. 42 (2012) 11; 969-977. M Akrap, N. Kuzmanić, J. Prlić-Kardum, Effect of mixing on the crystal size distribution of borax decahydrate in a batch cooling crystallizer, *Journal of crystal growth*. 312 (2010) , 24; 3603-3608.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific project 011-0112247-2241: Optimization of mixing and transport phenomena in solid-liquid agitated systems (2007-2013) Scientific project - Impact of processing conditions on kinetics of heterogeneous systems in agitated batch reactors, HRZZ-8959 (2014.-2018.)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	University of Missouri - Rolla Award, Rolla, Missouri, USA
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Evaluation organizer: University of Split Courses: Transport phenomena: Av. Grade: > 4.5 Introduction to chemical engineering: Av. Grade: > 4.5 Mechanical and heating operations, Av. Grade: > 4.5 Environmental engineering, Av. Grade: > 4.5 Separation processes, Av. Grade: > 4.5

First and last name and title of teacher	**PhD, Miroslav Labor, associate prof.**
The course he/she teaches in the proposed study programme	Exercises of the mineral raw materials from seawater
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	021/329-478
E-mail address	miroslav.labor@ktf-split.hr
Personal web page	
Year of birth	1963.

Scientist ID	199731
Research or art rank, and date of last rank appointment	Research scientist, 26th November 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 18th July 2014.
Area and field of election into research or art rank	Area -Technical Sciences, Field - Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	25th February 1992.
Name of position (professor, researcher, associate teacher, etc.)	Associate professor in Department of Thermodynamics
Field of research	Research and Highly Education
Function	Employer representative for occupational safetly (2000.- 2016.), Specialist occupational safetly (2016. -)
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. in the Scientific Area of Technical Sciences, Field of Chemical Engineering, Branch of Analysis, Synthesis and Conducting of Chemical Processes
Institution	Faculty of Chemistry and Technology
Place	Split
Date	15th February 2008.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Conducted laboratory exercises (base level) in: **Marine and Submarine Raw Materials** on: - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Technology of Sea and Mediterranean plants from 1993. to 2002., - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Chemistry and Technology of Mediterranean plants from 2002. to 2005., - Academic Graduate Study of Chemical Technology, Study Orientation: Materials from 2008. - . **Seawater as Sources of Mineral Raw Materials** on: Academic Undergraduate Study of Chemical Technology, Study Orientation: Chemical Engineering from 2005.to 2014.
Authorship of university/faculty textbooks in the field of the course	V. Martinac, **M. Labor**, Seawater as Sources of Mineral Raw Materials, (on line 2011-01-18), Laboratory exercises, Internal

	mimeographed notes, (in Croatian), Faculty of Chemistry and Technology, Split, 2011.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. J. Jakić, I. Martić, **M. Labor**, V. Martinac, The effect of the rinsing agent in treatment of seawater-derived magnesium hydroxide precipitate, Proceedings of the International Conference MATRIB 2015, Materials, Wear, Recycling, D. Ćorić, I. Žmak (Eds.), Croatian Society for Materials and Tribology, Zagreb, 2015., 166-176. 2. **M. Labor**, I. Bajić, J. Jakić, V. Martinac, Rinsing the magnesium hydroxide precipitate obtained from seawater, Proceedings MATRIB 2014, Electronic Edition , S. Šolić, M. Šnajdar Musa (Eds.), Croatian Society for Materials and Tribology, Zagreb, 2014., 271-278. 3. **M. Labor**, M. Perić, J. Jakić, V. Martinac, Sintering of magnesium oxide obtained from seawater at 1600 ^{o}C, Proceedings of the 10th International Scientific-Research Symposium, Electronic Edition , S. Muhamedagić (Ed.), University of Zenica, Faculty of Metallurgy and Materials Science, Zenica, 2014., 277-283. 4. **M. Labor**, M. Tolo, V. Martinac, J. Jakić, The MgO (80% precipitation) from seawater, Proceedings of the International Conference on Materials, Processes, Friction and Wear, MATRIB 2013, Ž. Alar, S. Jakovljević, S. Šolić (Eds.), Croatian Society for Materials and Tribology, Zagreb, 2013., 248-254. 5. **M. Labor**, V. Martinac, N. Petric, B_2O_3 content in the sintered magnesium oxide obtained from seawater, Indian journal of chemical technology, **20** (2013) 276-281
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Magdy Lučić Lavčević, associate prof.**
The course he/she teaches in the proposed study programme	Physics I Exercises in Pysics I Physics II Exercises in Pysics II
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21 000 Split
Telephone number	+385-21-329 449
E-mail address	malula@ktf-split.hr
Personal web page	
Year of birth	1957.
Scientist ID	118 560
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 2013.
Area and field of election into research or art rank	Natural sciences, physics
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	1982.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Experimental physics of condensed matter
Function	Head of the Physics department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Natural Sciences
Place	Zagreb
Date	28.12.1998.
INFORMATION ON ADDITIONAL TRAINING	
Year	1991. 1997/1998/2003.
Place	Zagreb Zagreb, Basovizza
Institution	Faculty of Natural Sciences Ruđer Bošković Institute /Sincrotrone Elettra
Field of training	Experimental phyisics of condensed matter
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English - 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French - 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian - 2
COMPETENCES FOR THE COURSE	
Earlier experience as course	

teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. M. Lučić Lavčević, P. Dubček, S. Bernstorff, M. Pavlović, L. Šilović, *A grazing-incidence small-angle X-ray scattering view of vertically aligned ZnO nanowires,* J. Nanomater. 2013 (2013) 381519 2. M. Lučić Lavčević, S. Bernstorff, P. Dubček, D. Jozić, I. Jerković, Z. Marijanović, *GISAXS/GIXRD view of ZnO films with hierarchical structural elements,* J. Nanotechnol. 2012 (2012) 354809 3. M. Lučić Lavčević, A. Turković, P. Dubček, Z. Crnjak Orel, B. Orel, S. Bernstorff, *GISAXS view of induced morphological changes in of nanostructured CeVO4 thin films,* J. Nanomater. 2011 (2011) 303808
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Croatian MSES: Nanostructures of metals and metal oxides: morphology and properties, 2007-2013 - leadership RCOP: MEMSplit (Strengthening the Capacities for Application and Technology Transfer of Microelectromehanical Systems at the University of Split), 2014-2016 - participation
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	

First and last name and title of teacher	**PhD, Jadranka Marasović, prof.**
The course he/she teaches in the proposed study programme	Measurements and Process Control
GENERAL INFORMATION ON COURSE TEACHER	
Address	Split, Zagrebačka 21
Telephone number	385 021 305 830 (institution)
E-mail address	jmar@fesb.hr
Personal web page	/
Year of birth	1955.
Scientist ID	080633
Research or art rank, and date of	Senior Research Scientist, 09. July 2007.

last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor, 01. March 2009.
Area and field of election into research or art rank	Technical science, field of electrical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Machine Engineering and Naval Architecture, University of Split
Date of employment	04. May 1978.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Science and Education
Function	/
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Doctor of science
Institution	Faculty of Electrical Engineering, Machine Engineering and Naval Architecture, University of Split
Place	Split
Date	11. July 1997.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (excellent -5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (sufficient-2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	**Undergraduate studies:** Mjerenje i vođenje procesa (Measurements and Process Control), Simulacijsko modeliranje (Simulation Modelling), Automatizacija industrijskih procesa (Industrial Process Control) **Graduate studies:** Automatsko reguliranje procesa (Automatic Control), Identifikacija sustava (System Identification), Praktikum iz vođenja procesa (Process Control Laboratory Exercises)

	Metode optimizacije (Optimization Methods), Automatizacija (Automation) **Postgraduate study:** Optimization Techniques for Environmental Studies (Wessex Institute of Tecnology, UK i FESB)
Authorship of university/faculty textbooks in the field of the course	- (autor) Kvantitativno i kvalitativno modeliranje i simuliranje (Quantitative and Qualitative Modelling and Simulation) (ISBN 953-6114-67-4), - (koautor) On-line (web) udžbenik, Informatički projekt MZT-a, http://laris.fesb.hr/digitalno_vodjenje (Digital Control) - (autor) Predavanja iz kolegija Metode optimizacije (Lessons for Optimizaion Methods) (FESB, e-learning). - (autor) Predavanja iz kolegija Modeliranje i simuliranje sustava (Lessons for Modelling and Simulations) (FESB, e-learning).
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	- Marasović, Tea; Papić, Vladan; **Marasović, Jadranka**. *Motion-based Gesture Recognition Algorithms for Robot Manipulation*. // International Journal of Advanced Robotic Systems. 12 (2015), 51; 1-13, doi: 10.5772/60077. - **Marasović, Jadranka**; Marasović, Tea; Đapić, Marija. *Fair Division Methods Approach as the Option of Learning Process Modeling*. // Proceedings of 18th IEEE International Symposium on Computers and Communications (ISCC). 2013; 735-739. - Mance, Davor; **Marasović, Jadranka**. *EMC in Electronic System Developed to Support Measurements in Space Environment*. // Proceedings of 20th International Conference on Software, Telecommunications and Computer Networks (SoftCOM). 2012; 1-5.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	/
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Suradnica na projektima: - Računalna inteligencija za prepoznavanje i potporu ljudskih aktivnosti (RIPrePAkt), - GRS Front End Electronics Characterization for LISA, - Agentski orijentirani inteligentni sustavi za nadzor i zaštitu okoliša (Agents Oriented Intelligent Systems for Environment Control and Protection), - Inteligentni agenti u modeliranju i vođenju kompleksnih sustava (Intelligent Agents used for Complex Systems Modelling and Control), - Vođenje složenih sustava inteligentnim metodama (Intelligent Methods for Complex Systems Control).
The name of the programme and the volume in which the main teacher passed exams in/acquired	/

the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	/
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Vanja Martinac, prof.**
The course he/she teaches in the proposed study programme	Thermodynamics Mineral Raw Materials from Seawater
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 447
E-mail address	martinac@ktf-split.hr
Personal web page	-
Year of birth	1959.
Scientist ID	119805
Research or art rank, and date of last rank appointment	Senior Research Scientist – 21st April 2006.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor (with tenure) – 25th July 2011.
Area and field of election into research or art rank	Area – Technical Sciences, Field – Chemical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	04th June 1984.
Name of position (professor, researcher, associate teacher, etc.)	Full professor (with tenure) in Department of Thermodynamics
Field of research	Research and Highly Education
Function	Head of Department of Thermodynamics (1998.-)
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. of Technical Sciences in the Field of Chemical Engineering
Institution	Faculty of Technology University of Split
Place	Split
Date	08th July 1994.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of	English (3)

foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	**Technical Thermodynamics** (base level) on: - Undergraduated University Study Programm in Chemical Technology from 1996. to 2005., - Professional Study of Chemical Technology (Study Orientation: Chemical Technology and Food Technology) 2001. and 2002. **Thermodynamics** (base level) on: - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Chemistry and Technology of Mediterranean plants from 2002. to 2005., - Academic Undergraduate Study of Chemical Technology, Study Orientation: Chemical Engineering and Enviromental Protection from 2005. - Academic Undergraduate Study of Food Technology from 2016. **Thermodynamics and Thermotechnics** (base level) on: - Professional Study of Chemical Technology (Study Orientation: Process Technology and Food Technology) from 2002. to 2005., - Professional Study of Chemical Technology (Study Orientation: Chemical Technology and Materials, and Food Technology) from 2005.-2015. - Proffesional Study of Materials protection and recycling from 2016. - Professional Study of Food Technology on Polytechnic of Knin “Marko Marulić” from 2005. to 2012. **Thermodynamics of Real Processes** (base level) on: - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Chemical Technology Processes from 1998. to 2006. - Academic Graduate Study of Chemical Technology, Study Orientation: Materials and Enviromental Protection from 2008. **Chemical Engineering Thermodynamics** (advanced level) on: - Postgraduated Study in “Chemical Engineering in Materials Development ”, acad. year 2004./05. - Postgraduated Doctoral Study in “Chemical Engineering in Materials Development and Enviromental Protection”, acad. year 2008./09. i 2012./13. **Marine and Submarine Raw Materials** (base level) on: - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Technology of Sea and Mediterranean plants from 1993. to 2002., - Undergraduated University Study Programm in Chemical Technology, Study Orientation: Chemistry and Technology of Mediterranean plants from 2002. to 2005., - Academic Graduate Study of Chemical Technology, Study

	Orientation: Materials from 2008. to 2014. **Marine and Submarine Raw Materials** (advanced level) on - Postgraduated Study in “Engineering Chemistry” acad. year 1994./95. and 2000./01. **Activated Sintering of Magnesium Oxide** (advanced level) on - Postgraduated Study in “Chemical Engineering in Materials Development”, acad. year 2004./05. **Magnesium Oxide from Seawater** (advanced level) on: - Postgraduated Study in “Chemical Engineering in Materials Development”, acad. year 2004./05. - Postgraduated Doctoral Study in “Chemical Engineering in Materials Development and Enviromental Protection”, acad. year 2008./09. and 2012./13. **Marine Raw Materials in Chemical Industry and Medicine** (advanced level) Postgraduate Study in “Applied Marine Science” (collaboration with University Centre for Marine Studies University of Split and Department of Aquaculture University of Dubrovnik), acad. year 2006./07. and acad. year 2014./15. **Seawater as Sources of Mineral Raw Materials** (base level) Academic Undergraduate Study of Chemical Technology, Study Orientation: Chemical Engineering from 2005.to 2014.
Authorship of university/faculty textbooks in the field of the course	1. N. Petric, I. Vojnović, **V. Martinac**, Technical Thermodynamics, University book, (in Croatian), 1st Ed., Hinus, Zagreb 1999. 2. N. Petric, I. Vojnović, **V. Martinac**, Technical Thermodynamics, University book, (in Croatian), 2nd Ed., Faculty of Chemistry and Technology, on line (2007-01-09), Split, 2007. 3. N. Petric, I. Vojnović, **V. Martinac**, Technical Thermodynamics, University book, (in Croatian), 3rd Ed., Redak, Split, 2015. 4. **V. Martinac**, Thermodynamics and Thermotechnics, (Handbook-Formulas and Tables), (in Croatian), Faculty of Chemistry and Technology, on line (2008-12-09), Split, 2008. 5. **V. Martinac**, Magnesium Oxide from Seawater, (on line 2010-12-13), University handbook, (in Croatian), Faculty of Chemistry and Technology, Split, 2010. 6. **V. Martinac**, M. Labor, Seawater as Sources of Mineral Raw Materials, (on line 2011-01-18), Laboratory exercises, Internal mimeographed notes, (in Croatian), Faculty of Chemistry and Technology, Split, 2011.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. J. Jakić, I. Martić, M. Labor, **V. Martinac**, The effect of the rinsing agent in treatment of seawater-derived magnesium hydroxide precipitate, Proceedings of the International Conference MATRIB 2015, Materials, Wear, Recycling, Electronic Edition, D. Ćorić, I. Žmak (Eds.), Zagreb, Croatian Society for Materials and Tribology, 2015., 166-176. 2.M. Labor, I. Bajić, J. Jakić, **V. Martinac**, Rinsing the magnesium hydroxide precipitate obtained from seawater, Proceedings of the International Conference MATRIB 2014, Electronic Edition, S. Šolić, M. Šnajdar Musa (Eds.), Zagreb, Croatian Society for Materials and Tribology, 2014., 271-278. 3. M. Labor, M. Perić, J. Jakić, **V. Martinac**, Sintering of magnesium oxide obtained from seawater at 1600 ^{o}C, Proceedings of the 10th International Scientific-Research

	Symposium, Electronic Edition, S. Muhamedagić (Ed.),Zenica, University of Zenica, Faculty of Metallurgy and Materials Science, 2014., 277-283. 4. M. Labor, **V. Martinac**, N. Petric, B_2O_3 content in the sintered magnesium oxide obtained from seawater, Ind. J Chem. Technol., **20** (2013) 276**-**281. 5. **V. Martinac**, Effect of TiO_2 Addition on the Sintering Process of Magnesium Oxide from Seawater, Sintering of Ceramics - New Emerging Techiques, A. Lakshmanan (Ed.), Rijeka, InTech, 2012., 309-322.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific Project 011-0112247-2250 “Acitivated Sintering of Magnesium Oxide“, Ministry of Science, Education and Sports of the Republic of Croatia, (2002.-2013.); Principal Investigator: Prof. Ph. D. V. Martinac
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Sanja Perinović Jozić, assistant prof.**
The course he/she teaches in the proposed study programme	Exercises in Polymeric Materials Exercises in Polymers and the Environment
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	021/329-455
E-mail address	sanja@ktf-split.hr
Personal web page	
Year of birth	26.09.1978.
Scientist ID	267214
Research or art rank, and date of last rank appointment	Research associate, 12.06.2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 18.01.2013.
Area and field of election into	Scientific sector of technical sciences, field of chemical

research or art rank	engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of chemistry and technology
Date of employment	01.09.2005.
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Chemical engineering in materials development
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Dr. sc.
Institution	Faculty of chemistry and technology
Place	Split
Date	11.01.2012.
INFORMATION ON ADDITIONAL TRAINING	
Year	2006.
Place	Aachen, Germany
Institution	Deutsches Wollforschungsinstitut an der Reinisch-Westfalisch Technische Hochschule (DWI an der RWTH)
Field of training	Polymeric materials
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. M. Erceg, D. Jozić, I. Banovac, **S. Perinović,** S. Bernstorff, Preparation and characterization of melt intercalated poly(ethylene oxide)/lithium montmorillonite nanocomposites, Thermochimi. Acta, 579 (2014), 86-92. 2. **S. Perinović**, B. Andričić, Influence of different processing techniques on the thermal properties of poly(L-lactide)/olive stone flour composites, 15th European Conference on Composite Materials, Venice, (2012) 1-8. 3. **S. Perinović**, B. Andričić, Modifikacija svojstava poli(L-laktida), Polimeri: časopis za plastiku i gumu, 33 (2012), 3-4, 100-105.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course	1. Polymer blends with biodegradable components (011-1252971-2249), Ministry of science, education and sports of the

carried out in the last five years (5 at most)	Republic of Croatia, 2007.-2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	- first place in the local competition of *FameLab* (popularisation of science), - *Green scholarships of Carlsberg Croatia* for a one-year project *"Polylactide composites with olive stone flour as a filler"*, - IUPAC scholarships for participation in *European Polymer Congress 2009* for a paper *Application of Model-Free Kinetics to the Thermal Degradation of Poly(L-lactide)/Olive Stone Flour Composites*.

First and last name and title of teacher	**PhD, Ante Prkić, assistant prof.**
The course he/she teaches in the proposed study programme	Analytical Chemistry Exercise from Analytical Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35
Telephone number	021329462
E-mail address	prkic@ktf-split.hr
Personal web page	
Year of birth	1981
Scientist ID	313112
Research or art rank, and date of last rank appointment	Associate Scientist, March 12th 2014.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant Professor, May 1st 2014.
Area and field of election into research or art rank	Natural Sciences, Chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	April 20th 2006.
Name of position (professor, researcher, associate teacher, etc.)	Assistant Professor
Field of research	Development of ion-selective membranes for potentiometric determinations, flow-injection analysis, UV/Vis spectrophotometry, Atomic spectroscopy, Theoretical chemistry
Function	Assistant Professor
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemical Engineering and Technology, University of Zagreb
Place	Zagreb
Date	September 30th 2013.

INFORMATION ON ADDITIONAL TRAINING	
Year	2006
Place	Klis
Institution	SMS
Field of training	Atomic spectroscopy
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Assistant for various experimental teachings in Analytical Chemistry
Authorship of university/faculty textbooks in the field of the course	• Ante Prkić, Vježbe iz Analitičke kemije, Undergraduate study of Chemical Technology, Split 2008. • Ante Prkić, Vježbe iz Analitičke kemije II, Undergraduate study of Chemistry, Split 2011. • Josipa Giljanović, Ante Prkić, Vježbe iz Fizikalnih metoda analize, Graduate study of Chemistry, Split 2009. • Ante Prkić, Josipa Giljanović, Vježbe iz Metoda odvajanja i specijacije, Graduate study of Chemistry, Split 2009.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Prkić, Ante; Giljanović, Josipa; Bralić, Marija; Boban, Katarina. Direct Potentiometric Determination of Fluoride Species by Using Ion-Selective Fluoride Electrode. International Journal of Electrochemical Science. 7 (2012); 1170-1179. 2. Radić, Njegomir; Prkić, Ante. Historical remarks on the Henderson-Hasselbalch equation: its advantages and limitations and a novel approach for exact pH calculation in buffer region. Reviews in analytical chemistry. 31 (2012); 93-98. 3. Prkić, Ante; Giljanović, Josipa; Petričević, Sandra; Brkljača, Mia; Bralić, Marija. Determination of cadmium, chromium, copper, iron, lead, magnesium, manganese, potassium and zinc in mint tea leaves by electrothermal atomizer atomic absorption spectrometry in samples purchased at local supermarkets and marketplaces. Analytical Letters. 46 (2013), 2; 367-378. 4. Prkić, Ante; Sokol, Vesna; Bošković, Perica. Conductometric Study of Cesium Bromide in Aqueous Butan-2-ol of Lower Mass Fraction. International journal of electrochemical Science, 8 (2013) 4886– 4900. 5. Vukušić, Tina; Prkić, Ante; Giljanović, Josipa; Sokol, Vesna; Bošković, Perica. Direct Potentiometric Determination of Penicillamine in Real Samples by Using Copper ISE. *Croatica Chemica Acta* 2015, 88(3). 255-258. DOI: 10.5562/cca2659
Professional and scholarly articles published in the last five years in subjects of teaching methodology	

and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Analytical Chemistry (lectures, seminars, exercises)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Davor Rušić, prof.**
The course he/she teaches in the proposed study programme	Mathematical Tools in Chemical Engineering Exercises in Mathematical Tools in Chemical Engineering Reaction Engineering
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 442
E-mail address	rusic@ktf-split.hr
Personal web page	-
Year of birth	1951
Scientist ID	202886
Research or art rank, and date of last rank appointment	Research adviser (2006)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	full professor in permanent position (2011)
Area and field of election into research or art rank	scientific area of technical sciences, scientific filed chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1993
Name of position (professor, researcher, associate teacher, etc.)	full professor in permanent position
Field of research	mathematical modelling
Function	full professor in the Department of Chemical Engineering
INFORMATION ON EDUCATION – Highest degree earned	

Degree	Ph. D. in Technical sciences (chemical engineering)
Institution	Faculty of Technology, University of Zagreb
Place	Zagreb
Date	1992
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	• Reaction Engineering (Undergraduate study of chemical engineering) • Biochemical Engineering (Graduate study of chemistry and chemical technology
Authorship of university/faculty textbooks in the field of the course	• D. Rušić; E. Bacci: Matematički alati-priručnik / Mathematical tools-manual / D. Rušić (ed.), Faculty of Chemistry and Technology, University of Split, Split, 2011. (reviewed and edited teaching materials). • D. Rušić; S. Matešić Slavica: Interaktivna MathCad zbirka zadataka iz reakcijskog inženjerstva/ Interactive Mathcad collection tasks of reaction engineering / D. Rušić (ed.), Faculty of Chemistry and Technology,

	University of Split, Split, 2011. (reviewed and edited teaching materials).
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	• S. Svilović, M. Jakovčević, R. Stipišić, D. Rušić, Equilibrium studies of copper cations exchange by sinthetic zeolite X, *Proceedings of International Conference on Materials, Tribology, Recycling - MATRIB 2013* / Alar, Ž. ; Jakovljević, S. ; Šolić , S. (ur.). Zagreb : Croatian Society for Materials and Tribology, 2013. 368-373. • S. Svilović, I. Piplica, D. Rušić, Adsorption isotherms of cobalt ions emoval using zeolite 13X, *Proceedings of international conference MATRIB 2012, materials/tribology/recycling* / Alar, Željko & Jakovljević, Suzana (ur.).Zagreb : Hrvatsko društvo za materijale i tribologiju, 2012. 290-295. • E. Bacci, D. Rušić, S. Svilović, R. Žanetić, matemetičko modeliranje kinetike heterogenih sustava: Modeliranje kinetike reakcijskih sustava koje imaju konverzijsku funkciju s infleksijom, *Proceedings 13th Ružićka Days Today science - tomorrow industry* / Drago Šubarić (ur.), Osijek : Prehrambeno tehnološki fakultet Osijek, Hrvatsko društvo kemijskih inženjera i tehnologa, 2011. 126-136.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	• Leader of scientific project 011-0112247-2245: *Chemical engineering in examination of Mari culture,* Ministry of Science, Education and Sports of the Republic of Croatia (January 2, 2007 - December 23, 2014)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	-

PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Mirjana Skočibušić, associate prof.**
The course he/she teaches in the proposed study programme	General microbiology Food microbiology
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 12, 21000 Split
Telephone number	021 38 51 33
E-mail address	Mirjana.Skocibusic@pmfst.hr
Personal web page	
Year of birth	1954
Scientist ID	137651
Research or art rank, and date of last rank appointment	*Associate professor*
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Natural sciences, field of biology, a branch of microbiology
Area and field of election into research or art rank	Teslina 12, 21000 Split
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	1/09/1986.
Date of employment	Professor, researcher
Name of position (professor, researcher, associate teacher, etc.)	Research projects, work with science students-assistants, publications, teaching.
Field of research	Head of the scientific project and manager doctoral studies-Biology
Function	1/09/1986.
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD in Natural science, Biology (Microbiology)
Institution	Faculty of Science -University of Zagreb
Place	Zagreb
Date	12/02/1998.
INFORMATION ON ADDITIONAL TRAINING	

Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Microbiology, General Microbiology, Marine Microbiology- undergraduate study of Biology and Chemistry, Special Microbiology - graduate studies in Biology and Chemistry, Bacteria, viruses and subviralni pathogens, Microbial Ecology- Doctoral studies in Education in the field of Natural and Engineering Sciences.
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	Maravić, Ana; **Skočibušić, Mirjana**; Šamanić, Ivica; Fredotović, Željana; Cvjetan, Svjetlana; Jutronić, Marinka; Puizina, Jasna. Aeromonas spp. simultaneously harbouring blaCTX-M-15, blaSHV-12, blaPER-1 and blaFOX-2, in wild-growing Mediterranean mussel (*Mytilus galloprovincialis*) from Adriatic Sea, Croatia. ***International Journal of Food Microbiology***. 166 (2013) , 2; 301-308. Maravić, Ana; **Skočibušić, Mirjana**; Šamanić, Ivica; Puizina, Jasna. Profile and multidrug resistance determinants of *Chryseobacterium indologenes* from seawater and marine fauna. ***World journal of microbiology & biotechnology*.** 29 (2013) , 3; 515-522. Odžak, Renata; **Skočibušić, Mirjana**; Maravić, Ana. Synthesis and antimicrobial profile of N-substituted imidazolium oximes and their monoquaternary salts against multidrug resistant bacteria. ***Bioorganic & Medicinal Chemistry*.** 21 (2013) , 23; 7499-7506. Politeo, Olivera; Skočibušić, Mirjana; Burcul, Franko; Maravić, Ana; Carev, Ivana; Ruščić, Mirko; Miloš, Mladen. *Campanula portenschlagiana* Roem. et Schult. : Chemical and Antimicrobial Activities. ***Chemistry & biodiversity*.** 10 (2013) , 6; 1072-1080. Maravić, Ana**; Skočibušić, Mirjana**; Šamanić, Ivica; Puizina, Jasna. Antibiotic susceptibility profiles and first report of TEM extended-spectrum β-lactamase in *Pseudomonas fluorescens* from coastal waters of the Kaštela Bay, Croatia. ***World journal of microbiology & biotechnology*.** 28 (2012) , 5; 2039-2045.
Professional and scholarly articles	

published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Indicators of fecal contamination and possible pathogens in coastal areas (177-0000000-3182) 2008 – 2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	The complete graduate studies of Biology - Professor of Biology
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Regular surveys of quality of teaching which is carried out by the University of Split. Ratings have been very positive.

First and last name and title of teacher	**PhD, Ivana Smoljko, assistant prof.**
The course he/she teaches in the proposed study programme	Exercises in Electrochemistry Exercises in Renewable Energy Sources
GENERAL INFORMATION ON COURSE TEACHER	
Address	Faculty of chemistry and technology, Ruđera Boškovića 35, 21000 Split
Telephone number	+385 021 329 444
E-mail address	ismoljko@ktf-split.hr
Personal web page	http://bib.irb.hr/lista-radova?autor=267183
Year of birth	1977.
Scientist ID	267183
Research or art rank, and date of last rank appointment	*Research associate,* 21 March 2011
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 5 February 2014
Area and field of election into research or art rank	Technical sciences, Chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of chemistry and technology
Date of employment	1 May 2004
Name of position (professor,	Assistant professor

researcher, associate teacher, etc.)	
Field of research	Chemical engineering, *Analysis, synthesis, and* design of *chemical processes*
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	University of Split, Faculty of chemistry and technology
Place	Split
Date	30 April 2010
INFORMATION ON ADDITIONAL TRAINING	
Year	2014
Place	Split
Institution	**University of Split, Faculty of Humanities and Social Sciences**
Field of training	Development and improvement of pedagogical *competencies* of *university teachers*
Year	2007
Place	Rijeka, First *Synchrotron Radiation Summer School* "Syncro 07"
Institution	University of Rijeka
Field of training	Natural sciences, Physics
Year	2006
Place	Palić, 4th European Summer School on Electrochemical Engineering "ESSEE 4"
Field of training	Technical sciences, Chemical engineering
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	• Exercises in Electrochemistry (Undergraduate Study of Chemical Technology, Orientation: Chemical engineering) • Electrochemical engineering - exercises (Graduate Study of Chemical Technology, Orientation: Materials) • Electrochemical engineering – exercises (Professional Study of Chemical Technology, Orientation: Chemical technology and materials)
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. *L. Vrsalović, T. Paić, V. Alar, I. Stojanović, S. Jakovljević, S. Gudić,* ***I. Smoljko***, The effects of surface treatment AISI 316L welded joints on its corrosion behaviour in chloride solution, Kovové materiály **54** (2016) 211-215. 2. *S. Gudić, E. E. Oguzie, A. Radonić, L. Vrsalović,* ***I. Smoljko****, M. Kliškić*, Inhibition of copper corrosion in chloride solution by caffeine isolated from black tea, Macedonian Journal of Chemistry and Chemical Engineering **33** (2014) 13-25. 3. ***I. Smoljko****, B. Jejina, S. Gudić, M. Kliškić, N. Kuzmanić,* Dobivanje vodika uporabom aluminijske ambalaže, Zbornik radova MATRIB 2013, Ž. Alar, S. Jakovljević, S. Šolić (ur.), Hrvatsko društvo za materijale i tribologiju, Zagreb, 2013. 356-366. 4. ***I. Smoljko****, S. Gudić, N. Kuzmanić, M. Kliškić*,

	Electrochemical properties of aluminium anodes for Al/air batteries with aqueous sodium chloride electrolyte, Journal of applied electrochemistry **42** (2012) 969-977.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Optimization of mixing and transport phenomena in solid-liquid agitated systems (011-0112247-2241)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	Development and improvement of pedagogical *competencies* of *university teachers (***University of Split, Faculty of Humanities and Social Sciences)**
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	• 2012 University of Split Faculty of Chemistry and Technology Dean's Recognition Award for Creativity *Activity* • 2010 University of Split Award for the Best Presentation • 2001 University of Split Rector's Award to the Best Students at University of Split • 1999 University of Split Faculty of Chemistry and Technology Award for Exceptional Achievements During Study
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Vesna Sokol, associate prof.**
The course he/she teaches in the proposed study programme	Physical Chemistry Exercises in Physical Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđer Bošković 35, 21 000 Split
Telephone number	021-329-445
E-mail address	vsokol@ktf-split.hr
Personal web page	
Year of birth	1968.
Scientist ID	212806
Research or art rank, and date of last rank appointment	Senior Research Associate, 2014.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor, 2015.
Area and field of election into research or art rank	Natural Sciences, Chemistry, Physical Chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split

Date of employment	1. 8. 1996.
Name of position (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	1. Thermodynamics of various ionic reactions in mixed solvents 2. Classical microemulsion systems and surfactant-free microemulsions 3. Application of ion sensors for the determination of different analytes
Function	Head of Department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	31. 10. 2006.
INFORMATION ON ADDITIONAL TRAINING	
Year	2007.
Place	Rijeka
Institution	University of Rijeka
Field of training	Synchrotron radiation
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, very good
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Physical Chemistry I, Undergraduated study of chemistry Physical Chemistry, Undergraduated study of chemical technology Physical Chemistry of Electrolyte Solutions, Graduated study of chemistry Colloid chemistry, Graduated study of chemistry
Authorship of university/faculty textbooks in the field of the course	V. Sokol, P. Bošković, Exercises in Colloid Chemistry, Faculty of Chemistry and Technology, Split, 2016.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Bošković, P.; Sokol, V.; Touraud, D.; Prkić, A.; Giljanović, J., The Nanostructure Studies of Surfactant-Free-Microemulsions in Fragrance Tinctures. // Acta chimica Slovenica. 63 (2016) 1; 138-143. 2. Bošković, P.; Sokol, V.; Zemb, T.; Touraud, D.; Kunz, W., Weak Micelle-Like Aggregation in Ternary Liquid Mixtures as Revealed by Conductivity, Surface Tension and Light Scattering. // The journal of physical chemistry. B, Condensed matter, materials, surfaces, interfaces & biophysical. 119 (2015) 30; 9933-9939. 3. Tranfić Bakić, M.; Jadreško, D.; Hrenar, T.; Horvat, G.; Požar, J.; Galić, N.; Sokol, V.; Tomaš, R.; Alihodžić, S.; Žinić, M.; Frkanec, L.; Tomišić, V., Fluorescent phenanthridine-based calix[4]arene derivatives: synthesis and thermodynamic and computational studies of their complexation with alkali-metal cations. // RSC Advances. 5 (2015) 30; 23900-23914.

	4. Vukušić, T.; Prkić, A.; Giljanović, J.; Sokol, V.; Bošković, P., Direct Potentiometric Determination of Penicillamine in Real Samples by Using Copper ISE. // Croatica chemica acta. 88 (2015) 3; 255-258. 5. Bošković, P.; Sokol, V.; Prkić, A.; Giljanović, J., Conductometric Study of Sodium Chloride in Aqueous 2-methylpropan-2-ol of Mass Fraction 0.10, 0.30, 0.50, 0.70, 0.80 and 0.90. // International journal of electrochemical science. 9 (2014) 7; 3574-3587.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific project 011-0000000-3220: " Electrolytes in mixed solvents ", the Ministry of Science, Education and Sports
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Nataša Stipanelov Vrandečić, prof.**
The course he/she teaches in the proposed study program	Technological processes in organic industry Exercises in Technological processes in organic industry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Faculty of Chemistry and Technology,Teslina 10/V, 21 000 Split, Croatia
Telephone number	00385 21 329 459
E-mail address	nstip@ktf-split.hr
Personal web page	http://tkojetko.irb.hr/znanstvenikDetalji.php?sifznan=7463
Year of birth	1966.
Scientist ID	226264
Research or art rank, and date of last rank appointment	Senior Research Scientist, 2010-4-27
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor, 2015-10-29
Area and field of election into research or art rank	Area: Technical Sciences; Field: Chemical Engineering

INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistriy and Technology
Date of employment	1995-06-01
Name of position (professor, researcher, associate teacher, etc.)	Associated Professor
Field of research	Chemical Engineering in Materials Development
Function	Vice dean
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Dr. Sc.
Institution	Faculty of Chemistry and Technology
Place	Split
Date	2003-3-28
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Processes in organic industry, Professional Study of Chemical Technology; Study Orientations: Chemical Technology and Materials Coatings, Academic Graduate Study of Chemical Technology; Study Orientations: Materials Characterization of polymers, Academic Graduate Study of Chemical Technology; Study Orientations: Materials
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. M. Jakić, N. Stipanelov Vrandečić and I. Klarić, Thermal degradation of poly(vinyl chloride)/poly(ethylene oxide) blends: Thermogravimetric analysis, Polymer Degradation and Stability 98 (2013) 1738-1743 2. N. Stipanelov Vrandečić, M. Erceg, M. Jakić and I. Klarić, Kinetic analysis of thermal degradation of poly(ethylene glycol) and poly(ethylene oxide)s of different molecular weight, Thermochimica Acta 498 (2010) 71-80 3. M. Jakić, N. Stipanelov Vrandečić, I. Klarić, Utjecaj poli(etilen-glikola) na toplinsku razgradnju mješavina poli(vinil-klorid)/poli(etilen-oksid) International Conference on Materials, Tribology, Recycling - MATRIB 2013, Zagreb: Hrvatsko društvo za materijale i tribologiju, Vela Luka, 2013. str. 192-203 4. M. Erceg, M. Omazić, N. Stipanelov Vrandečić, I. Banovac: Preparation and characterization of poly(ethylene oxide)/lithium montmorillonite composites, 15th European

	Conference On Composite Materials, Venecija, Italija, 2012.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Scientific project 011-1252971-2249: Polymer Blends with Biodegradable Components (2007-2013)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS	
Prizes and awards for teaching and scholarly/artistic work	Award of the Society of Plastics and Rubber for master's thesis in the field of polymeic technology (2001-12-4).

First and last name and title of teacher	**Renato Stipišić, senior lecturer**
The course he/she teaches in the proposed study programme	Exercise in Measurement and process control
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, Split
Telephone number	021/329431
E-mail address	stipisic@ktf-split.hr
Personal web page	
Year of birth	1965.
Scientist ID	
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior lecturer, 18.07.2014.
Area and field of election into research or art rank	Technical science, Chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	01.07.1992.
Name of position (professor, researcher, associate teacher, etc.)	Senior lecturer
Field of research	Mechanical, termal and separation operations
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	B.Sc. in Chemical Technology
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	18.04.1991.
INFORMATION ON ADDITIONAL TRAINING	
Year	Training course for the Environmental Management Systems

	(EMS), Auditor Training Course.
Place	Crikvenica
Institution	BVQI
Field of training	Environmental Management Systems
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 3 (good)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Slovenian 5 (excellent)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Unit operation, Professional study of chemical technology and materials and Professional study of food technology Measuring and control technology, Professional study of chemical technology and materials and Professional study of food technology
Authorship of university/faculty textbooks in the field of the course	R. Žanetić, R. Stipišić "Mjerni pretvornici u procesnoj industriji", Kemijsko-tehnološki fakultet, 2005.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	M. Žanetić, M. Jukić Špika, R. Stipišić, A. Jukić, S. Svilović, Influence of malaxation time and temperature on „Levantinka“ virgin olive oil properites, International Scientific and Professional Conference 15th Ružička days „TODAY SCIENCE – TOMORROW INDUSTRY“, 11.-12. September 2014, Vukovar, Croatia. S. Svilović, R. Stipišić, D. Rušić, N. Kuzmanić, Usporedba različitih kinetičkih modela drugog reda pri modeliranju kinetike ionske izmjene bakra na zeolitu NaX, 24. Hrvatski skup kemičara i kemijskih inženjera, 21.-24. Travnja 2015., Zagreb, Hrvatska.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	HRZZ research project IP-11-2013-4981: Impact of processing conditions on kinetics of heterogeneous systems in agitated batch reactors. (HETMIX)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course	

described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Sandra Svilović, associate prof.**
The course he/she teaches in the proposed study programme	Exercises in Reaction Engineering
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35
Telephone number	++385 21 329 431
E-mail address	sandra@ktf-split.hr
Personal web page	
Year of birth	1974
Scientist ID	237630
Research or art rank, and date of last rank appointment	Research scientist - May 27th, 2013
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor - 24.09.2015
Area and field of election into research or art rank	Technical sciences, chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	June 1st, 2000
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Reaction engineering
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	July 23rd, 2009
INFORMATION ON ADDITIONAL TRAINING	
Year	2003
Place	Split
Institution	Faculty of Science, University of Split
Field of training	Software Mathematica
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name	Chemical reactors - professional study of chemical technology

title of course, study programme where it is/was offered, and level of study programme)	
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	S. Svilović, M. Jakovčević, R. Stipišić, D. Rušić, Equilibrium studies of copper cations exchange by synthetic zeolite X, International conference MATRIB 2013, Vela Luka (2013) 368-373 M.N. Mužek, S. Svilović, J. Zelić, Fly ash-based geopolymeric adsorbent for copper ion removal from wastewater, Desalination and Water Treatment, 52 (2014) 2519-2526. Z. Zeković S Filip, S. Vidović, S. Jokić, S. Svilović, Mathematical modeling of Ocimum basilicum L. supercritical carbon dioxide extraction, Chemical Engineering & Technology 37 (2014) 2123-2128. M. Trgo, N. Vukojević Medvidović, J. Perić, S. Svilović, G. Čačija, Influence of zeolite particle size and initial lead concentration on sorption kinetic study by batch experiments, The Holistic Approach to Environment, 5 (2015) 105-118. M. N. Mužek, S. Svilović, M. Ugrina, J. Zelić, Removal of copper and cobalt ions by fly ash-based geopolymer from solutions - equilibrium study, Desalination and Water Treatment, 57 (2016) 10689-10699.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Project 011-0112247-2245 Chemical engineering in examination of mariculture HRZZ Research Projects (IP-11-2013-4981) Impact of processing conditions on kinetics of heterogeneous systems in agitated batch reactors (HETMIX)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Marina Trgo, prof.**
The course he/she teaches in the proposed study programme	Industry and environment Exercises in industry and environment

GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V
Telephone number	021329454
E-mail address	mtrgo@ktf-split.hr
Personal web page	https://tkojetko.irb.hr/znanstvenikDetalji.php?sifznan=6917
Year of birth	1972
Scientist ID	218460
Research or art rank, and date of last rank appointment	Scientific adviser, 9th October 2012
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor, 21st May 20015
Area and field of election into research or art rank	Technical sciences, chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1st March 2006
Name of position (professor, researcher, associate teacher, etc.)	Full professor, higher scientific researcher,
Field of research	Lecturer and research work within the field of chemical and environmental engineering
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	17th December 2003
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, excellent
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	• Industry and environment (2001 - today), lectures, exercises , Faculty of Chemistry and Technology, University of Split • Water in industry (2004 - today), lectures, seminars, exercises , Faculty of Chemistry and Technology, University of Split • Water technology (2006 - today), lectures, seminars, exercises , Faculty of Chemistry and Technology, University of Split • Water technology (2006 - 2010), lectures, exercises, University of Applied Sciences, Knin • Chemistry in industry (2007 - today), lectures, Faculty of Science, University of Split • Natural zeolites in environmental protection (2010), lectures, Faculty of Chemistry and Technology, University of Split • Wastewater treatment (2004 - 2006), lectures, exercises,

	Faculty of Chemistry and Technology, University of Split • Industrial wastewaters (2007) lectures, seminars, exercises, Faculty of Chemistry and Technology, University of Split.
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. I. Nuić**, M. Trgo**, N. Vukojević Medvidović, The application of the packed bed reactor theory to Pb and Zn uptake from the binary solution onto the fixed bed of natural zeolite, Chemical Engineering Journal, 295 (2016) 347-357. 2. I. Nuić, **M. Trgo**, J. Perić, N. Vukojević Medvidović Uptake of Pb and Zn from a binary solution onto different fixed bed depths of natural zeolite - the BDST model approach, Clay minerals, 50 (2015) 91-101. 3. M. Ugrina, N. Vukojević Medvidović, J. Perić, **M. Trgo,** A study of kinetics and successive sorption/desorption of Zn and Cd uptake onto iron-modified zeolite, Clay minerals 50 (2015) 117-132. 4. I. Nuić, **M. Trgo**, J. Perić, N. Vukojević Medvidović, Analysis of breakthrough curves of Pb and Zn sorption from binary solutions on natural clinoptilolite, Microporous and Mesoporous Materials, 167 (2013) 55-61. 5. M. Kragović, A. Daković, Ž. Sekulić, **M. Trgo**, M. Ugrina, J. Perić, G. D. Gatta, Removal of lead from aqueous solutions by using the natural and Fe(III)-modified zeolite, Applied Surface Science, 258 (2012) 8, 3667-3673.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Leader researcher HZZZ IP-11-2013-4981, NAZELLT - Natural zeolites as a reactive barrier for landfill leachate treatment, 2014.-2018. 2. Bilateral Croatian-Slovenian project: Application of Natural Zeolite for Remediation of Mercury Contaminated Soil, 2016-2018., researcher. 3. Bilateral Croatian-Serbian project: Low-cost sorbents as a potential materials for in situ remediation of heavy-metal contaminated groundwater, 2016.-2018., suradnica. 4. Technology transfer infrastructure in the Croatian Adriatic region -„TTAdria", IPA2007/HR/16IPO/001-040516, nositelj projekta Sveučilište u Splitu, 2013. – 2015., suradnica.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Award "Vera Johanides", 2006, for young scientists, Croatian Academy of Engineering.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation	

organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Ladislav Vrsalović, associate prof.**
The course he/she teaches in the proposed study programme	Electrodeposition Exercises in Electrodeposition Waste Management Exercises in Waste Management Exercises in Construction Materials Exercises in Construction Materials and Protection
GENERAL INFORMATION ON COURSE TEACHER	
Address	Vukovarska 145, Split
Telephone number	021 / 475 707
E-mail address	ladislav@ktf-split.hr
Personal web page	
Year of birth	1974.
Scientist ID	237626
Research or art rank, and date of last rank appointment	Scientific advisor, 26. 11. 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 28. 11. 2012.
Area and field of election into research or art rank	Technical sciences, Chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of chemistry and technology
Date of employment	01. 07. 2000.
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Corrosion, protection of materials
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	University of Split, Faculty of chemistry and technology
Place	Split
Date	03. 04. 2008.
INFORMATION ON ADDITIONAL TRAINING	
Year	2007.
Place	Rijeka
Institution	University of Rijeka
Field of training	First *Synchrotron Radiation Summer School* "*Syncro 07*".
Year	2004.
Place	Zagreb
Institution	Center for technology transfer, Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb
Field of training	Organization of laboratories according to standard HRN EN ISO/IEC 17025
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 3

Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Surface protection technology - Graduate study of chemical technology Corrosion and environment – Graduate study of chemical technology Electrodeposition processes – Professional study of chemical technology
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. S. Gudić, **L. Vrsalović**, M. Kliškić, A. Radonić, M. Zekić, I. Jerković, Corrosion inhibition of AA 5052 aluminium alloy in 0.5 M NaCl solution by different types of honey, *International Journal of Electrochemical Science* 11 (2016) 998-1011. 2. **L. Vrsalović**, S. Gudić, M. Kliškić, E. E. Oguzie, L. Carev, Inhibition of Copper Corrosion in NaCl Solution by Caffeic Acid, *International Journal of Electrochemical Science*. 11 (2016) 459-474. 3. S. Kožuh, **L. Vrsalović**, M. Gojić, S. Gudić, B. Kosec, Comparison of the corrosion behavior and surface morphology of NiTi alloy and stainless steels in sodium chloride solution, *Journal of mining and metallurgy. Section: B, Metallurgy,* 52 (2016) 53-61. 4. S. Kožuh, M. Gojić, **L. Vrsalović**, B. Ivković, Corrosion failure and microstructure analysis of AISI 316L stainless steels for ship pipeline before and after welding, *Kovove Materialy - Metallic Materials* 51 (2013) 53-61. 5. M. Gojić, **L. Vrsalović**, S. Kožuh, A. Kneissl, I. Anžel, S. Gudić, B. Kosec, M. Kliškić, Electrochemical and microstructural study of Cu-Al-Ni shape memory alloy, *Journal of alloys and compounds* 509 (2011) 9782-9790.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Project HRZZ IP-09-2014 „Design of microstructure and functional properties of Cu-based shape memory alloys.“
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken	

in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**PhD, Nediljka Vukojević Medvidović, associate prof.**
The course he/she teaches in the proposed study programme	Water protection Wastewaters Treatment Sustainable Development in Coastal Area Excercises in Wastewaters Treatment
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđer Bošković 35, 21000 Split
Telephone number	021-329-452
E-mail address	nvukojev@ktf-split.hr
Personal web page	http://tkojetko.irb.hr/znanstvenikDetalji.php?sifznan=19202
Year of birth	1976
Scientist ID	243570
Research or art rank, and date of last rank appointment	Scientific advisor, 26 November, 2013
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 26 November, 2012
Area and field of election into research or art rank	Area of Technical Science, field of chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	01 March, 2001
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Scientific, educational and professional activities related to wastewater treatment and environmental remediation
Function	Head of Department of Environmental Engineering (2013-today)
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Doctor of Science, (PhD of technical sciences, chemical engineering)
Institution	Faculty of Chemistry and Technology
Place	Split
Date	25 May, 2007
INFORMATION ON ADDITIONAL TRAINING	
Year	2006
Place	Sofia, Bulgaria
Institution	Institute of Organic Chemistry - Bulgarian Academy of Science
Field of training	Instrumental Analysis: X-ray, IR and Raman Spectroscopy Application
Year	2004
Place	Motovun, Croatia
Institution	Faculty of Chemical Engineering and Technology in Zagreb & National Institute for Chemistry in Ljubljana
Field of training	International school of ion chromatography

Year	2000
Place	Tokyo, Japan
Institution	National Environmental Training Institute in Tokyo
Field of training	Environmental monitoring, Water Quality
Year	1998
Place	Krakow, Poland
Institution	AGH University of Mining and Metallurgy
Field of training	Characterization of coal and coke
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5 - excellent)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French (3 - good)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	• Advanced wastewater treatment (2008-2009), lecture, postgraduate study, Faculty of Chemistry and Technology, University of Split • Process design, (2002- today), seminar, graduate study, Faculty of Chemistry and Technology, University of Split • Wastewater engineering, (2009-today), seminar, laboratory exercise, graduate study, Faculty of Chemistry and Technology, University of Split • Wastewater treatment (2015-today), lecture, seminar, graduate study, Faculty of Chemistry and Technology, University of Split • Water protection (2008–today), lecture, seminar, laboratory exercise, undergraduate study, Faculty of Chemistry and Technology, University of Split • Industrial wastewater, (2008–today), lecture, seminar, laboratory exercise, professional study, Faculty of Chemistry and Technology, University of Split • Water technology (2008), laboratory exercise, graduate study, Faculty of Chemistry and Technology, University of Split • Chemistry and technology of wastewater treatment, (2002-2008), seminar, laboratory exercise, graduate study, Faculty of Chemistry and Technology, University of Split • Water in industry (2004-2007), laboratory exercise, Faculty of Chemistry and Technology, University of Split • Wastewater treatment (2004-2007), laboratory exercise, Faculty of Chemistry and Technology, University of Split
Authorship of university/faculty textbooks in the field of the course	J. Perić, **N. Vukojević Medvidović**, I. Nuić, Inženjerstvo otpadnih voda, Priručnik za laboratorijske vježbe, Kemijsko tehnološki fakultet Sveučilišta u Splitu, lipanj 2012. (http://www.ktf-split.hr/bib/nm/inzenjerstvo_otpadnih_voda.pdf).
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. I. Nuić; M. Trgo; J. Perić; **N. Vukojević Medvidović**, Analysis of breakthrough curves of Pb and Zn sorption from binary solutions on natural clinoptilolite, Microporous and Mesoporous Materials 167 (2013) 55-61 (CC).

	2. **N. Vukojević Medvidović**, J. Perić, Jelena; M. Trgo, I. Nuić, M. Ugrina. Design of the fixed bed column for lead removal on natural zeolite based on batch studies., *Chemical and biochemical engeenering quartely*. 27 (2013) , 1; 21-28. 3. M. Trgo, J. Perić, **N. Vukojević Medvidović**, The effect of demulsifier and dewatering agent on separation of phases from oily water, The Holistic Approach to Environment 1 (2011) 1-9. 4. **N. Vukojević Medvidović**, S. Maletić, J. Perić, M. Trgo, M. Ugrina, Zinc removal from aqueous solutions by precipitation and coagulation/ flocculation // Proceedings 13th Ružićka Days Today science-tomorrow industry / D. Šubarić (ur.). Osijek : Prehrambeno tehnološki fakultet Osijek, Hrvatsko društvo kemijskih inženjera i tehnologa, 2011. 512-519. 5. **N. Vukojević Medvidović**, J. Perić, M. Trgo, Marina, M. Ugrina, M. Sikavica, Modified natural zeolite as a promising material for in situ environmental remediation//Proceedings of XIIth International Symposium Waste Management/XII. međunarodni simpozij gospodarenja otpadom / Anić Vučinić, Aleksandra (ur.). Zagreb: Geotehnički fakultet, 2012. 41-CD ROM.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	• Project leader in bilateral Project with Institute for technology of nuclear and other mineral resources, Beograd, Republic of Serbia: "Low-cost sorbents as a potential materials for *in situ* remediation of heavy-metal contaminated groundwater", 2016-2017. • Collaborator in bilateral project with Geological Department of Slovenia, Ljubljana, Slovenia, Application of natural zeolite for remediation of mercury contaminated soil, 2016-2017 (Project leader: PhD Ivona Nuić). • Collaborator in project HRZZ Research Projects (IP-11-2013-4981) Natural zeolites as a reactive barrier for landfill leachate treatment-NAZELLT, 2014-2018 (Project leader: PhD Marina Trgo, full professor) • Collaborator in project "Natural zeolite in water protection", Ministry of Science, Education and Sports of the Republic of Croatia, Croatia, 2007-2013 (Project leader: PhD Jelena Perić, professor emeritus)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	• Award of Faculty for academic year 1994/95 • Award of Faculty for academic year 1996/97 • Award of Faculty for academic year 1997/98 • Recognition for promotion of the Faculty of Chemistry and

	Technology in Split for academic year 2011/2012
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	- University of Split, EvaSys Evaluation, Average grade 4.4.-5.0 on in grading scale 1.0-5.0. Course evaluated: Wastewater engineering, Wastwater treatment, Industrial wastewater, Process design, Water protection

First and last name and title of teacher	**PhD, Jelica Zelić, prof.**
The course he/she teaches in the proposed study programme	Inorganic materials Exercises in Inorganic Materials Selected Processes of Chemical Industry Exercises in Selected Processes of Chemical Industry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 442
E-mail address	zelic@ktf-split.hr
Personal web page	-
Year of birth	1952
Scientist ID	143203
Research or art rank, and date of last rank appointment	Research adviser (June 10, 2008)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	full professor in permanent position (June 28, 2013)
Area and field of election into research or art rank	scientific area of technical sciences, scientific filed chemical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	September 15, 1993
Name of position (professor, researcher, associate teacher, etc.)	full professor in permanent position
Field of research	Cement composite materials with improved properties
Function	the head of the Dept. of Inorganic technology
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. in Technical sciences (chemical engineering)
Institution	Faculty of Technology, University of Split
Place	Split
Date	May 26, 1997
INFORMATION ON ADDITIONAL TRAINING	
Year	1978-1993 (15 years)
Place	Dugi Rat, Croatia
Institution	The Dalmacia Ferroalloys Works, Dugi rat, Croatia
Field of training	Work experience: Research, development and introducing advanced technology as replacement for existing one, raw materials-production process relationship and processes optimisation.
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and	English (4)

command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Graduate study of Chemical Technology, Orientation: Materials • Inorganic processes in the heterogeneous systems • Corrosion and degradation of building materials • Structure and properties of inorganic non-metallic materials • Glass and ceramics
Authorship of university/faculty textbooks in the field of the course	• Z. Osmanović, **J. Zelić**, Portland cement production/ Proizvodnja Portland-cementa, Manualia Universitatis Studiorum Tuzlaensis, University of Tuzla, B&H, Tuzla, 2010., ISBN 978-9958-897-04-7. http://www.knjiga.ba/proizvodnja_portlandj_cementa-k7412.html • **J. Zelić**, Z. Osmanović, Strength and Durability of Cement Composites/ Čvrstoća i trajnost cementnih kompozita, (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 2014, ISBN 978-953-7803-01-8. https://www.ktf.unist.hr/index.php/nastavni-materijali-knjiznice/repozitorij-265?start=40 • **J. Zelić**, Practicum in the processes of inorganic industry/Praktikum iz procesa anorganske industrije, Faculty of Chemistry and Technology, Split, 2013 (reviewed and edited teaching materials),http://www.ktf-split.hr/bib/nm/Procesi_anorganske_industrije.pdf • **J. Zelić**, Engineering of Selected Inorganic Materials, Faculty of Chemistry and Technology in Split, Split, 2013 (reviewed and edited teaching materials on english language), http://www1.ktf-split.hr/bib/nm/Inzenjerstvo_odabranih_anorganskih_materijala_en.pdf
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. M. N. Mužek; S. Svilović; M. Ugrina; J. Zelić: Removal of copper and cobalt ions by fly ash-based geopolymer from solutions-equilibrium study, *Desalination and Water Treatment*. **57** (2016), pp. 10689-10699. 2. J. Zelić: Industrial waste materials in cement composites imncreased strength and durability. *Book of Abstracts with electronic eddition of Proceedings, 10th Scientific-Research Symposium with International Participation, METALLIC AND NONMETALLIC MATERIALS: production-properties-*

	application, MNM 2014, S. Muhamedagić (ed.), Bugojno (B&H): University of Zenica (B&H), Faculty of Metallurgy and Material Science, 2014, pp. 13-33. (Key note paper) 3. M. N. Mužek; S. Svilović; J. Zelić: Fly ash-based geopolymeric adsorbent for copper from wastewater, *Desalination and Water Treatment*. **52** (2014),13/15; pp. 2519-2526. 4. M. N. Mužek; M. Jelović; S. Svilović; J. Zelić: Equilibrium studies of cobalt ions removal using fly ash Class F. *Proceedings Eurasia Waste Management Symposium 2014*, M. Sinan Bilgili (ed.), Istanbul, Turkey : Yildiz Technical University, 2014, pp. 666-672. 5. M. N. Mužek; J. Zelić; D. Jozić: Microstructure characteristics of geopolymers based on alkali-activated fly ash. *Chemical and Biochemical Engineering Quartely*. **26** (2012), 2; pp. 89-95.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	• Leader of scientific project 011-1252970-2252: Utilization of fly ash in new inorganic binding materials, *Ministry of Science, education and Sports of the republic of Croatia (January 2, 2007* – December 23, 2014)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

3.4. Optimal number of students

The optimal number of students in the Undergraduate Study of Chemical Tech in terms of space, equipment and number of full-time teachers is 90 and represents the proposed admission quota.

3.5. Estimate of costs per student

Average annual tuition fee per student amount about 31,500.00 kunas.

3.6. Plan of procedures of study programme quality assurance

<table>
<tr><td colspan="2">In keeping with the European standards and guidelines for internal quality assurance in higher education institutions (according to “Standards and Guidelines of Quality Assurance in the European Higher Education Area”) on the basis of which the University of Zagreb defines procedures for quality assurance, the proposer of the study programme is obliged to draw up a plan of procedures of study programme quality assurance.</td></tr>
<tr><td colspan="2">Documentation on which the quality assurance system of the constituent part of the University is based:</td></tr>
<tr><td colspan="2">• Regulations on the quality assurance system of the constituent part (enclose if existing)</td></tr>
<tr><td colspan="2">• Handbook on the quality assurance system of the constituent part (enclose if it exists)</td></tr>
<tr><td colspan="2">Description of procedures for evaluation of the quality of study programme implementation:
• Fore each procedure the method needs to be described (most often questionnaires for students or teachers, and self-evaluation questionnaire), name the body conducting evaluation (constituent part, university office), method of processing results and making information available, and timeframe for carrying out evaluation
• If procedure is described in an attached document, name the document and the article.</td></tr>
<tr><td>Evaluation of the work of teachers and part-time teachers</td><td>The process of student evaluation of the teaching quality is conducted by the Quality Enhancement Centre (at the level of the University) and the Quality Enhancement Committees (at the level of constituents). The procedure consists of informing students and teachers, student survey questionnaire, the processing of the questionnaires and reporting on the results, the adoption of measures to improve quality. The procedure is described in detail in the Regulations on the procedure for student evaluation of teaching at the University of Split. The processing of the questionnaires and reporting on the results are under jurisdiction of the Quality Enhancement Centre. Summary results for the each constituent are submitted to the Dean and the leader of the Quality Enhancement Committee.</td></tr>
<tr><td>Monitoring of grading and harmonization of grading with anticipated learning outcomes</td><td>Procedures, rules and criteria for grading of students include: method for taking the exams, requirements for taking the exams, method of evaluation through colloquia, seminars, active participation in classes, exams and other obligations, conditions for signature, a list of references for</td></tr>
</table>

	exam preparation, and data about the teacher, assistant, etc. Informations about procedures, rules and criteria for grading students can found on the website of the Faculty and at the introductory lectures.
Evaluation of availability of resources (spatial, human, IT) in the process of learning and instruction	The Faculty provides adequate and appropriate educational resources for the study program and support for teaching and non-teaching activities of students, which are consistent with the specific programs and student needs and readily accessible to students (equipped classrooms, library, computer classrooms, and support for students with disabilities.
Availability and evaluation of student support (mentorship, tutorship, advising)	Student evaluation of the teaching quality, student survey questionnaire.
Monitoring of student pass/fail rate by course and study programme as a whole	Analysis of student success at the study is conducted by Quality Enhancement Centre of the University of Split. The analysis is carried annually by survey questionnaire at the beginning of the academic year for the previous academic year. The results of the analysis and measures to improve student success are presented to the Senate of the University of Split by leader of the Quality Enhancement Centre. Likewise, ISVU system allows the student service and ISVU coordinator to keep track of student pass/fail rate by course and study programme as a whole.
Student satisfaction with the programme as a whole	Quality Improvement Centre of the University of Split has defined the procedure for conducting a survey on the evaluation of the overall study. The student survey questionnaire for evaluation of the study is conducted by the platform Evasys but after the student has passed the final exam. The aim of the survey is to hear the opinion of students on various aspects of the study which they have completed and to determine flaws in order to increase the quality of the content and implementation of the study. Data is conducted by Quality Enhancement Centre and results are submitted to the Head of Department and to leader of the Quality Enhancement Centre.
Procedures for obtaining feedback from external parties (alums, employers, labour market and other relevant organizations)	Former students are contacted in order to express their assessment of the qualifications for the professional requirements. Selected employers can be contacted as well in order to assess their satisfaction with students which have been studing at this the study program. Regular exchange of information at conferences organized by the ALUMNI of the Faculty (AMACTFS).
Evaluation of student practical education (where this applies)	Evaluation of student training is conducted orally by the course teacher. At the same time the student must submit the log and seminar about selected topic of professional practice.
Other evaluation procedures carried out by the proposer	Formal and informal consultation with colleagues in the profession at the Faculty level and beyond.

Description of procedures for informing external parties on the study programme (students, employers, alums)	Results are available on the official web site of the Faculty (https://www.ktf.unist.hr) Brochure (revised annually) The University review. Universitas – supplement of the Slobodna Dalmacija about the University of Split. The participation of staff and students ot the Faculty at the Science Festival and similar events.