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 CHEMISTRY

SPLIT, May, 2016

GENERAL INFORMATION OF HIGHER EDUCATION INSTITUTION

Name of higher education institution	Faculty of Chemistry and Technology
Address	Split, Ruđera Boškovića 35
Phone	++ 385 21 329 420
Fax	++ 385 21 329 461
E-mail	dekanat@ktf-split.hr
Internet address	www.ktf.unist.hr

GENERAL INFORMATION OF THE STUDY PROGRAMME

Name of the study programme	Undergraduate Study of Chemistry		
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 ☐	Graduate X	Integrated ☐
	Postgraduate ☐	Postgraduate specialist ☐	Graduate specialist ☐
Academic/vocational title earned at completion of study	Bachelor of Chemistry		

1. INTRODUCTION

1.1. Reasons for starting the study programme

Chemistry permeating the entire modern society, are represented in all developed regions of the EU countries and, therefore, need to take an appropriate position in the Split-Dalmatia County and beyond through the activities of University education institutions.
Chemistry, as a fundamental field of natural sciences and one of the oldest scientific disciplines, has grown up on three mutually related contents: theory, synthesis and analysis. In the global development of contemporary society chemistry was and has remained an unavoidable widely applicable scientific field focusing on industry, environmental protection, pharmacy and nutrition. It is necessary to foster, promote and develop the educational programmes of chemistry at all levels for the purposes of continual extending of knowledge of chemistry and the realization of educational support for the future superstructure of graduate and postgraduate study programmes from other scientific fields like chemical engineering and technology, environmental protection, biology, pharmacy, medicine, agronomy, food technology, agronomy, forensics, etc.

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

Possible partners outside the high school system who have so far expressed interest and established cooperation (some are teaching base of the Faculty and the University of Split), and planned employment of young people who have completed university undergraduate, graduate and post-graduate study program in chemistry are: companies from Dalmatia (eg. AD Plastik, Brodosplit, CEMEX, Cian), the entire Croatian (the pharmaceutical industry (eg., PLIVA Croatia, Adriatic galenic laboratory), the oil industry (INA), the food industry, cosmetics industry, paints and varnishes, the company dealing with the protection environment, etc.) and Bosnia and Herzegovina (eg. aluminum), institutes (eg, Institute for Adriatic Crops and karst Reclamation, Institute of Oceanography and Fisheries, Mediterranean Institute for life Sciences), educational institutions of different levels (high school, polytechnic) VIK, County Institute of public health, the Croatian army and police, various inspection services at the national and regional level, ect.

1.3. Compatibility with requirements of professional organizations

One of the basic preconditions for quality implementation of the proposed program is educational, professional and research cooperation of all relevant factors that may contribute to the process of training and education of students. Teachers who teach in the study Chemistry are members of various professional associations and bodies in Croatia (Croatian Chemical Society, Association of Chemical Engineers Split, Croatian Society of Chemical Engineers, Parent Committee for the natural sciences,

field chemistry, Regional scientific council for natural Science, Croatian Academy of Engineering, Croatian standards Institute, etc.) and abroad (eg. American Chemical Society).

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

Some of the specialized industry places and laboratories, teaching bases and the so-called places with whom Faculty of Chemical Technology cooperates (usually for the purpose of maintaining the placement of students - practical and field work and the preparation of the final work of students) are: companies from Dalmatia (eg. AD Plastik, Brodosplit, CEMEX, Cian), the entire Croatian (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. aluminum) and others. Partners faculties and institutes are as follows: Ruder Boskovic, Institute for Adriatic Crops and karst Reclamation, Institute of Oceanography and Fisheries, Mediterranean Institute for life Sciences.

1.5. Financing

Undergraduate study program Chemistry financed as all other study programs at the Faculty of Chemical Technology in Split (earmarked funds MZOS).

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

In developing the curriculum of undergraduate study Chemistry analyzed the comparability with similar programs of university studies in the world, including comparable programs exist in the following institutions University of Maribor (http://www.fkkt.um.si/sl/node/1462), Maribor , Slovenia, University of Ljubljana (http://www.fkkt.uni-lj.si/sl/studij/), Ljubljana, Slovenia, Universite de Geneve (http://www.unige.ch/sciences/Enseignements/ProgrammeCours_en .html), Geneva, Switzerland, Universite de Provence (http://chimie-sciences.univ-amu.fr/master-chimie), Marseille, France, University of Oxford (https://www.ox.ac.uk / admissions / undergraduate / courses-listing / chemistry? WSSS = 1), Oxford, United Kingdom, etc.

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

The study is organized through one semester courses, which is one of the important preconditions for mobility. Compliance programs Chemistry with similar studies in the Republic of Croatia and the EU allows mobility of students and teaching staff. Mobility can be achieved through enrollment in certain courses in studies of other faculties, the whole semester at similar colleges or through the development of the final project.

The Faculty has signed the agreement for Erasmus mobility of teachers and students from the Universite Techniche Dresden, Dresden, Germany, Universita degli Studi di Cagliari, Cagliari, Italy, Universita di Trieste, Trieste, Italy, AGH University of Science ant Technology, Krakow, Polonia, Polytecnich institutes of Braganca, Braganca, Portugal, University of Maribor, Maribor, Slovenia, Polymer technology college, Maribor, Slovenia and others. Chemistry and technology in Split participate 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: 1) Faculty of Material Science and Ceramics, AGH University of Science and Technology, Krakow, 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

Program is aligned with the Strategy of Faculty of Cemistry and Technology, University of Split, and its mission and vision, but also the strategy of the University of Split.

1.9. Current experiences in equivalent or similar study programmes

Faculty of Cemistry and Technology in Split was founded in 1960. During the last period, the Faculty has made a mark in the scientific production of Croatian and is thus confirmed his college education and maturity level. After his scientific productivity has become a major research institution located outside the Croatian Zagreb. The Faculty of Medicine published a considerable number of scientific papers, of which a significant number covered by the scientific bases *Web of Science* and *Current Contents*.
University teaching activity Faculty since its foundation is based on two scientific fields: chemistry and chemical engineering, which belong to different scientific fields (natural and technical).
Undergraduate study program Chemistry grew out of the former 45-year-old teaching and research experience of the faculty. Teachers College for many years involved in the teaching of chemistry in other faculties and departments of the University of Split, as well as at other universities abroad.

2. DESCRIPTION OF THE STUDY PROGRAMME

2.1. General information

Scientific/artistic area of the study programme	Natural Science, field Chemistry
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 chemistry will be able to:

- solve problems applying knowledge of mathematical and physical principles
- apply major concepts, theoretical principles and experimental findings in chemistry to the solution of problems
- apply proper procedures and regulations for safe handling and use of chemicals
- use common computer programs for chemical computations, data acquisition and data base searching
- carry out, record and analyze the results of chemical experiments
- use modern instrumentation and classical techniques and properly record the results of their experiment
- understand the basic principles of unit operations
- solve problems using critical thinking and analytical reasoning
- perform a literature review to find the informations necessary for their work
- present written and oral reports of technical information clearly and concisely
- understand the impact of their work on the economy, environment and society
- understand the professional and ethical responsibility
- function effectively in multidisciplinary team
- present the professional contents independently
- recognize the importance of life-long learning.

2.3. Employment possibilities

Graduates students can be employed by the aforementioned business entities with which the faculty cooperates, as well as in educational institutions, various inspection services at the national and regional leve, ect.

2.4. Possibilities of continuing studies at a higher level

At the Faculty of Chemistry and Technology are graduate study Chemistry and Chemical Technology, and besides opportunities to continue studying at the Faculty, graduates of university undergraduate study Chemistry can continue their studies at other universities at home and abroad, especially in the field of European Higher Education.

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

Terms and method of studying at a university undergraduate degree in chemistry are based on the Regulations on the Study and Study System Chemical Technology that complies with the Rules of Study and Study System of the University of Split. For example, mention rules detailed provision requirements for enrollment in the next academic year, regular or compulsory exams and exam dates and the like.

2.7. Guiding and tutoring through the study system

At the Faculty of Chemistry and Technology there is a model teacher-mentor through which students can get help, advice and support. There is also a mentoring system when creating the final work.

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

For undergraduate study Chemistry students may choose electives for a small number of cases (eg, English, sports activities) from other studies at the University of Split in accordance with the rules of the University who may or may not enter the workload which yields a specific decision for each student.

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

Teaching at undergraduate level of Chemistry, generally will run in the Croatian language. Since the program there are objects which carries a possibility of realization of teaching in English, it is possible that in these courses as needed realizes teaching in English.

2.10. Criteria and conditions for transferring the ECTS credits

Criteria and transfer credits shall be prescribed by agreement between the institutions of higher education, the Rules on Study and Study System at the

University of Split, the Statute of Chemical Technology in Split and the Regulations on Study and Study System of Chemical 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

List of courses							
Year of study: I.							
Semester: I.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA101	Mathematics 1	45	45	0	0	8.0
	KTA102	Physics I	45	30	0	0	8.0
	KTA103	Exercises in Physics I	0	0	15	0	1.0
	KTA104	General Chemistry	45	30	0	0	7.0
	KTG101	Exercises in General Chemistry	0	0	45	0	2.0
	KTA113	Computer application	30	0	15	0	4.0
	Total		**165**	**105**	**75**	**0**	**30**

List of courses							
Year of study: I.							
Semester: II.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTA106	Mathematics 2	45	30	0	0	6.0
	KTG102	Physics II	45	15	0	0	6.0
	KTG103	Exercises in Pysics II	0	0	30	0	2.0
	KTG104	Inorganic chemistry I	30	15	0	0	4.0
	KTG105	Exercises in Inorganic Chemistry	0	0	45	0	3.0
	KTG106	Analytical Chemistry I	45	15	0	0	6.0
	KTG107	Exercise of Analytical Chemistry I	0	0	45	0	3.0
	Total		**165**	**75**	**120**	**0**	**30**

List of courses							
Year of study: II.							
Semester: III.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTG201	Inorganic Chemistry II	30	30	0	0	5.0
	KTG202	Exercises in Inorganic Chemistry II	0	0	30	0	2.0
	KTG203	Analytical Chemistry II	30	15	0	0	4.0
	KTG204	Exercises in Analytical Chemistry II	0	0	60	0	4.0
	KTG205	Physical chemistry I	60	15	0	0	6.5
	KTG206	Organic chemistry I	60	15	0	0	6.5
	KTG207	Laboratory exercises in organic chemistry I	0	0	30	0	2.0
	Total		**180**	**75**	**120**	**0**	**30**

List of courses							
Year of study: II.							
Semester: IV.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTG208	Organic Chemistry II	30	15	0	0	5.0
	KTG209	Experimental Organic Chemistry II	0	0	45	0	3.0
	KTG210	Physical Chemistry II	30	15	0	0	5.0
	KTG211	Exercises in Physical Chemistry II	0	0	60	0	4.0
	KTG213	Natural Products	45	0	0	0	4.0
	KTG214	Experimental in Natural Products	0	0	30	0	2.0
	KTG212	Catalysis	30	15	0	0	4.0
	KTGOSP	Proffesional practice					3.0
	Total		**135**	**45**	**135**	**0**	**30**

List of courses							
Year of study: III.							
Semester: V.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTG313	Environmental Chemistry	30	15	0	0	4.0
	KTG302	Instrumental Methods of Analysis	30	15	0	0	4.5
	KTG303	Exercises in Instrumental Methods of Analysis	0	0	30	0	2.0
	KTG304	Biochemistry I	45	15	0	0	5.0
	KTG305	Biochemistry I laboratory	0	0	60	0	4.0
	KTG306	Analysis of real samples	30	15	0	0	3.5
	KTG307	Exercise of Analysis of real samples	0	0	30	0	2.0
	KTG308	Elementary chemical engineering	30	15	0	0	4.0
	KTG309	Exercises of elementary chemical engineering	0	0	15	0	1.0
	Total		**180**	**75**	**105**	**0**	**30**

List of courses							
Year of study: III.							
Semester: VI.							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	KTG305	Biochemistry II	30	15	0	0	6.0
	KTG311	Selected processes of chemical industry	45	15	0	0	5.5
	KTG312	Selected processes of chemical industry-laboratory	0	0	30	0	2.0
	KTGOZR	Final work					8.0
	Total		**75**	**30**	**30**	**0**	**21.5**
Elective	KTG301	General Biology	30	15	0	0	4.0
	KTG315	Enzyme kinetics	30	15	0	0	4.0
	KTG316	Enzyme kinetics exercise	0	0	30	0	2.0
	KTG317	Perfumes and Cosmetics	30	0	0	0	4.0
	KTG318	Experimental in Perfumes and Cosmetics	0	0	15	0	1.0
	KTG319	Chemistry in pharmacology	30	15	0	0	4.0
	KTG320	Exercise of chemistry in pharmacology	0	0	30	0	2.0
	KTG321	Chemistry of polymers	30	0	0	0	3.0

	KTG322	Exercises in polymer chemistry	0	0	30	0	2.0
	KTG323	Nanochemistry	30	0	30	0	3.0
	KTG324	English	30	0	0	0	2.0
	KTG325	German	30	0	0	0	2.0
	KTG326	Sociology of contemporary society	30	0	0	0	2.0
	The minimum amount of credit that must be obtained from elective courses is 8.5						

2.13. Course description

Mathematics 1

NAME OF THE COURSE	Mathematics 1					
Code	KTA101	Year of study	1st year			
Course teacher	Mr, 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	☐independent assignments ✕multimedia ☐laboratory ☐work with mentor				

<table>
<tr><td></td><td colspan="6">☐partial e-learning
☐ield work</td><td colspan="2">☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="8">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 colspan="2">Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td colspan="2">(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td colspan="2">(Other)</td><td></td></tr>
<tr><td>Tests</td><td>2</td><td>Oral exam</td><td>1,5</td><td colspan="2">(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1,5</td><td>Project</td><td></td><td colspan="2">(Other)</td><td></td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">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="5">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="5">T. Bradić, i dr., Matematika za tehnološke fakultete, Element, Zagreb (više izdanja)</td><td>47</td><td></td></tr>
<tr><td colspan="5">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="5">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="8">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="8">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="8"></td></tr>
</table>

Physics 1

<table>
<tr><td>COURSE NAME</td><td colspan="5">Physics 1</td></tr>
<tr><td>Course code</td><td>KTA 102</td><td>Year of study</td><td colspan="4">1st Academic Undergraduate Study</td></tr>
<tr><td>Course lecturer</td><td>PhD, Magdi Lučić Lavčević, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">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="4"></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 Physics 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.</td></tr>
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<table>
<tr><td></td><td colspan="6">Seminar: Solving the numerical examples pertaining to the theoretical content 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 work in class and at the final exam</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.
During the final examination period, the final theory exam shall be taken after</td></tr>
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<table>
<tr><td></td><td colspan="3">passing the final problem's solving exam.
Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td>Book title</td><td>Number of books in the library</td><td>Available via other media</td></tr>
<tr><td>N. Cindro, Fizika I, Školska knjiga, Zagreb, 1985;</td><td>10</td><td>-</td></tr>
<tr><td>E. Babić, R. Krsnik, M. Očko, Zbirka riješenih zadataka iz fizike, Školska knjiga Zagreb, Zagreb, 1990.</td><td>3</td><td>-</td></tr>
<tr><td></td><td></td><td>-</td></tr>
<tr><td>Optional literature</td><td colspan="3">• 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.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">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="3"></td></tr>
</table>

Exercises in Pysics 1

NAME OF THE COURSE	Exercises in Pysics 1						
Code	KTA103	Year of study	1st Academic Undergraduate Study				
Course teacher	PhD, Magdi Lučić Lavčević, 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	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 physics quantities in the field of mechanics. Additionally, 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 level of the course (4 to 10 learning outcomes)	- Obtaining basic knowledge and skills needed to conduct experiments - The knowledge of various methods and techniques of measurement - Mastering the calculation of errors which occurred during the measurement - Mastering the evaluation of errors which occurred 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
Course content broken down in detail by weekly class schedule (syllabus)	• 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 hydrostatics (Archimedes law, surface tension). (*3 hours*) • Compensating exercises • Final revision test
Format of instruction	☐ lectures ☐ seminars and workshops **X** exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia **X** laboratory ☐ work with mentor **X** group and individual tutorials ☐ (other)
Student responsibilities	.

Screening student work *(name the proportion of ECTS credits for each activity so that the*	Class attendance	0.3	Research		Practical training	
	Experimental work		Report		Pre-test preparation classes	0.3

total number of ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		(Other)	
	Tests	0.4	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Weekly tests, Grade of the written experiment report, Final test Grades: 55-64% - sufficient; 65-79% - 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**
	D. Krpan Lisica, Praktikum iz fizike - I.dio, 2010, sveučilišni priručnik	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)			

General Chemistry

NAME OF THE COURSE	General Chemistry					
Code	KTA104	Year of study	1.			
Course teacher	PhD, Slobodan Brinić, associate prof. PhD, Zoran Grubač, prof.	Credits (ECTS)	7			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			45	30	-	
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 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 ☐partial e-learning ☐field work	☐independent assignments ☐multimedia ☐laboratory ☐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.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and 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	KTG101	Year of study	1.			
Course teacher	PhD, Slobodan Brinić, associate prof. PhD, Zoran Grubač, prof.	Credits (ECTS)	2			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
					45	
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 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> 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). Exercise 6 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. Exercise 7 Protolytic reactions and titration curves obtained with the help of computers Determination of the acid dissociation constant, K_a. Hydrolysis. Buffers. Exercise 8 Vacuum distillation. Determination of the molar mass of easily volatile liquids. Determination of molar mass by freezing point depression
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line* in entirety ☐partial e-learning ☐field work ☐independent assignments ☐multimedia x laboratory ☐work with mentor ☐ (other)
Student responsibilities	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		Research		Practical training	
	Experimental work	2	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	Prior to joining the laboratory exercises, students' knowledge of the material concerned exercises will be verified by tests.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	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)	

Computer application

NAME OF THE COURSE	Computer application					
Code	KTA113	Year of study	1			
Course teacher	PhD, Dražan Jozić, associated prof.	Credits (ECTS)	4.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30		15	
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 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	1.0
	Experimental work		Report		Independent work	0.6
	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,	1	

	2013.		
	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	1. Tracking suggestions and reactions of students throughout the semester 2. Student survey		
Other (as the proposer wishes to add)			

Mathematics 2

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Mathematics 2</td></tr>
<tr><td>Code</td><td>KTA106</td><td>Year of study</td><td colspan="4">1st year</td></tr>
<tr><td>Course teacher</td><td>Mr, Branka Gotovac, lecturer</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Lucija Ružman, 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>30</td><td></td><td></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">To introduce students to the basic elements of integral calculus, differential calculus of several variables and the basic of differential equations.</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 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 (variables separable, homogeneous differential equations, linear differential equations, exact differential equations)
• solve the second-order linear nonhomogeneous differential equations with constant coefficients</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">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.</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">Regular attendance of classes.</td></tr>
</table>

<table>
<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>2,3</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>1,5</td><td>Oral exam</td><td>1,1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1,1</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">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="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. Bradić, i dr., Matematika za tehnološke fakultete, Element, Zagreb (više izdanja)</td><td>47</td><td colspan="2"></td></tr>
<tr><td colspan="3">B.P. Demidovič, Zadaci i riješeni primjeri iz više matematike, Tehnička knjiga, Zagreb (više izdanja)</td><td>5</td><td colspan="2"></td></tr>
<tr><td colspan="3">I. Slapničar, Matematika 2, Fakultet elektrotehnike, strojarstva i brodogradnje Sveučilišta u Splitu, Split, 2008. (http://lavica.fesb.hr/mat2)</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">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.</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>

Physics 2

<table>
<tr><td>COURSE NAME</td><td colspan="5">Physics 2</td></tr>
<tr><td>Course code</td><td>KTG102</td><td>Year of study</td><td colspan="4">1st Academic Undergraduate Study</td></tr>
<tr><td>Course lecturer</td><td>PhD, Magdi Lučić Lavčević, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">6.0</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>15</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="4"></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 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</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 II</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
– 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="5">1st week: Electric charges, electrostatic force and electrostatic field. Vector field flux and Gauss's law. Application of Gauss law. (3 hours)
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course. (1 hour)
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 hour)
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 hour)
4th week: Magnetic field. Gauss law. Ampere's law. (3 hours)
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour)
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 hour)
Partial assessment (1st preliminary test) related to seminars and theory addressed during the course.
6th week: Vector field circulation. Applications. (3 hours)
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour)
7th week: Maxwell equations. (3 hours)
Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour)</td></tr>
</table>

	8th: week: Alternating currents. Electromagnetic oscillating circuit and radiation. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 9th week: Energy of electric and magnetic fields. Electromagnetic waves and nature of light. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 10th week: Electric and magnetic field in matter. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) Partial assessment (2nd preliminary test) related to seminars and theory addressed during the course. 11th week: Physical optics (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 12th week: Geometric optics. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 13th week: Optical systems and instruments. Eye physics. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 14th week: Wave properties of matter. Concepts of quantum physics (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) 15th week: Concepts of quantum physics - applications. (3 hours) Seminar: Solving the numerical examples pertaining to the theoretical content addressed during the course (1 hour) Partial assessment (3rd preliminary test) related to seminars and theory addressed during the course

Format of instruction	**X** lectures ☐ seminars and workshops ☐exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments **X** multimedia ☐ laboratory ☐ work with mentor **X** group and individual tutorials **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	0.9	Research		Practical training	
	Experimental work		Report		Pre-test preparation classes	
	Essay		Seminar essay		(Other)	
	Tests	1.7	Oral exam	1.7	(Other)	
	Written exam	1.7	Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester, the final exam can be substituted via 3 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% -

<table>
<tr><td></td><td colspan="3">excellent</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td>Book title</td><td>Number of books in the library</td><td>Available via other media</td></tr>
<tr><td>N. Cindro, Fizika II, Školska knjiga, Zagreb, 1985.</td><td>10</td><td>-</td></tr>
<tr><td>E. Babić, R. Krsnik, M. Očko, Zbirka riješenih zadataka iz fizike, Školska knjiga, Zagreb, Zagreb, 1990.</td><td>3</td><td>-</td></tr>
<tr><td>Optional literature</td><td colspan="3">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.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">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="3"></td></tr>
</table>

Exercises in Pysics 2

<table>
<tr><td>COURSE NAME</td><td colspan="6">Exercises in Pysics 2</td></tr>
<tr><td>Course code</td><td>KTG103</td><td>Year of study</td><td colspan="4">1st Academic Undergraduate Study</td></tr>
<tr><td>Course lecturer</td><td>PhD, Magdi Lučić Lavčević, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">2.0</td></tr>
<tr><td rowspan="2">Assistants</td><td rowspan="2">PhD, Mirko Marušić
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>0</td><td>0</td><td>30</td><td>0</td></tr>
<tr><td>Course status</td><td>Mandatory</td><td>Application of e-learning (percentage)</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<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 from the field of electromagnetism and optics. Additionally, 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.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Pysics 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 occurred during the measurement
- Mastering the evaluation of errors which occurred 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="2">Screening student work (name the proportion of ECTS credits for each activity so that the</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>
</table>

<table>
<tr><td rowspan="3">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>0.8</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>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">M. Lučić Lavčević, Praktikum iz fizike, II. dio, 2012, script in preparation</td><td></td><td colspan="2">Web - portal</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 proposer wishes to add)</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">- 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 occurred during the measurement
- Mastering the evaluation of errors which occurred 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>Screening student work (name the</td><td>Class attendance</td><td>0.6</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		Pre-test preparation classes	0.6
	Essay		Seminar essay		(Other)	
	Tests	0.8	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Weekly tests, Grade of the written experiment report, Final test. 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**
	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 1

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Inorganic chemistry 1</td></tr>
<tr><td>Code</td><td>KTG104</td><td>Year of study</td><td colspan="4">1.</td></tr>
<tr><td>Course teacher</td><td>PhD, Zoran Grubač, prof.
PhD, Slobodan Brinić, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">7</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>15</td><td>30</td><td></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">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</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 Inorganic Chemistry
The condition for taking the exam: Passed the course "Exercises in Inorganic Chemistry I"</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">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</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6"><u>Lectures</u>:
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</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">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</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
☐multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">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="6">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:</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">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>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>I. Filipović, S. Lipanović, Opća i anorganska kemija II dio, Školska knjiga, Zagreb, 1995</td><td>10</td><td></td></tr>
<tr><td>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>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>
<tr><td>Vježbe iz Anorganske kemije (interna skripta), Kemijsko-tehnološki fakultet, Split, 2013.</td><td></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="3">F. Albert Cotton et al., Basic Inorganic Chemistry, New York, John Wiley and Sons, 1995.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- 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="3"></td></tr>
</table>

Exercises in Inorganic Chemistry 1

NAME OF THE COURSE	Exercises in Inorganic Chemistry 1							
Code	KTG105		Year of study	1.				
Course teacher	PhD, Zoran Grubač, prof. PhD, Slobodan Brinić, associate prof.		Credits (ECTS)	3				
Associate teachers			Type of instruction (number of hours)	L	S	E	F	
						45		
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) 6. Exercise: TRANSITION ELEMENTS (groups 3 to 7) 7. Exercise: TRANSITION ELEMENTS (groups 8 to 12) 8. Exercise: Synthesis of double salts, alums and Tutton salts, Synthesis of Mohr's salt 9. Exercise: Synthesis of nickel complexes							
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work			☐ independent assignments ☐ multimedia x laboratory ☐ work with mentor ☐ (other)				
Student responsibilities	Completed all laboratory exercises.							
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of*	Class attendance		Research		Practical training			
	Experimental work	2	Report		(Other)			
	Essay		Seminar essay		(Other)			

<table>
<tr><td rowspan="2">ECTS credits is equal to the ECTS value of the course)</td><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>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>

Analitycal Chemistry 1

NAME OF THE COURSE	Analytical Chemistry 1					
Code	KTG106	Year of study	1			
Course teacher	PhD, Josiap Giljanović, associate prof.	Credits (ECTS)				
Associate teachers		Type of instruction (number of hours)	P	S	V	T
			45	15	0	0
Status of the course	Mandatory	Percentage of application of e-learning				
OPIS PREDMETA						
Course objectives	Acquiring basic basic theoretical knowledge of analytical chemistry, the role and application of analytical chemistry in various fields of human activity. Being able to access the chemical analysis of the sample by applying the laws of chemistry chemical balance for identification of an analyte in a sample in order to obtain useful information.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercise of Analytical Chemistry I					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	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 - Define the concept of analyte, the analytical signal and information. -Understanding the basic laws of chemical analysis. - Define the equilibrium constants of chemical reactions, the law of mass action and the principle according to Le Chatelier. -. Implement the principle of chemical equilibrium chemical reactions for identification and separation of analytes from complex matrix. 5. Distinguish the heterogeneous from homogeneous chemical equilibrium systems. 6. Predict the behavior of a chemical reaction due to the change in pH and due to the effect of the foreign ions. 7. Capacity to apply knowledge in practice, especially in problem solving based on information from systems.					
Course content broken down in detail by weekly class schedule (syllabus)	Week 1: The description and view the contents of the object. Definitions of analytical chemistry. Division of Analytical Chemistry. The concept and the formation of the analytical signal. Seminar: Solving problems. Week 2: Definition of chemical analysis - qualitative and quantitative. Seminar: Solving problems. Week 3: Constants homogeneous equilibrium of importance in analytical chemistry. Seminar: Solving problems. Week 4: Constants of heterogeneous equilibrium of importance in analytical chemistry. Seminar: Solving problems. Week 5: Qualitative chemical analysis. The concept and definition of acids and bases. Consideration of acid-base balance. Seminar: Solving problems. Week 6: Acid-base equilibrium, acidity, pH buffers. Seminar: Solving problems Week 7: I. Partial test (theoretical and seminar materials). Solving test Week 8: Concept and definition of complex ions, complexometric equilibrium, kinetics of complex formation. Seminar: Solving problems Week 9. Consideration of complexometric equilibrium. Seminar: Solving problems.					

	Week 10: Concept and definition of the electrochemical reaction. Consideration of equilibrium electrochemical reactions. Seminar: Solving problems Week 11: Concept and definition of the redox reaction. Consideration of equilibrium electrochemical reactions. Seminar: Solving problems. Week 12: Concept and definition of heterogeneous equilibrium. Consideration of the process of dissolution and precipitation. Seminar: Solving problems Week 13: Concept and definition of extraction. Simple and complex extraction. Extraction of weak acids and metal cations from solution. Seminar: Solving problems Week 14: Concept and definition of chromatography. Analytical separation by chromatography. Seminar: Solving problems 15th week: II. Partial test (theoretical and seminar materials). Solving test
Format of instruction	☐x lectures ☐x seminars and workshops ☐x exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments x☐ multimedia x☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The 80% presence at lectures 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	1	Research		Practical training	
	Experimental work		Report		Laboratory exercise	3
	Essay		Seminar essay		(Other)	
	Tests	1	Oral exam	2	(Other)	
	Written exam	2	Project		(Other)	

Grading and evaluating student work in class and at the final exam	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 30% , written-oral with 60% 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.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	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.};	1.6	Web page of the Department of Analytical Chemistry
	2.A. Skoog, D. M. West i F. J. Holler, S. R. Crouch,	1	

	Fundamentals of Analytical Chemistry, 9th edition, Brooks&Cole, SAD, 2014.;		
	3. Nj. Radić, L. Kukoč-Modun, Uvod u analitičku kemiju, Redak, 2013.	32	
	.; 4.D.C.Harris, Quantitative Chemical Analysis, Eighth Edition, W.H.Freeman and Company, New York, 2010.	1	
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		
Other (as the proposer wishes to add)			

Exercise of Analytical Chemistry 1

NAME OF THE COURSE	Exercises in Analytical Chemistry 1						
Code	KTG107	Year of study	1				
Course teacher	PhD, Josiap Giljanović associate prof.	Credits (ECTS)					
Associate teachers		Type of instruction (number of hours)	P	S	V	T	
			0	0	45	0	
Status of the course	Mandatory	Percentage of application of e-learning					

OPIS PREDMETA	
Course objectives	The aim is to familiarize students with the mechanisms and equilibrium of homogeneous and heterogeneous chemical reactions and their application in analytical methods and qualitative determination.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Analytical Chemistry I
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Plan and conduct chemical experiments on the basis of theoretical knowledge and predictions based on calculations, Systematics cations and anions
Course content broken down in detail by weekly class schedule (syllabus)	1. Week: Introduction in laboratory work, Basic laboratory operations. (3 hours) 2. Week: Qualitative chemical analysis – determination of groups of cations. (3 hours) 3. Week: Qualitative chemical analysis – determination of cations in groups (6 hours) 4. Week: Determination of cations in the mixture. (hours) 5. Week: Qualitative chemical analysis – determination of groups of anions (3 hours) 6. Week: Qualitative chemical analysis – determination of anions in groups (6 hours) 7. Week: Determination of aniona in the mixture (6 hours) 8. Week: extraction (4 hours) 9. Week: chromatography (4 hours) 10. Week: ionic exchange (4 hours)
Format of instruction	☐ lectures ☐ seminars and workshops ☐x exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia x☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	

Screening student work *(name the proportion of ECTS credits for each*						
	Class attendance		Research		Practical training	
	Experimental		Report		Laboratory exercise	2

activity so that the total number of ECTS credits is equal to the ECTS value of the course)	work					
	Essay	1	Seminar essay		(Other)	
	Tests	1	Oral exam	2	(Other)	
	Written exam	2	Project		(Other)	

Grading and evaluating student work in class and at the final exam	Completed all laboratory exercises and tests (100 %).		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	J. Giljanović, Practicum in qualitative analysis, university manual,2010	20	Web page of the Department of Analytical Chemistry
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	• Completed all laboratory exercises • annual analysis of students success in this course • student's survey in order to evaluate the professor		
Other (as the proposer wishes to add)			

Inorganic Chemistry 2

NAME OF THE COURSE	Inorganic Chemistry 2					
Code	KTG201	Year of study	2.			
Course teacher	PhD, Slobodan Brinić, associate prof. PhD, Zoran Grubač, prof.	Credits (ECTS)	5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	30		
Status of the course	Mandatory	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Introduce students to the chemistry of transition metals and to the structure and properties of their compounds. Applying important theoretical principles of atomic theory and chemical bonding in explanation of structure of complex compounds with examples of their use and importance in bioinorganic and organometallic chemistry.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Inorganic Chemistry II The condition for taking the exam: Passed the course "Exercises in Inorganic Chemistry 2"					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	At the end of the course students will: • know the characteristic properties and reactions of transition metal • be able to predict physical and chemical properties of transition metals compounds based on the knowledge of their structure • be able to determine the structure and predict the properties of complex ions and their compounds • be able to predict the influence of ligands on the properties of complex ions and their compounds • understand the basic problems in bioinorganic and organometallic chemistry					
Course content broken down in detail by weekly class schedule (syllabus)	1. lecture: Introduction to the Chemistry of transition elements 2. lecture: Group III PSE, lanthanides and actinides 3. lecture: IV and V groups PSE 4. lecture VI and VII of the PSE Group 5. lecture: VIII and IX of the PSE Group 6. lecture: X, XI and XII PSE group 7. lecture: Complex compounds, types of ligands, isomerism, the application of valence bond theory 8. lecture: Theory of crystal field 9. lecture: Theory of molecular orbitals (LCAO) and photoelectron spectroscopy, symmetrical operations 10. lecture: ligand field theory. 11. lecture: The stability of complex compounds, thermodynamic and kinetic 12. lecture: Spectroscopic and magnetokemijsko behavior of complex compounds. 13. lecture: Organometallic compounds. 14. lecture: Bioinorganic Chemistry.					

<table>
<tr><td></td><td colspan="6">1. seminar: Transition elements,
2. seminar: Elements of 4th-5th PSE group
3. seminar: Elements 5th-6th PSE group
4. seminar: Elements of 7th-8th PSE group
5. seminar: Elements of 9th-10th PSE group
6. seminar: Elements of 11th-12th PSE group
7. seminar: Coordination nomenclature
8. seminar: isomerion complex compounds
9. seminar: The structure of complex ions, magnetic properties
10. seminar: Forecasting the colors of the complex based on the type of ligand and cleavage d orbitals of the metal ion
11. seminar: Determining the structure of a complex compound on the basis of experimental results
12. seminar: Identifying stable complexes
13. seminar: Organometallic Compounds
14. seminar: Bioinorganic Chemistry</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
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">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>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>1</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></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Students who obtain a signature from the course Inorganic Chemistry II 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 two 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>Required literature</td><td colspan="3">Title</td><td>Number of</td><td>Availability via</td></tr>
</table>

(available in the library and via other media)		**copies in the library**	**other media**
	F. Albert Cotton et al., Advanced Inorganic Chemistry, New York, John Wiley and Sons, 1999.		
	W. Kaim, B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, J. Wiley & Sons, Chichester, 1994.		
	Brinić, Slobodan: „Predavanja iz odabranih poglavlja Anorganske kemije II“		web http://www.ktf-split.hr
	Grubač, Zoran: „Predavanja iz odabranih poglavlja Anorganske kemije II“		web http://www.ktf-split.hr
	Vježbe iz Anorganske kemije II (interna skripta), Kemijsko-tehnološki fakultet, Split, 2008.		web http://www.ktf-split.hr
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)			

Exercises in Inorganic Chemistry 2

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Exercises in Inorganic Chemistry 2</td></tr>
<tr><td>Code</td><td>KTG202</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>PhD, Slobodan Brinić, associate prof.
PhD, Zoran Grubač, prof.</td><td>Credits (ECTS)</td><td colspan="5">3</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></td><td></td><td>30</td><td></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">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.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Inorganic Chemistry II</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">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.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">In the frame of laboratory exercises students will perform exercises independently from the content of these topics:
<u>Exercises</u> :
<u>Exercise 1</u>
Changing the coordination number of compounds - Complexes of nickel
<u>Exercise 2</u>
Preparation of potassium trioxalatoferrate(III) trihydrate and preparation of potassium tetraperoxochromate(V)
<u>Exercise 3</u>
Determination of composition of the potassium trioxalatoferrate(III) trihydrate and potassium tetraperoxochromate(V).
<u>Exercise 4</u>
Preparation of ammonium manganese(II) phosphate monohydrate; Preparation of ferric(III) chloride; Preparation of chromium (III) oxide
<u>Exercise 5</u>
Preparation of $[CoCl(NH_3)_5]^{2+}$ complex.
<u>Exercise 6</u>
Hydration of $[CoCl(NH_3)_5]^{2+}$ complex.</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>
</table>

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	3	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	Prior to joining the laboratory exercises, students' knowledge of the material concerned exercises will be verified by tests. All exercises must be completed. It is necessary to pass all tests in order to pass the exam.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Vježbe iz Anorganske kemije II (interna skripta), Kemijsko-tehnološki fakultet, Split, 2008.	10	

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)	

Analytical Chemistry 2

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Analytical Chemistry II</td></tr>
<tr><td>Code</td><td>(112485) (KTG203)</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>PhD, Lea Kukoč Modun, assistant prof.</td><td>Credits (ECTS)</td><td colspan="5">4.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Maja Biočić, 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>30</td><td>15</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>basic</td><td>Percentage of application of e-learning</td><td colspan="5">0 %</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The goal of course is to familiarize students with the mechanisms and equilibrium of homogenous and heterogeneous chemical reactions and their applications in analytical methods for determining process. Theoretical basis of kinetic methods of analysis will be explained.</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 Analytical Chemistry II</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Calculate and predict the acid-base titration curve. Apply acid-base titration based on theoretical predictions.
2. Explain the method of calculating pM values different parts of the EDTA titration curves, based on the application of knowledge of the equilibrium of complex formation.
3. Construct the redox titration curve and anticipate the possibility of using visual redox indicators based on theoretical predictions.
4. Define and apply the precipitation requirements.
5. Calculate and predict the precipitation titration curve.
6. Compare kinetic methods of analysis and classical analytical methods based on thermodynamic equilibrium, in terms of selectivity and application options.
7. Solve numerically analytical problems.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week
Lectures: Gravimetric analysis.
Seminars: Gravimetric analysis (numerical examples).

2nd week
Lectures: Precipitation gravimetry, properties of precipitate and precipitation requirements.
Seminars: Gravimetric analysis (numerical examples).

3rd week
Lectures: Quantitative determination, titrations, standard preparation.
Seminars: Quantitative determination, titrations, standard preparation (numerical examples).

4th week
Lectures: Precipitation titrations.
Seminars: Precipitation titrations (numerical examples, titration curve construction,</td></tr>
</table>

	using of the Excel spreadsheet). 5th week Lectures: Precipitation titration, End –point detection. Seminars: Precipitation titrations (numerical examples, titration curve construction, using of the Excel spreadsheet) 6th week Lectures: Acid-base titrations, titration of the strong acid with strong base and strong base with strong acid. Titration of the weak acid with strong base and weak base with strong acid. Seminars: Acid-base titrations (numerical examples, titration curve construction, using of the Excel spreadsheet).. 7th week Lectures: Titrations in polyprotic systems. Finding the end point with pH electrode. Seminars: Acid-base titrations (numerical examples, titration curve construction, using of the Excel spreadsheet).. 8th week Lectures: Finding the end point with visual indicators. Titration in nonaqueous solvents. Seminars: Acid-base titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 9th week Lectures: EDTA titrations. The impact of conditional formation constants on the inflection of the EDTA titration curves. Seminars: EDTA titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 10th week Lectures: Auxilary complexing agents. Metal ion indicators. Seminars: EDTA titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 11th week Lectures: Redox titrations. Redox titration based on the simple stochiometry redox reaction. Seminars: Redox titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 12th week Lectures: Redox titration based on the complex stochiometry redox reaction, the effect of pH value. Seminars: Redox titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 13th week Lectures: Analysis of a mixture. Finding the end point of redox titrations. Seminars: Redox titrations (numerical examples, titration curve construction, using of the Excel spreadsheet).

	14th week Lectures: Adjustment of analyte oxidation state. Preparation and standardization of titration standards. Seminars: Redox titrations (numerical examples, titration curve construction, using of the Excel spreadsheet). 15th week Lectures: Kinetic method analysis. Seminars: Kinetic method analysis (numerical examples).
Format of instruction	x lectures x seminars and workshops □ exercises □ *on line*in entirety □ partial e-learning □ field work x independent assignments x multimedia □ laboratory □ work with mentor x team based learning
Studentresponsibilities	The 70% presence at lectures and seminars

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		Test of numerical examples	30 % (1,2 ECTS)
	Essay		Seminar essay		Test of teoretical part	55 % (2,2 ECTS)
	Tests		Oral exam	15 % (0,6 ECTS)	(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Scoring at the exam consists of two basic parts, test of numerical example (minimum score: 18; maximum score: 30) and test of theoretical part (minimum score: 42; maximum score: 70). Students who had attended lectures and seminar in 70 % can take the exam through partial tests: 2 tests of numerical examples (minimum score: 9; maximum score: 15) and 2 tests of theoretical part (minimum score: 21; maximum score: 35) The rating is formed in accordance with the score ranges: sufficient (60 - 70 points) , good (71-80 points) , very good (81-90 points) , excellent (≥91points)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	D.A. Skoog, D.M. West, F.J. Holler, Osnove analitičke kemije, šesto izdanje (englesko), prvo izdanje (hrvatsko), Školska knjiga, Zagreb, 1999.	18	
	Nj. Radić i L. Kukoč Modun, Uvod u analitičku kemiju I. dio, Redak, Split, 2013.	32	
	M. Kaštelan-Macan, Kemijska analiza u sustavu kvalitete, Školska knjiga, Zagreb 2003.	3	

Optional literature (at the time of submission of study programme proposal)	1. R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel and H. M. Widmer (Urednici), Analytical Chemistry (A Modern Approach to Analytical Science, Second Edition) Wiley-VCHVerlag Gmbh & Co. KGaA, Weinheim, 2004. 2. D. A. Skoog, D. M. West, F. J. Holler and S. R. Crouch, Fundamentals of

	Analytical Chemistry, Eighth Edition, Thompson Brooks/Cole, Belmont, USA, 2004. 3. G. D.Christian, Analytical Chemistry, Sixth Edition, John Willey & Sons, INC, 2004. 4. D. Harvey, Modern Analytical Chemistry, McGraw-Hill Higher Education, New York, London, 2000. 5. F. W. Fifield & D. Kealey, Principles and Practice of Analytical Chemistry, Blackwell Science Ltd, Malden MA, London, 2000. 6. M. Kaštelan-Macan, Enciklopedijski rječnik analitičkog nazivlja, FKIT, Mentor, Zagreb 2014.
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 Analytical Chemistry 2

NAME OF THE COURSE	Exercises in Analytical Chemistry II				
Code	(112486) (KTG204)	Year of study	2.		
Course teacher	PhD, Lea Kukoč Modun, assistant prof.	Credits (ECTS)	4.0		
Associate teachers	Maja Biočić, assistant Ivana Panžić, assistant	Type of instruction (number of hours)	L	S	E	F
					60	
Status of the course	basic	Percentage of application of e-learning	0 %			

COURSE DESCRIPTION

Course objectives	Students gain basic knowledge of working in the analytical laboratory, the proper approach to chemical analysis of samples, the possibility of critical reasoning based on knowledge, the chemical changes in the experimental work , correct writing lab reports in accordance with good laboratory practices.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Analytical Chemistry II
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	1. Apply standard laboratory procedures in gravimetric analysis. 2. Apply titration based on homogenous or heterogeneous equilibrium with previous theoretical predictions. 4. Apply the principles of good laboratory practice. 5. Properly collect and process numerical data. 6. Write the appropriate laboratory report.
Course content broken down in detail by weekly class schedule (syllabus)	1. (6 hours) Determinations based on heterogeneous equilibrium. Argentometric titration. 2. (6 hours) Potentiometric titration. 3. (6 hours) Gravimetric determination of sulphate ion. 4. (6 hours) Gravimetric determination of nickel ion. 5. (4 hours) Preparing standard solution, acid-base titration. 6. (6 hours) Acid-base titration, determination of $H_2C_2O_4$. 7. (6 hours) Finding the end point with pH electrode. 8. (4 hours) Preparing standard solution, EDTA titration. 9. (6 hours) EDTA titration, determination of Fe^{3+}. 10. (4 hours) Preparing standard solution, redox titration. 11. (6 hours) Redox titration, determination of Cu^{2+}.
Format of instruction	□ lectures □ seminars and workshops x exercises □ *on line*in entirety □ partial e-learning □ field work □ independent assignments □ multimedia x laboratory □ work with mentor x `team based learning`
Studentresponsibilities	Students must attend classes regularly and do all laboratory exercises in planned program.

Screening student work*(name the proportion of ECTS credits for*						
	Class attendance		Research		Practical training	40 % (1,6 ECTS bod)
	Experimental work		Report		Lab Notebook	20 % (0,8 ECTS

eachactivity so that the total number of ECTS credits is equal to the ECTS value of the course)						bodova)
	Essay		Seminar essay			
	Tests	40 % (1,6 ECTS bod)	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The rating is formed from three parts: tests which is 40 % of the grade , the experimental section, which is 40 % of the grade , and Lab Notebook, which is the remaining 20 % of the grade.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	A. Prkić, Vježbe iz analitičke kemije, Preddiplomski studij kemijske tehnologije, interna recenzirana skripta, Split, 2008. (odabrana poglavlja)		available in digital form
	Vježbe iz kvalitativne analitičke kemije, dr. sc. Josipa Komljenović, doc. (odabrana poglavlja)		available

Optional literature (at the time of submission of study programme proposal)	1. D.A. Skoog, D.M. West, F.J. Holler, Osnove analitičke kemije, šesto izdanje (englesko), prvo izdanje (hrvatsko), Školska knjiga, Zagreb, 1999. 2. Nj. Radić i L. Kukoč Modun, Uvod u analitičku kemiju I. dio, Redak, Split, 2013.. 3. M. Kaštelan-Macan, Kemijska analiza u sustavu kvalitete, Školska knjiga, Zagreb 2003.
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)	

Physical chemistry 1

NAME OF THE COURSE	Physical chemistry 1					
Code	KTG203	Year of study	2.			
Course teacher	PhD, Vesna Sokol assistant prof.	Credits (ECTS)	6.5			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			60	15		
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					
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)	<u>Lectures</u> 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. 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.
Format of instruction	xlectures xseminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning ☐field work ☐independent assignments xmultimedia ☐aboratory ☐work with mentor ☐ (other)
Studentresponsibilities	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.

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	2.0	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1.5	Oral exam	1.5	(Other)	
	Written exam	1.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	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 (3), 80-89% very good (4), 90-100% excellent (5).		
Required literature	**Title**	**Number of**	**Availability via**

(available in the library and via other media)		**copies in the library**	**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)			

Organic chemistry 1

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Organic chemistry 1</td></tr>
<tr><td>Code</td><td>KTG206</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>Dr. Igor Jerković, full prof.</td><td>Credits (ECTS)</td><td colspan="5">6.5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Ani Radonić, associate 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>60</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>obligatory</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">Acquisition of basic knowledge of modern organic chemistry, understanding the structure and properties of organic compounds, nomenclature of organic compounds, the types of isomers, spectroscopic techniques in determining organic structures, understanding the mechanisms of organic reactions of addition, substitution, elimination and rearrangement.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Laboratory exercises in organic chemistry I</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 course, students will be able to:
• describe the basic concepts, nomenclature of organic compounds, stereochemistry, and typical organic reactions of addition, elimination, substitution and rearrangement
• illustrate modes of applying the nomenclature, isomerism, stereochemistry and mechanisms of organic reactions (ion type and radical type)
• determine the structure of simple organic compounds on the basis of spectroscopic methods
• propose mechanisms for nucleophilic substitution reactions at saturated carbon and elimination reactions, additions to the unsaturated carbon and electrophilic aromatic substitution, taking into account the regio-selectivity / specificity and stereo-selectivity / specificity
• choose the correct chemical approach to solving problems in the field of organic chemistry, starting from the acquired knowledge in general, analytical and physical chemistry</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Introduction. A short historical overview. The modern organic chemistry. The binding in organic molecules. Electronegativity and bond types. Quantum mechanics and atomic orbitals. Electronic configuration. Lengths and bond energies. (3 hours); Hybrid atomic orbitals (sp³, sp² and sp). Molecular orbitals (σ- and π-bonds), polar and non-polar covalent bond. Bonding angles. Examples of organic molecules (orbital images) with single, double and triple bond. (3 hours); Physical properties, molecular structure and intermolecular bonds (dipole-dipole, van der Waals and hydrogen bonding). Solubility in organic solvent. Examples. Presentation of organic structures. (3 hours)

Classification and nomenclature of organic compounds. Functional groups and priority order. Alkanes. Alkenes. Alkynes. Aromatic hydrocarbons. Examples of the nomenclature of branched acyclic and cyclic and aromatic hydrocarbons. Alcohols. Phenols. Thiols. (3 hours); Ethers. Thioethers. Amines. Organohalogen compounds. Aldehydes. Ketones. Carboxylic acids. Carboxylic acid derivatives (acyl halides,</td></tr>
</table>

	anhydrides, esters, amides and nitriles). (3 hours); Examples of the nomenclature of various functional groups. (3 hours) **Isomers**. Constitutional isomers. Index of hydrogen deficiency (IHD). The conformation and configuration. Stereoisomers. Conformations of acyclic alkanes (conformational analysis). (3 hours); Conformations of cycloalkanes (angle tension and heat of combustion). Substituted cycloalkanes. Geometric isomers of alkenes, aldoximes, ketoximes and azo compounds (*cis*, *trans*, *E*, *Z*, *sin*, *anti*). CIP rule sequence. (3 hours); Examples of geometric isomers of molecules with multiple double bonds. Geometric isomers of cyclic compounds (*cis*, *trans* isomers conformational structure). Symmetry, chirality and achirality. Stereogenic center (chiral center). Enantiomers. Diastereomers. (3 hours); The absolute configuration. CIP system - rule sequences. Fischer projection formula. The properties of the enantiomers. Optical activity. The racemic mixture. Enantiomeric excess. The optical purity. The biological significance of chirality. Examples of chiral biologically active substances. (3 hours); The separation of the racemate (direct crystallization, converting into diastereomers, chromatographic methods and kinetic resolution). Molecules having multiple stereogenic centers. Relative configuration erythro- and threo. Meso compounds. Stereoisomers of cyclic compounds. Chiral molecules without tetrahedral atoms. Examples of different kinds of stereoisomers. (3 hours) **Determination of organic structures**. Introduction. Mass spectrometry (MS). Resolution. The 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 the IR and NMR spectra. (11 hours) **Types of organic reactions.** Mechanisms. Acid-base reactions. Nucleophiles and electrophiles. Redox reactions. Energy and reaction kinetics. (4 hours) **Nucleophilic substitution at saturated carbon**. S_N2-mechanism. S_N1-mechanism. Energy diagrams. The stereochemistry of the nucleophilic substitution. (3 hours); Variables in the nucleophilic substitution of (leaving group, nucleophile, position of substitution and solvent). Conditions of S_N2 and S_N1-reaction. Competitive reactions. (3 hours); Nucleophilic substitution possibilities, conventional nucleophiles and their products. Examples. **Elimination reactions**. *E1* and *E2* mechanism. Conditions of *E1* and *E2* reactions. Orientation of elimination. The stereochemistry of the elimination (*anti*- or *sin*-) (3 hours); Competition elimination and substitution (reaction process conditions and examples). Examples of elimination reactions: dehydrogen-halogenation, dehalogenation of vicinal dihalogenalkanes, double dehydrogenation, dehydratation of alcohols (*E1* and *E2* mechanism, energy diagrams). (3 hours) **Electrophilic Addition.** Orientation and additions (regioselectivity). The stereochemistry of the addition (*anti*- or *sin*-). Addition of free radicals. The addition of hydrogen. The addition of halogen. Halohydrin reaction. The addition of hydrogen halide. Conditions of Markovnikov and anti-Markovnikov addition. (3 hours); Hydration. Oxymercuration / demercuration. Hydroboration. Epoxidation - hydroxylation. Oxidation of alkenes with $KMnO_4$ and OsO_4. The ozonolysis of alkenes. The addition of alkenes (alkylation). (3 hours); Polymerization (radicals type and ions type). Examples of typical polymers. The additions to alkynes. Examples. Summary of the reaction of alkanes, alkenes, alkynes and halogenoalkanes. (3 hours) Aromatic compounds and antiaromatics. The structure of benzene. Examples. **Mechanism of electrophilic aromatic substitution.** The impact on the groups on electrophilic aromatic substitution. (3 hours); Multiple substitutions of substituted aromatic compounds. Arenes. Phenols. Aromatic amines. Examples. (3 hours)

<table>
<tr><td></td><td colspan="6"></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
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Students are required to attend classes (lectures and seminars) and actively participate in the teaching process, which will be evaluated in the final assessment by the weight coefficient of 5%.</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</td><td>Research</td><td>0</td><td>Practical training</td><td>0</td></tr>
<tr><td>Experimental work</td><td>0</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>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0</td><td>Oral exam</td><td>0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam (or partial tests)</td><td>4</td><td>Project</td><td>0</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">Students can take three partial tests during the lectures. If not pass partial tests, students will be evaluated by written exam. Rating at partial tests and the final examination is formed as follows: 51-60% sufficient (2); 61-75% good (3); 76-88% very good (4); 89-100% excellent (5). The total score is formed by summing all activities (for each activity % success multiply weigh coefficient): 5% x the presence and activity in lectures and seminars + 36% x performance on the first test + 23% x performance on the second test + 36% x performance on the third test.</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">S. H. Pine: Organska kemija, Školska knjiga, Zagreb, 1994.</td><td>9</td><td>no</td></tr>
<tr><td colspan="3">Morrison and Boyd, Organic Chemistry, 6th edition, Prentice Hall of India, New Delhi, India, 2002.</td><td>2</td><td>nn</td></tr>
<tr><td colspan="3">Vodič kroz IUPAC-ovu nomenkalturu organskih spojeva, Školska knjiga Zagreb. 2002.</td><td>2</td><td>no</td></tr>
<tr><td colspan="3">I. Jerković, Predlošci za predavanja iz Organske kemije I, 2014.</td><td>0</td><td>yes (web page KTF)</td></tr>
<tr><td colspan="3">I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, KTF-Split, 2009.</td><td>0</td><td>yes (web page KTF)</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">Clayden, Greeves, Warren and Wothers, Organic Chemistry, Oxford University Press, 2001.
S. Borčić, O. Kronja, Praktikum preparativne organske kemije, Školska knjiga Zagreb, 1991.</td></tr>
<tr><td>Quality assurance methods that</td><td colspan="6">Monitoring of quality assurance will be performed at three levels:
(1) University; (2) Faculty Level by Quality Control Committee; (3) Academic Level.</td></tr>
</table>

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

Laboratory exercises in organic chemistry 1

NAME OF THE COURSE	Laboratory exercises in organic chemistry 1							
Code	KTG207	Year of study	2.					
Course teacher	PhD, Igor Jerković, prof.	Credits (ECTS)	2					
Associate teachers	assistant	Type of instruction (number of hours)	L	S	E	F		
			0	0	30	0		
Status of the course	obligatory	Percentage of application of e-learning						

COURSE DESCRIPTION

Course objectives	Acquisition of basic knowledge of practical work in organic-chemical laboratory in line with modern trends in organic chemistry.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Organic chemistry I
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course, students will be able to: • describe basic laboratory procedures in organic-chemistry laboratory • demonstrate fundamental processes in organic-chemical laboratory, the simple methods of synthesis of organic compounds and determination the functional groups • determine the structure of simple organic compounds using spectroscopic methods • propose basic laboratory procedures in accordance with set-up objectives (synthesis or isolation)
Course content broken down in detail by weekly class schedule (syllabus)	Preparing for laboratory work, conducting laboratory diary and account of reaction yields. Isolation and purification of organic compounds. Recrystallization. Sublimation. Extraction. Distillation. Chromatography. (5 hours) Qualitative element analysis of organic compounds. The solubility of organic compounds. Detection of functional groups of organic compounds. Spectroscopic methods of organic analysis. (10 hours) Organic reactions and preparation of compounds. Oxido-reduction reactions. Nucleophilic substitution and elimination reactions at saturated carbon Electrophilic aromatic substitution. (15 hours)
Format of instruction	☐ lectures ☐ seminars and workshops **X** exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia **X** 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	Research	0	Practical training	0
	Experimental work	1.5	Report	0	(Other)	
	Essay	0	Seminar essay	0	(Other)	
	Tests	0.5	Oral exam	0	(Other)	
	Written exam	0	Project	0	(Other)	

<table>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="3">Students during exercises are evaluated on their knowledge shown by the examinations and their commitment, the work and the results of work in organic-chemistry lab.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, KTF-Split, 2009.</td><td>0</td><td>yes (web page KTF)</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">I. Borčić, O. Kronja, Praktikum iz preparativne organske kemije, Školska knjiga Zagreb, 1991.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Monitoring of quality assurance will be performed at three levels:
(1) University; (2) Faculty Level by Quality Control Committee; (3) Academic Level.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

Organic Chemistry 2

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Organic Chemistry 2</td></tr>
<tr><td>Code</td><td>KTG208</td><td>Year of study</td><td colspan="4">2.</td></tr>
<tr><td>Course teacher</td><td>PhD, Ani Radonić, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">5.0</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>15</td><td>0</td><td></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">Acquisition of basic knowledge about chemistry of carbonyl compounds, carboxylic acid and derivatives, heterocycles and carbohydrates.
This course is basis for understanding other courses, such as Natural products, Organic synthesis, Organic analysis, Biochemistry.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Experimental Organic Chemistry II</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 will be able to:
- recognize and give the IUPAC name to carbonyl compounds, carboxylic acids and derivatives, heterocycles and carbohydrates, and draw the corresponding structural formula based on systematic name (apply basic rules of organic compounds nomenclature)
- connect organic compounds molecular structure with their physico - chemical properties and reactivity
- differentiate, describe and compare reaction mechanisms of nucleophilic addition and nucleophilic substitution at carbonyl group
- specify the most important reactions of carbonyl and carboxylic compounds
-describe heterocycles and carbohydrates reaction mechanisms, specify the most important reactions of these compounds
- solving problems regarding carbonyl compounds, carboxylic acid and derivatives, heterocycles and carbohydrates</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (2 hours weekly):

1st week: Introduction to course (course content, students responsibilities, terms and conditions for passing exam). Nucleophilic aromatic substitution. Addition-elimination mechanism. Elimination-addition mechanism. Aryl cation mechanism.
2nd week: Polycyclic aromatic compounds - sources. Polycyclic aromatic compounds reactions. Nucleophilic addition to carbonyl group - introduction. Cyanide as a nucleophile (cyanohydrin formation).
3th week: Oxygen and sulphur as nucleophiles. Addition of alcohols (hemiacetals and acetals formation). Addition of water (hydrates formation). Addition of thiols (hemithioacetals and thioacetals formation). Hydride as a nucleophile - reduction. Reduction by complex metal hydrides. Cannizzaro reaction -disproportionation.
4th week: Carbon as a nucleophile - organometallic compounds. Organometallic reagents synthesis. Grignard reaction. Syntheses using Grignard reagents.
5th week: Nitrogen as a nucleophile. Imines. Enamines. Nucleophilic addition to carbonyl related compounds. Nucleophilic addition to imines. Nucleophilic addition</td></tr>
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<table>
<tr><td></td><td colspan="6">to enamines. Nucleophilic addition to nitriles.
6th week: Nucleophilic acyl substitution - introduction. Carboxylic acids and derivatives reactivity. Oxygen and sulfur as nucleophiles. Substitution with alcohols - esterification. Lactonization. Transesterification. Substitution with water - hydrolysis.
7th week: Substitution with thiols. Nitrogen as a nucleophile. Acyl halides and anhydrides. Acyl halide synthesis. Anhydride synthesis.
8th week: Hydride as a nucleophile - reduction. Carbon as a nucleophile - organometallic reagents. Reactions with esters. Reactions with acyl halides. Reactions with carboxylic acids.
9th week: Nucleophilic substitution on derivatives of sulfuric and phosphoric acid. Nucleophilic reactions involving enolate anions. Enols and enolate anions. Enolization (keto-enol tautomerism). The aldol reaction.
10th week: Mixed aldol reaction. Dehydration of aldol products. Ester condensation – Claisen condensation.
11th week: Mixed Claisen condensation. β-dicarbonyl compounds splitting. Reverse Claisen reaction. Decarboxylation.
12th week: Alkylation of enolate anions. Active methylene compounds.
Conjugate addition reactions. Electrophilic conjugate addition - conjugated dienes.
13th week: Nucleophilic conjugate addition - α,β-unsaturated carbonyl compounds. Michael reaction. Diels-Alder cycloaddition.
14th week: Carbohydrates – definition and classification. Cyclic forms of monosaccharides and their representation. Reactions of monosaccharides. Oxidation. Reduction. Monosaccharides in aqueous solution (mutarotation). Monosaccharides in alkaline or acidic solution.
15th week: Glycosides. Typical disaccharides and polysaccharides.
Heterocyclic compounds (five-membered and six-membered heterocycles). Structures and stability of aromatic heterocycles. Electrophilic and nucleophilic aromatic substitution reactions.

Seminars (1 hour weekly):
Solving problems in organic chemistry.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
X seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
X multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Students are required to attend lectures and seminars in the amount of at least 80% of the times scheduled and complete all laboratory exercises (100% attendance). Active participation in teaching process will be also evaluated in the final score.</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>(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>4.0</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</td><td colspan="6">A student can pass the entire exam by taking and passing two partial exams (tests)</td></tr>
</table>

<table>
<tr><td>work in class and at the final exam</td><td colspan="3">consisting of theoretical questions and seminar problems during the semester. Test passing score is 60%. Each test constitute 45% of the final exam score. Attendance to the lectures and seminars (80-100%) participate in the final score with 5%. Any of the partial exams passed during the semester is valid throughout the academic year. Students who do not pass one of the partial exam or both of them have to take an written exam in the regular examination periods. Exam passing score is 60%. Grades depending on the test score: 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>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>S. H. Pine, Organska kemija, Školska knjiga, Zagreb, 1994.</td><td>8</td><td></td></tr>
<tr><td>R. T. Morrison, R. N. Boyd, Organska kemija, Sveučilišna naklada Liber, Zagreb, 1979.</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">T. W. Solomons, C. B. Fryhle, Organic Chemistry, John Wiley & Sons, Inc., New York, 2004.
J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, Oxford, 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Monitoring of quality assurance will be performed at three levels:
(1) University Level, conducting surveys of students on teaching quality;
(2) Faculty Level, by Quality Control Committee;
(3) Lecturer’s Level, monitoring and accepting suggestions of students and colleagues</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

Exercises in Organic Chemistry 2

NAME OF THE COURSE	Exercises in Organic Chemistry 2							
Code	KTG209		Year of study	2.				
Course teacher	PhD, Ani Radonić, associate prof.		Credits (ECTS)	3.0				
Associate teachers			Type of instruction (number of hours)	L	S	E	F	
				0	0	45		
Status of the course	Mandatory		Percentage of application of e-learning	-				
COURSE DESCRIPTION								
Course objectives	Acquisition of basic knowledge and working skills in organic laboratory, application of laboratory methods and techniques for laboratory synthesis, isolation, characterization and purification of organic compounds.							
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Organic Chemistry II							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course students will be able to: - perform independently laboratory exercises according to laboratory procedures - apply basic laboratory procedures and techniques for synthesis, isolation and purification of organic compounds as well as their characterization and identification - connect theoretical knowledge gained throughout lectures in organic chemistry with experimental work - propose basic laboratory procedures in accordance with set-up objectives (organic compound synthesis or isolation)							
Course content broken down in detail by weekly class schedule (syllabus)	**Exercises (3 hours weekly joined together in 7 lab periods):** 1. Nucleophilic substitution at acyl carbon. Acetanilide synthesis. (1 lab period) 2. Electrophilic aromatic substitution. *p*-Nitroacetanilide synthesis. *p*-Nitroaniline synthesis. (2 lab periods) 3. Nucleophilic aromatic substitution. Diazotation. Phenol synthesis. (2 lab periods) 4. Nucleophilic addition at carbonyl group. The Cannizzaro reaction – benzyl alcohol and benzoic acid synthesis. (1 lab period) 5. Organic compounds characterization. Determination of physical constants and spectroscopic analysis (UV/VIS and FT-IR spectra recording and interpretation). (1 lab period)							
Format of instruction	☐lectures ☐seminars and workshops X exercises ☐*on line* in entirety ☐partial e-learning ☐field work			☐independent assignments ☐multimedia X laboratory ☐work with mentor ☐ (other)				
Studentresponsibilities	Students have to complete all planned laboratory exercises (100% of the times scheduled) and active participate in laboratory work.							
Screening student work*(name the proportion of ECTS credits for eachactivity so that the total number of*	Class attendance		Research		Practical training			
	Experimental work	1.0	Report	1.0	(Other)			
	Essay		Seminar essay		(Other)			

ECTS credits is equal to the ECTS value of the course)	Tests	1.0	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Students are evaluated based on their knowledge shown at the tests accompanying exercises and their commitment during experimental work and the results achieved during work in organic-chemistry lab.					
Required literature (available in the library and via other media)	**Title**				**Number of copies in the library**	**Availability via other media**
	I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, KTF-Split, 2009.				-	Yes, web site of the institution
Optional literature (at the time of submission of study programme proposal)	S. Borčić, O. Kronja, Praktikum preparativne organske kemije, Školska knjiga, Zagreb, 1991. V. Rapić, Postupci priprave i izolacije organskih spojeva, Školska knjiga, Zagreb, 1994.					
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University Level, conducting surveys of students on teaching quality; (2) Faculty Level, by Quality Control Committee; (3) Lecturer's Level, monitoring and accepting suggestions of students and colleagues					
Other (as the proposer wishes to add)						

Physical Chemistry 2

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Physical Chemistry 2</td></tr>
<tr><td>Code</td><td>KTG210(206)</td><td>Year of study</td><td colspan="4">2nd year of undergraduate study of chemistry</td></tr>
<tr><td>Course teacher</td><td>PhD, Renato Tomaš, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">5 ECTS</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>15</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Core course</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">The aims of the course are to enable students to:
- understand chemical and electrochemical kinetics which is raised at a higher level,
- understand processes and equilibriums in electrolyte solutions, and understand of surface dynamics,
- resolve different physicochemical problems,
- apply acquired knowledge and skills in professional and specialist courses.</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 Physical Chemistry II</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Upon successful completion of the program, students will be able to:
1. Describe and explain mechanism and kinetics of complexs reactions.
2. Describe and explain various equilibriums in the electrolyte solutions.
3. Describe and explain equilibrium and dynamics of processes on solid and liquid surfaces.
4. Calculate physicochemical parameters using thermodynamic and kinetic equations.
5. Interpret experimental and numerical data.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (2 hours weekly):
1st, 2nd and 3rd week: Ionic equilibria: The solute activity in molality scale. Mean activity coefficient of electrolyte. Debye-Hückel theory. Colligative properties of electrolyte solutions. Acid-base equilibria in water medium. Solubility of slightly soluble salts. The solubility constant. The common-ion efect. The activity coefficient from measurement of solubility.
4th, 5th, and 6th and 7th week: Equilibrium electrochemistry: Thermodynamic functions of the ion formation. Electrochemical cells. Galvanic cells. Half-reactions and electrodes. Reactions at electrodes. The cell reaction. The potential difference of the cell. Standard electrode potentials. Cells at equilibrium. Types of electrode. Types of galvanic cells. The liquid junction potential and transference number. The solobility constant from potential difference mesurements of the cell. The determination of pH. The determination of thermodynamic functions. Diffusion potential.
8th, 9th and 10th week: The kinetics of complex reactions: Chain reactions. The structure of chain reactions. The rate laws of chain reactions. The explosion. Polymerization kinetics. Chain polymerization. Stepwise polymerization. Photochemical reactions and their quantum yields. Molecular reaction dynamics. Reactive encounters. Activated complex theory. Catalysis. Kinetics in the liquid</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">phase. Primary kinetic salt efect.
<u>11th, 12th and 13th week:</u> The properties of surfaces (Surface dynamics): Types of disperse systems. Colloidal systems. The properties of liquid surfaces. Solid surfaces: surfaces growth and surface composition and structure. Physisorption and chemisorption. Adsorption isotherms. Langmuir isotherm. Catalytic activity at surfaces. Mechanisms af heterogeneous catalysis. Use of adsorption measurements to determine surface area: Low-energy electron diffraction. Electron emission from surfaces (photoelectron spectroscopy).
<u>14th and 15th week:</u> Dynamic electrochemistry: Processes at electrodes. The electrical double layer. The rate of charge transfer. Polarization. Electrochemical processes. Electrolysis. The characteristics of working cells. Fuel cells and secondary cells. Corrosion. The rate of corrosion. The inhibition of corrosion.

<u>Seminars (one hour weekly):</u>
Solving numerical problems in physical chemistry.</td></tr>
<tr><td>Format of instruction</td><td colspan="3"><u>☐ectures</u>
<u>☐eminars and workshops</u>
☐exercises
☐on linein entirety
☐partial e-learning
☐ield work</td><td colspan="3"><u>☐ndependent assignments</u>
<u>☐multimedia</u>
☐aboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Lecture and seminar attendance and active participation of at least 70 percent of the planned schedule.
The exam can be taken continuously (cumulatively) through colloquiums (partial tests) combining theoretical and practical tasks or as one comprehensive exam (written and oral).</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>Oral exam</td><td>1</td><td>Practical training</td><td></td></tr>
<tr><td>Consultations</td><td>0.2</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>2</td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.8</td><td></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">Continually evaluation: (success (%) / share in evaluating (%):
• presence and activities in the classroom: (70 - 100 / 10)
• first partial test: (60 - 100 / 30)
• second partial test: (60 - 100 / 30)
• third partial test: (60 - 100 / 30)
Final evaluation: (success (%) / share in evaluating (%):
• written exam with numerical tasks: (50 - 100 / 40)
• oral exam: (50 - 100 / 45)
• priviously activities from continually evaluation: (50 - 100 / 15)</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">I. Tominić, Fizikalna kemija II, Kemijsko-tehnološki fakultet, Split, 2010.</td><td></td><td colspan="2">www.ktf-split.hr</td></tr>
<tr><td colspan="3">R. J. Silbey, R. A. Alberty, M. G. Bawendi, Physical Chemistry, 4th Edition, John Wiley and Sons, New</td><td>1</td><td colspan="2"></td></tr>
</table>

	Jersey, 2005.		
	R. Tomaš, Own lectures from Physical chemistry II, powerpoint presentation, 2013.		digitalni zapis
	P. Atkins, J. de Paula, Elements of Physical Chemistry, 4th Edition, Oxford University Press, Oxford, 2005.	2	
Optional literature (at the time of submission of study programme proposal)	I. Mekjavić, Fizikalna kemija 2, Golden marketing, Zagreb, 1999. P. Atkins, J. de Paula, Atkins' Physical Chemistry, 8th Edition, Oxford University Press, Oxford, 2006.		
Quality assurance methods that ensure the acquisition of exit competences	- monitoring suggestions and reactions of participants during the semester - student survey		
Other (as the proposer wishes to add)			

Exercises in Physical Chemistry

NAME OF THE COURSE	Exercises in Physical Chemistry					
Code	KTG211	Year of study	2nd year of undergraduate study of chemistry			
Course teacher	PhD, Renato Tomaš, associate prof.	Credits (ECTS)	4 ECTS			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
					60	
Status of the course	Core course	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	The aims of the course are to enable students to: - perform measurements in the laboratory individually or in a team, present and process measurement data. - apply acquired knowledge and skills in professional and specialist courses.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Physical Chemistry II					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Upon successful completion of the program, students will be able to: 6. Perform experiments and measurements in the laboratory. 7. Explain different physicochemical dependencies of the examined systems. 8. Calculate physicochemical parameters using thermodynamic and kinetic equations. 9. Interpret experimental and numerical data.					
Course content broken down in detail by weekly class schedule (syllabus)	**Exercises in Laboratory for Physical Chemistry (5 hours weekly):** 1. week: Vapour pressure of pure liquid. 2. week: Surface tension and refractometric determination of composition of two-component mixture. 3. week: Viscosity. 4. week: Colligative properties. 5. week: Adsorption from aqueous solution. 6. week: Equilibrium constant of homogeneous reaction. 7. week: Phase diagram for three-component system. 8. week: Transference numbers by Hittorf method. 9. week: Conductometry and conductometric titrations. 10. week: Galvanic cell and electrode potentials. 11. week: Rate constant of inversion of sucrose by polarimetric method. 12. week: Conductometric determination of the rate constant of hydrolysis of ethyl acetate.					
Format of instruction	☐ **laboratory** ☐ **exercises** ☐ **independent assignments**					
Student responsibilities	Completed all laboratory exercises (100 %). Student must show theoretical knowledge before each practical work or experiments (12 partial oral exams). Student must write 12 reports with complete experimental and calculated data: All					

<table>
<tr><td></td><td colspan="6">reports should contains tables and graphical dependencies. At the end of report put conslusion.</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>2.5</td><td>Report</td><td>0.8</td><td></td><td></td></tr>
<tr><td>Consultations</td><td>0.2</td><td>Oral 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">Continually evaluation: (success (%) / share in evaluating (%):
presence and activities in the laboratory: (100 / 10)
laboratory exercises (measurements): (60 - 100 / 25)
12 partial test: (60 - 100 / 25)
12 final reports: (60 - 100 / 40)</td></tr>
<tr><td rowspan="3">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">J. Radošević, Lj. Aljinović, Fizikalna kemija, Laboratorijske vježbe, Sveučilišna naklada Liber, Split, 1980.</td><td>25</td><td colspan="2"></td></tr>
<tr><td colspan="3">R. J. Silbey, R. A. Alberty, M. G. Bawendi, Physical Chemistry, 4th Edition, John Wiley and Sons, New Jersey, 2005.</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">A. M. Halpern, Experimental Physical Chemistry, A Laboratory Textbook, 2nd Edition, Prentice Hall, New Jersey, 1997.</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>

Natural Products

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Natural Products</td></tr>
<tr><td>Code</td><td>KTG213</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>PhD, Ani Radonić, associate prof.</td><td>Credits (ECTS)</td><td colspan="5">4.0</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>45</td><td>0</td><td>0</td><td></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">Acquisition of basic knowledge about structural characteristics, properties, biological distribution, biological activity and application of important classes of natural products. The course is basis for understanding of other courses, especially Chemistry and technology of aromatic plants , Aroma chemistry, Synthesis of biological active compounds.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Experimental in Natural Products</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 will be able to:
- differentiate primary and secondary metabolites
- specify important classes of natural products and characteristic representatives of each class
- recognize and give name to some, important natural compounds based on structural formula and classify them in the appropriate class based on structural features
- present by structural formula the most important natural compounds
- specify main characteristics, physical and chemical properties of important natural compounds based on their structure
- describe biosynthesis of natural products classes or important natural compounds
- specify major biological activities (physiological function) of important natural compounds
- specify importance and application of important natural compounds</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (3 hours weekly):
1st week: Introduction to course (course content, students responsibilities, terms and conditions for passing exam). Primary and secondary metabolism. Primary and secondary metabolites. Natural products isolation methods. Basic isolation procedures. Distillation. Extraction.
2nd week: Chromatographic methods – definition and classification. Thin-layer chromatography. Column chromatography. Gas chromatography. Liquid chromatography.
3th week: Lipids - introduction. Classification. Fats and oils. Fatty acids. Saturated, unsaturated, ω-3 and ω-6, polyunsaturated and essential fatty acids.
4th week: Physico-chemical properties of fats and oils. Hydrolysis. Oxidation. Hydrogenation. Physical and chemical constants of fats and oils. Isolation methods of fats and oils.
5th week: Waxes. Plant waxes. Animal waxes. Compound lipids. Phospholipids.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Sphingolipids. Glycolipids.
6th week: Terpenoids – introduction. Classification of terpenoids. Monoterpenes. Sesquiterpenes. Diterpenes. Triterpenes. Polyterpenes.
7th week: Steroids – introduction. Classification. Sterols. Zoosterols. Cholesterol. Phytosterols. Stigmasterol. β-Sitosterol. Sterols of yeast and fungi. Ergosterol. Bile acids.
8th week: Steroid hormones – introduction. Classification. Sex hormones. Estrogens. Progestogens. Androgens. Adrenocortical hormones- corticosteroids.
9th week: Steroid glycosides. Cardiac glycosides. Saponins. Carotenoids – introduction. Carotenes. Xanthophylls.
10th week: Vitamins – introduction. Classification of vitamins. Water-soluble vitamins. Vitamin C. Vitamin B complex. Vitamin B_1. Vitamin B_2. Niacine-vitamin B_3. Vitamin B_5. Vitamin B_6. Folic acid. Biotin. Vitamin B_{12}.
11th week: Fat-soluble vitamins. Vitamin A. Vitamin D. Vitamin E. Vitamin K. Alkaloids. Definition. Function of alkaloids. Classification of alkaloids.
12th week: Protoalkaloids. Alkaloids with pyridine, piperidine and pyrolidine ring. Tropane alkaloids.
13th week: Alkaloids with quinoline ring. Opium alkaloids. Alkaloids with indole ring. Purine alkaloids. Phenolic compounds. Definition, properties and function of phenolics. Biosynthesis. Shikimic acid and shikimic acid derived compounds.
14th week: Structural types of phenolic compounds. Phenylpropanoids. Phenolic acids. Lignins. Flavonoids.
15th week: Natural dyes. Flavonoid dyes. Anthocyanins. Quinones. Benzoquinones. Naphthoquinones. Anthraquinones. Carotenoids. Pyrols. Alkaloids.</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">☐independent assignments
X multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Students are required to attend lectures in the amount of at least 80% of the times scheduled. Active participation in teaching process will be also evaluated in the final score.</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>(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></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 the entire exam by taking and passing three partial exams (tests) during the semester. Test passing score is 60%. Each test constitute 30% of the final exam score. Attendance to the lectures (80-100%) participate in the final score with 10%. Any of the partial exams passed during the semester is valid throughout the academic year.
Students who do not pass some of the partial exams or all of them have to take an written exam in the regular examination periods. Exam passing score is 60%.
Grades depending on the test score: 60% - 69% - satisfactory, 70% -79% - good, 80% -89% very good, 90% -100% - excellent.</td></tr>
</table>

<table>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>S. V. Bhat, B. A. Nagasampagi, M. Sivakumar, Chemistry of Natural Products, Springer-Narosa, Berlin, 2005.</td><td>1</td><td></td></tr>
<tr><td>P. M. Dewick, Medicinal Natural Products, John Wiley & Sons, Inc., New York, 1997.</td><td>1</td><td></td></tr>
<tr><td>J. Mann, R. S. Davidson, J. B. Hobbs, D. V. Banthorpe, J. B. Harborne, Natural products: their chemistry and biological significance, Addison Wesley Longman Limited, Harlow, 1994.</td><td>1</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">J. Bruneton, Pharmacognosy, Phytochemistry, Medicinal Plants, Lavoisier publishing Inc., Paris, 1995.
I. Tabaković, Organska kemija prirodnih spojeva, Glas, Banja Luka, 1983.
D. Kuštrak, Farmakognozija-Fitofarmacija, Golden marketing-Tehnička knjiga, Zagreb, 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Monitoring of quality assurance will be performed at three levels:
(1) University Level, conducting surveys of students on teaching quality;
(2) Faculty Level, by Quality Control Committee;
(3) Lecturer’s Level, monitoring and accepting suggestions of students and colleagues</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

Exercises in Natural Products

NAME OF THE COURSE	Exercises in Natural Products						
Code	KTG214	Year of study	2.				
Course teacher	PhD, Ani Radonić, associate professor	Credits (ECTS)	2.0				
Associate teachers		Type of instruction (number of hours)	L	S	E	F	
			0	0	30		
Status of the course	Mandatory	Percentage of application of e-learning					
COURSE DESCRIPTION							
Course objectives	Acquisition of basic knowledge and working skills in organic laboratory, application of laboratory methods and techniques for isolation, purification and characterization of natural organic compounds.						
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Natural Products						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the course students will be able to: - perform independently laboratory exercises according to laboratory procedures - propose basic laboratory procedures for isolation of natural organic compounds from biological material based on knowledge gained throughout lectures in natural products (connect theoretical knowledge with experimental work) - apply basic laboratory procedures and techniques for isolation and purification of natural products as well as their characterization - set up appropriate apparatus for performing isolation of natural products from biological material and their purification - record and interpret UV/VIS and FT-IR spectra						
Course content broken down in detail by weekly class schedule (syllabus)	**Exercises (2 hours weekly joined together in 6 lab periods):** Isolation of selected natural products. 1. Lipids. Isolation of fatty acids from natural fatty oil. Isolation of oleic acid from olive oil. (2 lab periods) 2. Carotenoids. Isolation of carotenes from tomato. Thin-layer chromatography of carotenes. (1 lab period) 3. Alkaloids. Isolation of piperine from black pepper. (2 lab periods) 4. Alkaloids. Isolation of caffeine from tea. (1 lab period) 5. Characterization of piperine and caffeine. Determination of melting point, thin-layer chromatography, UV/VIS and FT-IR spectroscopy. (1 lab period)						
Format of instruction	☐lectures ☐seminars and workshops X exercises ☐*on line*in entirety ☐partial e-learning ☐field work		☐independent assignments ☐multimedia X laboratory ☐work with mentor ☐ (other)				
Studentresponsibilities	Students have to complete all planned laboratory exercises (100% of the times scheduled) and active participate in laboratory work.						
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	1.0	Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1.0	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Students are evaluated based on their knowledge shown at the tests accompanying exercises and their commitment during experimental work as well as the results achieved during work in organic-chemistry lab.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, KTF-Split, 2009.				Yes, web site of the institution	
Optional literature (at the time of submission of study programme proposal)	V. Rapić, Postupci priprave i izolacije organskih spojeva, Školska knjiga, Zagreb, 1994. S. Borčić, O. Kronja, Praktikum preparativne organske kemije, Školska knjiga, Zagreb, 1991.					
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University Level, conducting surveys of students on teaching quality; (2) Faculty Level, by Quality Control Committee; (3) Lecturer's Level, monitoring and accepting suggestions of students and colleagues					
Other (as the proposer wishes to add)						

Catalysis

NAME OF THE COURSE	Catalysis					
Code	KTG212	Year of study	3.			
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		
Status of the course	Obligatory	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.					

<table>
<tr><td></td><td colspan="6">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.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">x lectures
x seminars and workshops
☐exercises
☐on linein 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">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 colspan="6"></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</td><td colspan="6">Quality assurance will be performed at three levels: (1) University Level, (2) Faculty</td></tr>
</table>

ensure the acquisition of exit competences	Level by Quality Control Committee, (3) Lecturer's Level.
Other (as the proposer wishes to add)	

Environmental Chemistry

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Environmental Chemistry</td></tr>
<tr><td>Code</td><td>KTG313</td><td>Year of study</td><td colspan="4">3</td></tr>
<tr><td>Course teacher</td><td>PhD, Marija Bralić, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">4.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Maša Buljac</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></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 basic objective of the course is to study the basic chemical principles that are happening in the environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After course students will be able to :
1. knowing the first and explain the interactions that occur between different phases in the environment (water-to-air, ground-to-air, water-soil)
2. distinction approach to chemical analysis of soil, water or air
3. understand the circular cycle gas emissions (CO_2, NO_x, SO_x) in the environment
4. explain the impact of metals on the environment
5. identify and explain the effect of organic compounds in the environment
6. solve problems in environmental protection</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lecture 1: Introduction to Environmental Chemistry. The impact of technology on the chemical processes in the environment.

Lecture 2: Parts of the environment: hydrosphere, atmosphere, geosphere and biosphere. Water chemistry. Gases in Water

Lecture 3: Complexation and speciation. Redox reactions, pE in natural waters.

Seminar 1 (2 hours): Interpretation and Data Processing

Lecture 4: pE-pH diagrams. Interaction phases: solid-liquid-gas.

Seminar 2 (2 hours): Redox reactions, PE in natural waters.

Lecture 5: Creating sediment and ion-exchange processes on its border. Biochemical processes in the waters

Seminar 3 (2 hours): pE-pH diagrams. Interaction phases: solid-liquid-gas

Lecture 6: Transformation elements. Biodegradation of the organic material. water pollution

Lecture 7: The atmosphere and the chemistry of the atmosphere. Physical</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">characteristics of the atmosphere

Lecture 8: Chemical and photochemical reactions in the atmosphere

Seminar 4 (2 hours): Standard deviations, errors

Lecture 9:. Air pollution: inorganic gases, organic compounds, particulate matter

Seminar 5 (2 hours): Biochemical processes in the waters

Lecture 10: Photochemical smog. Geosphere and geochemistry.

Seminar 6 (2 hours): Determination of pH and concentration in aquatic environmental samples

Lecture 11: The composition of the soil, nutrients. Acid-base and ion-exchange reactions

Seminar 7 (2 hours): Processing of the data collected by monitoring the atmosphere

Lecture 12: soil pollution

Lecture 13: Toxicity of chemical substances. Analytical Environmental Chemistry.

Lecture 14: Analytical Environmental Chemistry

Lecture 15: Evaluation and interpretation of analytical data from the environment. specific applications

Seminar 8 (1 hour): Assignments: gases, calculations composition</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>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>0.5</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="6">During the semester, the two partial tests 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</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">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="2">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>E. Burcu Özkaraova Güngör, Environmental Technologies New Developments, Vienna,2008
P.O'Neil, Environmental Science, London, 1993.;
W. Stumm, J.J. Morgan, Aquatic Chemistry, New York, 1996;
B.J.Alloway, Heavy Metals in Soils, London, 1995;
D. Tuhtar, Zagađivanje zraka i vode, Sarajevo, 1984,</td><td></td><td>1

1
1</td></tr>
<tr><td></td><td>Vježbe iz 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="3">V. Glavač, Uvod u globalnu ekologiju, Zagreb, 1999.
M. Črnjar, Ekonomija i zaštita okoliša, Rijeka, 1997.,
C.Baird, Environmental chemistry,New York, 1998.,
C.E. Kupchella, M. C. Hyland, Enviromental science, Massachusetts, 1989</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">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="3"></td></tr>
</table>

Instrumental Methods of Analysis

NAME OF THE COURSE	Instrumental Methods of Analysis					
Code	(126477) (KTG302)	Year of study	3rd			
Course teacher	PhD, Lea Kukoč Modun, associate prof.	Credits (ECTS)	4,5			
Associate teachers	Maja Biočić, assistant	Type of instruction (number of hours)	L	S	E	F
			30	15		
Status of the course	mandatory	Percentage of application of e-learning	0 %			
COURSE DESCRIPTION						
Course objectives	The aim of this course is to introduce students to the theoretical principles, practical work and the use of instrumental techniques and procedures relating to the process analysis. The choice of method will depend on the knowledge of the basic principles of individual method or group of methods and the understanding of their advantages and limitations.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises in Instrumental Methods of Analysis					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	1. Adopt theoretical knowledge related to methods of instrumental analysis (spectrometry, electroanalytical, thermal methods, instrumental separation methods) and the principles of instruments. 2. Correctly interpret the adopted theoretical knowledge relating to methods of analysis instrument and principles of instruments. 3. Explain the connection between basic knowledge of analytical chemistry with application in instrument analysis. 4. Select analytical technique due to the characteristics of the analyte and the specificity of the sample. 5. Integrate acquired knowledge and apply them in problem-solving and decision-making in analytical practice and in process analysis.					
Course content broken down in detail by weekly class schedule (syllabus)	1st week Lectures: Fundamentals of instrumental techniques and their application in continuous and process analysis. Seminars: Introduction, memento. SI system of units. 2nd week Lectures: Planning and optimizing the experiment. Optimizing analytical control of technology process. Seminars: Kinetic method analysis. 3rd week Lectures: Gass chromatography. High performance liquid chromatography. Gass chromatography coloumns and detectors. Seminars: Chromatography (numerical examples). 4th week Lectures: Continuous segmentation flow analysis. Flow injection analysis. Seminars: Flow injection analysis, construction of manifold. 5th week					

	Lectures: Thermal analysis Termogravimetric methods. Differential thermal analysis. Seminars: Thermal analysis (numerical examples). 6th week Lectures: Fundamentals of spectrophotometry. Atomic absorption spectrometry. Flame emission spectrometry. Atomic fluorescence. Atomic emission. Atomic absorption. Seminars: Atomic absorption spectroscopy. 7th week Lectures: Ultraviolet / Visible absorption spectrometry. Seminars: Spectrometry (numerical examples). 8th week Lectures: Infrared absorption spectrometry. Raman spectrometry. Seminars: Spectrometry (numerical examples). 11th week 9th week Lectures: Mass spectrometry. Nuclear Magnetic Resonance Spectrometry, Fotoelectron spectrometry. Auger electron spectrometry. Photoelectron spectroscopy. Analysis of surface with electron beams. Seminars: Mass spectrometry, modern ionisation methods. 10th week Lectures: Microanalysis with electronic sampling. X-ray diffraction analysis. Scanning electron microskop. Seminars: Potentiometry (numerical examples). 11th week Lectures: Electroanalytical methods. Potentiometry. Indicator electrodes. Potentiometric setup. Seminars: Potentiometry (numerical examples). 12th week Lectures: Coulometry. Seminars: Electrogravimetry (numerical examples). 13th week Lectures: Coulometry Seminars: Coulometry (numerical examples). 14th week Lectures: Voltammetry. Seminar: Voltammetry (numerical examples). 15th week Lectures: Amperometry. Seminars: Amperometry (numerical examples).					
Format of instruction	x lectures x seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐field work			x independent assignments x multimedia ☐laboratory ☐work with mentor x team based learning		
Studentresponsibilities	The 70% presence at lectures and seminars.					
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		Test of numerical examples	30 % (1,4 ECTS)
	Essay		Seminar essay		Test of theoretical part	55 % (2,4 ECTS)
	Tests		Oral exam	15 % (0,7 ECTS)	(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Scoring at the exam consists of two basic parts, test of numerical example (minimum score: 18; maximum score: 30) and test of theoretical part (minimum score: 42; maximum score: 70). Students who had attended lectures and seminar in 70 % can take the exam through partial tests: 2 tests of numerical examples (minimum score: 9; maximum score: 15) and 2 tests of theoretical part (minimum score: 21; maximum score: 35) The rating is formed in accordance with the score ranges: sufficient (60 - 70 points) , good (71-80 points) , very good (81-90 points) , excellent (≥91points).

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	D.A. Skoog, D.M. West, F.J. Holler, Osnove analitičke kemije, šesto izdanje (englesko), prvo izdanje (hrvatsko), Školska knjiga, Zagreb, 1999.	18	
	Nj. Radić i L. Kukoč Modun, Uvod u analitičku kemiju I. dio, Redak, Split, 2013.	32	
	M. Kaštelan-Macan, Kemijska analiza u sustavu kvalitete, Školska knjiga, Zagreb 2003.	3	
	I. Piljac, Elektroanalitičke metode, RMC, 1995.	3	
	I. Piljac, Senzori fizikalnih veličina i analitičke metode, Zagreb, 2010.	3	
	Analitika okoliša (ur. M. Kaštelan Macan, M. Petrović), HINUS i FKIT, Zagreb 2013.	3	
	I. S. Krull, Analytical Chemistry, Intech, Rijeka, 2012.		available on web: DOI: 10.5772/3086

Optional literature (at the time of submission of study programme proposal)	1. R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel and H. M. Widmer (Urednici), Analytical Chemistry (A Modern Approach to Analytical Science, Second Edition) Wiley-VCHVerlag Gmbh & Co. KGaA, Weinheim, 2004. 2. D. A. Skoog, D. M. West, F. J. Holler and S. R. Crouch, Fundamentals of Analytical Chemistry, Eighth Edition, Thompson Brooks/Cole, Belmont, USA, 2004. 3. G. D.Christian, Analytical Chemistry, Sixth Edition, John Willey & Sons, INC, 2004. 4. D. Harvey, Modern Analytical Chemistry, McGraw-Hill Higher Education, New York, London, 2000. 5. F. W. Fifield & D. Kealey, Principles and Practice of Analytical Chemistry, Blackwell Science Ltd, Malden MA, London, 2000. 6. M. Kaštelan-Macan, Enciklopedijski rječnik analitičkog nazivlja, FKIT, Mentor, Zagreb 2014.
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 Instrumental Methods of Analysis

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Exercises in Instrumental Methods of Analysis</td></tr>
<tr><td>Code</td><td>(126478) (KTG303)</td><td>Year of study</td><td colspan="5">3th</td></tr>
<tr><td>Course teacher</td><td>PhD, Lea Kukoč Modun, assistant prof.</td><td>Credits (ECTS)</td><td colspan="5">2.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Maja Biočić, assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td colspan="2">F</td></tr>
<tr><td></td><td></td><td>30</td><td colspan="2"></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="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">After completion of a process of learning the learner is able for independent work in instrumental analytical laboratory</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Enrolled in or passed the course Instrumental Methods of Analysis</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Adopt theoretical knowledge related to methods of instrumental analysis (spectrometry , electroanalytical , thermal methods , instrumental methods for separation) and principles of instruments and apply knowledge in the experimental work.
2. Select analytical technique due to the characteristics of the analyte and the specificity of the sample.
3. Plan and install an experiment using instrumental techniques.
4. Apply basic statistical analysis of numerical data and graphed the results.
5. Independently take Lab Notes and prepare a report after completion of the analysis.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">1. Kinetic methods of analysis, determoination of tiolic compound using kinetic manifold with spectrophotometric detector
2. Flow injection analysis, determination of ascorbic acid by flow injection analysis and spectrophotometric detector
3. UV/Vis spectrophotometry, spectrophotometric measurement of an equilibrium constant
4. Atomic absorption spectroscopy, determination of metals in real samples
5. Ions selective electrode, potentiometry, measurement of an equilibrium constant
6. Electrogravimetric determination, determination or separation of metals</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="4">x independent assignments
x multimedia
x laboratory
☐ work with mentor
x team based learning</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="7">Students must attend classes regularly and do all laboratory exercises in planned program.</td></tr>
<tr><td rowspan="2">Screening student work(name the proportion of ECTS credits for eachactivity so that</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>40 % (0,8 ECTS)</td><td>Report</td><td>20 % (0,4 ECTS)</td><td>(Other)</td><td></td></tr>
</table>

the total number of ECTS credits is equal to the ECTS value of the course)	Essay		Seminar essay		(Other)	
	Tests	40 % (0,8 ECTS)	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	The rating is formed from three parts: tests which is 40 % of the grade , the experimental section, which is 40 % of the grade , and Report, which is the remaining 20 % of the grade.					

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	D.A. Skoog, D.M. West, F.J. Holler, Osnove analitičke kemije, šesto izdanje (englesko), prvo izdanje (hrvatsko), Školska knjiga, Zagreb, 1999.	18	
	I. S. Krull, Analytical Chemistry, Intech, Rijeka, 2012.		available on web: DOI: 10.5772/3086
	L. Kukoč, Molekulska spektroskopija, Interna recenirana skripta, 2003.	30 (u ZAK)	available in digital form
	L. Kukoč, Spektrometrijske metode elementne analize, Interna recenirana skripta, 2005.	30 (u ZAK)	available in digital form
	Josipa Komljenović, Ion selektivna sulfidna elektroda, Interna recenzirana skripta	30 (u ZAK)	available in digital form

Optional literature (at the time of submission of study programme proposal)	1. Nj. Radić i L. Kukoč Modun, Uvod u analitičku kemiju I. dio, Redak, Split, 2013. 2. R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel and H. M. Widmer (Urednici), Analytical Chemistry (A Modern Approach to Analytical Science, Second Edition) Wiley-VCHVerlag Gmbh & Co. KGaA, Weinheim, 2004. 3. D. A. Skoog, D. M. West, F. J. Holler and S. R. Crouch, Fundamentals of Analytical Chemistry, Eighth Edition, Thompson Brooks/Cole, Belmont, USA, 2004. 4. D. Harvey, Modern Analytical Chemistry, McGraw-Hill Higher Education, New York, London, 2000. 5. F. W. Fifield & D. Kealey, Principles and Practice of Analytical Chemistry, Blackwell Science Ltd, Malden MA, London, 2000. 6. M. Kaštelan-Macan, Enciklopedijski rječnik analitičkog nazivlja, FKIT, Mentor, Zagreb 2014.
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)	

Biochemistry 1

NAME OF THE COURSE	Biochemistry 1					
Code	KTG304	Year of study	Third			
Course teacher	PhD, Mila Radan, assistant prof.	Credits (ECTS)	5.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			3	1		
Status of the course	Required	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Acquisition of basic knowledge and skills in the field of biochemistry.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Biochemistry I laboratory					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	(1) Upon completion of this course, students should be able to recognize how fundamental chemical principles and reactions are utilized in biochemical processes. (2) Be able to identify, formulate and solve complex biochemical problems. (3) Calculate the speed of biochemical reactions catalyzed by enzymes, determine the type of inhibition (4) To predict the potential impact of compounds on the pace of enzymatic reactions (5) Have the necessary knowledge and strategies for the separation, identification and quantification of compounds and elements from complex mixtures. (6) Connect the structure of DNA molecules with the transfer of genetic information and the principles of inheritance (7) Be able to design and conduct experiments. (8) Be able to communicate the findings and conclusions. (9) Read and understand original research.					
Course content broken down in detail by weekly class schedule (syllabus)	The contents of the course, the historical development of biochemistry, biomolecules, biological structures (3) Water, hydrogen bonds, the role of water, buffer systems in the body, amino acids (3) Amino acids, peptides, proteins, peptide bond (4) The techniques of protein purification; electrophoresis, chromatographic methods, ultracentrifugation (4) Characterization of protein: Edman degradation, immunological, mass spectrometry, MALDI-TOF, X-ray crystallography, NMR spectroscopy (3) Structure of nucleotides, DNA, RNA, and the flow of genetic information, DNA replication, transcription and translation, gene expression (3) Hemoglobin-myoglobin, structure and function, allosteric proteins (3) Enzymes as catalysts in biological systems, the model Menten kinetics Michaelis- (3) Types of enzyme inhibition: competitively, nekompeticijski and akompeticijski inhibitors (3) Catalytic strategies, catalytic core principles, covalent catalysis, acid base catalysis, catalysis approaching, metal ion catalysis (3) Regulatory strategies, allosteric control, isozymes, reversible covalent modification, activation of proteolysis-zymogens (3) Carbohydrates: monosaccharides, complex carbohydrates, glycoproteins, proteoglycans, lectins (3) lipids and the cell membrane, transport of molecules through the membrane, types of movement across the cell membrane (4) Signal transduction cascades, primary and secondary signal carriers, phosphorylation cascade, disturbances in the signal conducting paths (3)					
Format of	x ectures	x independent assignments				

<table>
<tr><td>instruction</td><td colspan="3">x seminars and workshops
x exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">x multimedia
☐laboratory
x work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6"></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></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</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>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Partial exams. Oral examination.</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">Biokemija , J.M. Berg, J.L. Tymoczko and L. Stryer, Prijevod VI izdanja, Školska knjiga Zagreb, 2013.</td><td>1</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</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>

Exercises in Biochemistry 1

NAME OF THE COURSE	Exercises in Biochemistry 1						
Code	KTG305	Year of study	Third				
Course teacher	PhD, Mila Radan, assistant prof.	Credits (ECTS)	4				
Associate teachers		Type of instruction (number of hours)	L	S	E	F	
					4		
Status of the course	Required	Percentage of application of e-learning					

COURSE DESCRIPTION

Course objectives	This laboratory course will introduce student to techniques fundamental to biochemical investigations.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Biochemistry I
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- understand and use many of the techniques and tools of biochemistry - comprehend fundamental principles of biochemical research - communicate research results effectively in written format
Course content broken down in detail by weekly class schedule (syllabus)	Potentiometric determination of amino acids (4) Qualitative analysis of proteins: colored and precipitation reactions to proteins (4) Lipid-isolation and detection of phospholipids from egg yolk (4) Properties of carbohydrates and carbohydrate tests (4) Enzymes: properties of digestive enzymes - ptyalin (4) Determination of protein concentration by Bradford assay (4) Determination of carbohydrate structures using periodic acid (4) Properties of lipids, solubility, saponification (4) Gel filtration of hemoglobin (4) Enzyme catalysis - kinetics of the enzymatic reactions (4) Enzyme catalysis - effect of inhibitors on enzyme activity (4) enzyme catalysis - effect of temperature and pH on enzyme activity (4) Isolation and quantification of nucleic acids (4) Protein electrophoresis (4) Biological oxidation: oxidation test with substance (4)
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line*in entirety ☐partial e-learning ☐field work ☐independent assignments ☐multimedia xlaboratory ☐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		Research		Practical training	
	Experimental work	3	Report	1	(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			
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Internal script: "Biochemical practicum", O. Politeo		
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)			

Analysis of Real Samples

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="5">Analysis of Real Samples</td></tr>
<tr><td>Code</td><td>KTG306</td><td>Year of study</td><td colspan="3">3.</td></tr>
<tr><td>Course teacher</td><td>PhD, Ante Prkić, assistant prof.</td><td>Credits (ECTS)</td><td colspan="3">3.5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>P</td><td>S</td><td>V</td><td>T</td></tr>
<tr><td>30</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="3">-</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">• Provide students with the basics of sampling.
• Teach students solve practical problems of sampling of real sample
• Introduction of students to basic methods for assessing the composition and size fractions in the real sample.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Enrolled in or passed the course Exercise of Analysis of real samples</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">Implementation of the sampling process as the initial step of each chemical analysis
Proper selection of the quantity of collected material, depending on the analyte and the available analytical methods and techniques
Link Auditors solve problems related to sampling using statistical methods with the available techniques and methods which can be carried out chemical analysis
Learning to use mathematical tools in solving mathematical problems related to sampling</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Week 1: Significance analysis of real samples: raw materials, industrial products. The development and control processes. Seminar: Solving numerical examples treated theoretical material.
Week 2: Sampling of gases, liquids and solids. Seminar: Solving numerical examples from the sampling of gases, liquids and solids.
Week 3: Analytical separation. Preparation of samples for analysis. Seminar: Solving numerical problems in the theory of analytic separation.
Week 4: Decomposition and dissolution of samples. Seminar: Solving numerical examples treated theoretical material - Decomposition and dissolution of samples.
Week 5: Development of selected methods. The choice of methods of analysis. Seminar: Solving numerical examples treated theoretical material - Development of selected methods.
Week 6: Reporting and interpretation of analytical data. Seminar: Solving numerical examples treated theoretical material - Reporting and interpretation of analytical data.
Week 7: Revision of theoretical and seminar materials. Assessment (first partial test of theoretical and seminar materials).
Week 8: Determination of water. Moisture in solids and gases. Seminar: Solving numerical examples treated theoretical material - moisture in solids and gases.
Week 9: Methods for the analysis of materials: cement, minerals, alloys and metals, oil, water. Seminar: Solving numerical examples treated theoretical materials - Methods for analysis of materials.</td></tr>
</table>

	10th week: Quality control. Tolerance. Seminar: Solving numerical examples treated theoretical material - Quality control and tolerance. 11th week: Reference Materials. Seminar: Solving numerical examples treated theoretical material - Reference Materials. 12 weeks: Sampling and sample preparation for analysis of plaster and cement. Seminar: Solving numerical examples treated theoretical materials - Sampling plaster and cement. 13th week: Separation and Analysis of Minerals. Seminar: Solving numerical examples treated theoretical material - Collection and analysis of minerals. 14th week: Separation and analysis: alloy. Seminar: Solving numerical examples treated theoretical material - Collection and analysis of alloys. Week 15: Revision of theoretical and seminar materials. Examination (II. Partial test theoretical and seminar materials).
Format of instruction:	☒ lectures ☒ seminars and workshop ☐ exercise ☐*on line* entirely ☐medley e-learning ☐fieldwork ☐homework ☒ multimedia ☐ laboratory ☐mentoring ☐ (other)
Student responsibilities	Attending lectures in the amount of 80% of the hourly rate.

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)*						
	Attendance	0.25	Exploration		Practical work	
	Experiment		Report		Laboratory exercises	
	Essay		Seminar	0.25	(Other)	
	Colloquia		Oral examination	1.5	(Other)	
	Test paper	1.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The entire examination can be applied over the two partial test of theoretical and seminar materials during the semester. Passing threshold is 60%. Each colloquium in the assessment accounts for 50%. Lectures presence of 80 to 100% is 10% marks. The examination periods there is a written, oral and written and oral examination. Passing threshold is 60%. Passing one partial test from any part (previous activity) is valid throughout the current academic year. Written exam has a share of 30% of oral and written with 60% and 10% verbal. Students who did not pass the exam by the partial tests take the exam through written, oral and written-oral examination in the regular examination periods. Passing threshold is 60% and the examination form to participate in the assessment with 50%. Rating: 60% -69% - satisfactory, 70% -79% - a good 80% -89% -very good, 90% - 100% - excellent.

Required literature (available in the library and via other media)	**Naslov**	**Broj primjeraka u knjižnici**	**Dostupnost putem ostalih medija**
	1. D. A. Skoog, D. M. West i F. J. Holler, Osnove analitičke kemije, Školska knjiga, Zagreb, 1999. 2. A. I. Vogel, A. Tekst-book quantitative inorganic analysis, Fifth Edition Longman, London, 1986.;	1. 6	

	3. R. Kellner, J.M. Mermet, M. Otto, M. Varcarcel, H.M. Widmer, Analytical Chemistry (A Modern Approach to Analytical Science, 2nd Edition) Wiley-VCHVerlag Gmbh&Co. KGaA, Weinheim, 2004. 4. D. A. Skoog, D. M. West i F. J. Holler, S. R. Crouch, Fundamentals of Analytical Chemistry, 9th edition, Brooks&Cole, SAD, 2014.		
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	- Monitoring suggestions and reactions of students during the semester - Student survey		
Other (as the proposer wishes to add)			

Exercise in Analysis of Real Samples

NAME OF THE COURSE	Exercise in Analysis of Real Samples					
Code	KTG307	Year of study	3			
Course teacher	PhD, Ante Prkić, 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	• To enable students to maintain their own sampling • Teach students solve practical problems of sample analysis • Introduce students to the basic methods of sampling and critical analysis of the results, their display and interpretation and linking theoretical knowledge and experimental work.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Analysis of real samples
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Collection, identification and interpretation of results of analysis of real samples. Sampling of solids, liquids and gases. Dissolution samples of solids and liquids. The separation of homogeneous and heterogeneous mixture
Course content broken down in detail by weekly class schedule (syllabus)	1. Introduction to the problem of sampling (4 hours). 2. Sampling of mineral resources (3 hours) 3. Dissolving sample of mineral resources (4 hours) 4. Sampling of water (sea and water) (3 hours) 5. Processing and analysis of samples of sea and tap water (6 hours) 6. Sampling and dissolving alloys (5 hours) 7. Sampling and dissolving organic origin sample (5 hours)
Format of instruction:	☐ lectures ☐ seminars and workshop ☒ **exercise** ☐ *on line* entirely ☐medley e-learning ☐fieldwork ☒ **homework** ☐ multimedija ☒ **laboratory** ☐ mentoring
Student responsibilities	The presence and activity of the exercises in the amount of 100% of the times scheduled. Perform all prescribed laboratory exercises and writing reports. Continuous assessment by tests prior to commencement of the exercise.

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)*						
	Working in a laboratory - preparation		Consultation		Oral exam - colloquies, independent learning	0,5
	Laboratory exercises - performance measurement	2	Writing reports	0,5		

<table>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="3">Continuous evaluation: (success (%) / share in the assessment (%))
• presence and activity in the classroom: (100/10)
• oral exams (60-100 / 25)
• Performance measurement: (60-100 / 25)
• writing reports (experimental data, calculating data, tables and graphs, conclusion): (60-100 / 40)</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)
Optional literature (at the time of submission of study programme proposal)</td><td>Title</td><td>Number of copies in the library</td><td>Accessible via other media</td></tr>
<tr><td>E. Generalić, S. Krka, Analiza realnih uzoraka – vježbe, Split 2012. (interni nerecenzirani skript)</td><td></td><td>Web-site of Department</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3"></td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3">- Monitoring suggestions and reactions of students during the semester
- Student survey</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="3"></td></tr>
</table>

Elementary Chemical Engineering

NAME OF THE COURSE	Elementary Chemical Engineering					
Code	KTG312	Year of study	3th			
Course teacher	PhD, Nenad Kuzmanić, prof.	Credits (ECTS)	4.0			
Associate teachers	Renato Stipišić, lecturer Antonija Kaćunić, assistant	Type of instruction (number of hours)	L	S	E	F
			45	15	0	
Status of the course	Obligatory	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	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.					
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Exercises of elementary chemical engineering					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, student is expected to know how to: - apply the laws of conservation in fluid flow - identify and analyze molecule and vortex mechanisms of transport phenomena - notice the major resistances in transport phenomena and to know how to intensify transport in different unit operations - differentiate the key parameters in mechanic, heat and diffusion based unit operations of chemical industry					
Course content broken down in detail by weekly class schedule (syllabus)	1st. week: Introduction to chemical engineering. Processes and process variables. Process classification. Flowchart of process. 2nd week: Fundamentals of material and energy balances. General balance equation. Material balances on batch, semibatch and continuous processes. 3th week: Energy and energy balances. Energy balances on closed and opened systems. 4th week: Introduction to physical transport phenomena. Rate of transport processes. Molecular and convective transport mechanisms. 5th week: Flow phenomena. Conservation law. Application of momentum and mass balances in fluid mechanics. Application of heat balance in fluid mechanics: Bernoulli equation and its application in process engineering. 6th week: Flow phenomena. Laminar and turbulent flow. Flow in boundary layers. Pressure drop in pipe systems. 7th week: Flow around obstacles. Rate of sedimentation. 8th week: Flow through beds of particles. Fluidization. Filtration. 9th week: Fundamental principles of heat transfer. Stationary heat conduction. Heat transfer by forced and natural convection. Heat transport by radiation. 10th week: Heat transfer industrial applications. Heat-exchange equipments. 11th week: Fundamental principles of mass transfer. Stationary diffusion. Equimolar counterdiffusion and one-component diffusion. Mass transfer with forced and natural convection. 12th week: Interphase mass transfer. Analogy between heat and mass transfer.					

<table>
<tr><td></td><td colspan="6">13th week: Unit operations involving mass transfer. Gas absorption. Apparatus used in gas absorption.
14th week: Distillation and its aplications. Performance of distillation columns.
15th week: Crystallization. Influence of process parameters on final products of crystallization. Crystallization equipments.</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>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>Seminar</td><td>0.5</td></tr>
<tr><td>Written exam</td><td>0</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 only the theoretical (oral) part.</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">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></td></tr>
<tr><td colspan="3">R. M. Felder, R. W. Rousseau, Elementary Principles of Chemical Processes, 3 rd edition, John Wiley & Sons, Inc., New York, 2000.</td><td>1</td><td></td></tr>
<tr><td colspan="3">N. Kuzmanić, Osnove kemijskog inženjerstva, Priručnik za predavanja (za unutarnju uporabu), Kemijsko-tehnološki fakultet u Splitu, Split, 2012.</td><td></td><td>Web site of institution</td></tr>
<tr><td colspan="3">W.L. McCabe, J.C. Smith, P. Harriott, Unit Operations of Chemical Engineering, McGraw-Hill, 6th edition, New York, 2001.</td><td>3</td><td></td></tr>
<tr><td colspan="3">M. Hraste, Mehaničko procesno inženjerstvo, HINUS, Zagreb, 2003.</td><td>10</td><td></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.
V. Koharić, Mehaničke operacije, Sveučilište u Zagrebu, Zagreb, 1996.</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>
</table>

Other (as the proposer wishes to add)	

Exercises in **elementary chemical engineering**

NAME OF THE COURSE	Exercises in **elementary chemical engineering**					
Code	KTG309	Year of study	3.			
Course teacher	Renato Stipišić, lecturer	Credits (ECTS)	1			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
					15	
Status of the course	Obligated	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	Establishing knowledge of the principles of momentum, heat and mass transfer and its application in technological processes of the chemical industry.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Elementary chemical engineering
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After passing the exam, the student is expected to: - Apply conservation laws in fluid flow - Identify and analyze the molecular mechanisms and eddy transfer of momentum, energy and mass - The eve of major resistance for notebook phenomenon and the possibility of intensifying the transfer of the unit operations - Different key parameters for mechanical, thermal and diffusion unit operations of chemical industry
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1: Determination of fluid flow type and the critical Reynolds number; Applying the Bernoulli's theorem. (2.5 hours) Exercise 2: Determination of pressure drop in the pipeline. (2.5 hours) Exercise 3: Determination of fluidized bed characteristics. (2 hours) Exercise 4: Filtration - determination of filtration coefficient and filtration cake resistance. (2 hours) Exercise 5: Heat exchanger - overall heat transfer coefficient determination in heat exchangers. (2 hours) Exercise 6: Absorption - determination of loading and flooding points of packed tower absorber. (2 hours) Exercise 7: Crystallization - Impact of process parameters on final product of crystallization. (2 hours)
Format of instruction	lectures seminars and workshops x exercises *on line*in entirety partial e-learning field work independent assignments multimedia x laboratory work with mentor (other)
Studentresponsibilities	Attendance at 100% of the hourly rate.

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

ECTS credits is equal to the ECTS value of the course)	Tests	0.1	Oral exam		(Other)	
	Written exam	0.3	Project		(Other)	
Grading and evaluating student work in class and at the final exam	A student can pass the entire exam written exam. The principle of assessment: 60-69% - satisfactory, 70% -79% - a good 80% -89% Very good, 90% -100% - excellent.					

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Priručnik za vježbe iz kolegija Tehnološke operacije, interna skripta 2012.	-	Web pages KTF-a
	E. Mitrović - Kessler: Tehnološke operacije kemijske industrije - laboratorijske vježbe, Sveučilište u Splitu, Split 1991.	10	-
Optional literature (at the time of submission of study programme proposal)			
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)			

Biochemistry 2

NAME OF THE COURSE	Biochemistry 2					
Code	KTG304	Year of study	Third			
Course teacher	PhD, Mila Radan, assistant prof.	Credits (ECTS)	6.0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			2	1		
Status of the course	Required	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Acquisition of basic knowledge and skills in the field of metabolism.					
Course enrolment requirements and entry competences required for the course						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	(1) Upon completion of this course, students should be able to judge whether a proposed or hypothetical reaction is consistent with the general framework of catabolic and anabolic metabolism. (2) Students should recognize how common foodstuffs are turned into metabolic energy and will be able to predict the energy content and value of different classes of chemical compounds. (3) Locate the site of the metabolism of nutrients in the subcellular structures, and track their transport to or from cellular organelles (4) Comprehension of complex regulatory mechanisms whose action is necessary to maintain homeostasis (5) To perceive the importance of vitamins in the composition of enzymes (cofactors) for the activities of key enzymes in the metabolism (6) Related mutual rearrangement of different types of biomolecules (carbohydrates, proteins and fats) (7) Monitor the fate of a metabolite or food ingredient from resorption to complete degradation or turnover into new compounds (8) Understand the causes of metabolic diseases, to predict the possibilities of their treatment					
Course content broken down in detail by weekly class schedule (syllabus)	Basic concepts and properties of metabolism, catabolism and anabolism (2) Metabolism of carbohydrates: transport of glucose into cells, glycolysis (3) gluconeogenesis (2) Metabolic energy: citric acid cycle and oxidative phosphorylation (4) Pentose phs phosphate pathway(2) Glycogen metabolism: degradation and synthesis (2) Lipid metabolism: triglycerides, phospholipids and cholesterol (3) Fatty acids degradation (beta-oxidation) and fatty acid synthesis, synthesis of phospholipids, ceramides and gangliosides (3) synthesis of cholesterol, and compounds resulting from cholesterol (steroid hormones, bile salts, vitamin D), lipoproteins (LDL, HDL), ikosanoidi (3) Amino acids degradation and the urea synthesis, synthesis of amino acids and co-factors, glutathione, mobilization of nitrogen and integration into biomolecules, complex regulation of the enzyme glutamine synthetase (4) Biosynthesis and degradation of purine and pyrimidine nucleotides, nucleotide metabolism disorders (2) Integration of metabolism					
Format of instruction	x ectures x seminars and workshops x exercises ☐*on line*in entirety ☐partial e-learning ☐field work		x independent assignments x multimedia ☐aboratory x work with mentor ☐ (other)			

<table>
<tr><td>Studentresponsibilities</td><td colspan="6"></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></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</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">Partial exams. Oral examination.</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">Biokemija , J.M. Berg, J.L. Tymoczko and L. Stryer, Prijevod VI izdanja, Školska knjiga Zagreb, 2013.</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">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>

Selected processes of chemical industry

NAME OF THE COURSE	Selected processes of chemical industry					
Code	KTG311	Year of study	3.			
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	5.5			
Associate teachers	Miće Jakić, assistant	Type of instruction (number of hours)	L	S	E	F
			45	15		
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 course Selected processes of chemical industry-laboratory					
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. 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.
Format of instruction	**x**lectures **x**seminars and workshops ☐exercises ☐*on line*in entirety ☐partial e-learning ☐field work **x**independent assignments ☐multimedia ☐laboratory ☐work with mentor ☐ (other)
Student responsibilities	

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	1.0	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay	0.5	(Other)	
	Tests	1.0	Oral exam	1.5	(Other)	
	Written exam	1.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	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.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	R. Krstulović, Technological Processes of Inorganic Industry/Tehnološki procesi anorganske industrije, (in Croatian), Manualia Universitatis Studiorum	5	

	Spalatensis, University of Split, Split, 1986.		
	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
	Z. Janović, Polimerizacije i polimeri, Hrvatsko društvo kemijskih inženjera i tehnologa, Zagreb, 1997.	6	
	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 edited teaching materials), https://www.ktf-split.hr/index.php/nastavni-materijali-knjiznice/repozitorij-265?start=20		www.ktf-split.hr
	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)			

Exercices in selected processes of chemical industry

NAME OF THE COURSE	Exercices in selected processes of chemical industry					
Code	KTG312	Year of study	3.			
Course teacher	PhD, Jelica Zelić, prof.	Credits (ECTS)	2.0			
Associate teachers	Miće Jakić, assistant Mario N. Mužek, assistant	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	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 course 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 detail by weekly class schedule (syllabus)	1. Water treatment. Water softening processes. Lime-Soda process. Ion-exchange process. 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).	
Format of instruction	☐lectures ☐seminars and workshops **x**exercises ☐*on line*in entirety ☐partial e-learning ☐field work	**x**independent assignments ☐multimedia **xl**aboratory ☐work with mentor ☐ (other)
Student responsibilities	Implementation and analysis of selected processes according to preset conditions.	

<table>
<tr><td></td><td colspan="6">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="6"></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="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 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 organske industrije (printed course materials), Faculty of Technology in Split, Split, 1990.</td><td>10</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">1. R. Krstulović, Technological Processes of Inorganic Industry/Tehnološki procesi anorganske industrije, (in Croatian), Manualia Universitatis Studiorum Spalatensis, University of Split, Split, 1986.</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>

General Biology

NAME OF THE COURSE	General Biology					
Code	KTG 301	Year of study	3.			
Course teacher	PhD, Nada Bezić, prof.	Credits (ECTS)	4.0			
Associate teachers	PhD, Valerija Dunkić, associat prof.	Type of instruction (number of hours)	L	S	E	F
			30	15		
Status of the course	Elective	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	Enrolled in or passed 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** ☐ **seminars and workshops** ☐ exercises ☐ *on line*in entirety ☐ partial e-learning	☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)

<table>
<tr><td></td><td colspan="6">☐ field work</td><td colspan="2"></td></tr>
<tr><td>Studentresponsibilities</td><td colspan="8">Admission to the lectures of at least 70%, as well as seminars and seminar work in 100% of scheduled 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></td><td>Research</td><td></td><td>Practical training</td><td colspan="2"></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Written exam</td><td>3</td><td>Project</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">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.</td></tr>
<tr><td rowspan="3">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">Literatura the Webb Science</td><td></td><td></td></tr>
<tr><td colspan="5">G. M. Cooper, The Cell: A Molecular Approach, ASM Press. Washington , D.C. 2004.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="8">A.Delić i N. Vijtiuk, Prirodoslovlje, Školska knjiga, Zagreb, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="8">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="8"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Enzyme kinetics</td></tr>
<tr><td>Code</td><td>KTG315</td><td>Year of study</td><td colspan="4">3st</td></tr>
<tr><td>Course teacher</td><td>PhD, Olivera Politeo, associate prof.</td><td>Credits (ECTS)</td><td colspan="4">4 ECTS</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">PhD, Franko Burčul, assistant
Ivana Carev, 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>30</td><td>15</td><td>-</td><td>-</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">Acquisition of basic knowledge and skills in the field of enzyme kinetics.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Enzyme kinetics exercise</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">• Understand the basic principles of chemical kinetics.
• Understand the importance and role of the enzymes in the life of the cell.
• Understand and explain Mechaelis-Menten kinetics model.
• Experimentally determined parameters of the enzyme-catalysed reactions.
• Understand and explain the importance and role of inhibition of enzyme-catalyzed reactions.
• Explain the mechanisms of regulation of enzyme activity.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">LECTURES:
Basic principles of chemical kinetics: order of reaction. The reaction rate constants. The influence of temperature on rate constants. (3) Enzymes as biological catalysts: Basic properties of the enzymes. Nomenclature and classification of enzymes. The specificity of the enzymes. The active site of the enzymes. (4) Cofactors and coenzymes. (2) The kinetics of enzyme-catalyzed reactions: Activation energy. Enzyme-substrate reaction. Michaelis - Menten equation. Experimental determination of Km and Vmax. Graph of the Michaelis-Menten equation: the Lineweaver-Burkov double-reciprocal plot. Hanes plot. Eadie-Hofstee plot. (3) Inhibition of enzymes. Competitive inhibition. Uncompetitive reversible inhibition. Mixed inhibition. Irreversible inhibition. (3) Effect of pH and temperature on enzyme activity. (2) Control of enzyme activity: Cooperativity. Allosteric interactions. Hill equation. (2) Catalytic strategies. (4) Mehanisms of regulation: Inhibition feedback, covalent modifications, proteolytic cleavage (3) Kinetics of multienzyme systems. (2) Fast reactions (2)

SEMINARS:
Basic principles of chemical kinetics (2) Enzymes as biocatalysts. (1) Cofactors and coenzymes. (1) Michaelis-Menten equation. (4) Inhibition of enzymes. (4) Effect of pH and temperature on enzyme activity. (1) Allosteric interactions. (1) Mehanisms of regulation of enzyme activity. (1)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐lectures
☐seminars</td><td colspan="3"></td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Class attendance, preparing seminar papers and taking the final exam.</td></tr>
</table>

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	(Other)	
	Tests		Oral exam	0,5	(Other)	
	Written exam	2,5	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Activity during attendance, presentation of seminar papers and final exam.					

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	J.M. Berg, J.L. Tymoczko, L. Stryer: *Biokemija*, 5th Ed, Školska knjiga Zagreb, 2013.		
	R.K. Murray, D.A. Bender, K.M. Botham, P.J. Kennelly, V.W. Rodwell, P.A. Weil, Harperova ilustrirana biokemija, Medicinska naklada, Zagreb, 2011.;		
	D. Voet. J. G. Voet, C. W. Pratt, Fundamentals of Biochemistry, John Wiley & Sons, Inc., NY, Chichester, Weinheim, Brisbane, Singapore, Toronto, 1999. .		
	Cornish-Bowden: Fundamentals of Enzyme Kinetics, Butterworth, London 1979		
Optional literature (at the time of submission of study programme proposal)	• Christopher K. Mathews and K. E. Van Holde: Biochemistry, Second edition, The Benjamin / Cummings Publishing Company Inc 1996. • Thomas M. Devlin: Textbook of Biochemistry, Third Edition, Wiley and Sons Inc., New York, Chichester, Brisbane, Toronto, Singapore, 1992.		
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, (3) Level of teachers.		
Other (as the proposer wishes to add)	-		

NAME OF THE COURSE	Enzyme kinetics exercise				
Code		Year of study	3st		
Course teacher	PhD, Olivera Politeo, associate prof.	Credits (ECTS)	2 ECTS		
Associate teachers	PhD, Franko Burčul, assistant Ivana Carev, assistant	Type of instruction (number of hours)	L	S	E	F
			-	-	30	-
Status of the course	elective	Percentage of application of e-learning	-			

COURSE DESCRIPTION

Course objectives	Acquisition of basic knowledge and skills in the field of enzyme kinetics.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Enzyme kinetics
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	• Understand the basic principles of chemical kinetics. • Understand the importance and role of the enzymes in the life of the cell. • Understand and explain Mechaelis-Menten kinetics model. • Experimentally determined parameters of the enzyme-catalysed reactions. • Understand and explain the importance and role of inhibition of enzyme-catalyzed reactions. • Explain the mechanisms of regulation of enzyme activity.
Course content broken down in detail by weekly class schedule (syllabus)	The influence of enzyme concentration on the reaction rate. Kinetics of the enzymatic reaction (experimental determination of Km and Vmax). The influence of pH on enzyme activity. The influence of temperature on enzyme activity. The influence of inhibitors on enzyme activity.
Format of instruction	☐ exercises
Student responsibilities	Lab attendance, taking the tests and taking the final exam.

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	1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	Activity during experimental work, tests and final exam.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S.K. Sawhney: Introductory Practical Biochemistry. Alpha Science International Ltd., Harrow, U.K., 2008.		

	Olivera Politeo: Biokemijski praktikum, internal material.		
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, (3) Level of teachers.		
Other (as the proposer wishes to add)	-		

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Perfumes and Cosmetics</td></tr>
<tr><td>Code</td><td>KTG317</td><td>Year of study</td><td colspan="4">3.</td></tr>
<tr><td>Course teacher</td><td>PhD, Ani Radonić, 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></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">Acquisition of basic knowledge in the field of chemistry of fragrances and fragrant compounds and their significance and application in everyday life.
Acquisition of basic knowledge about the most important raw materials which are used in production of cosmetic preparations, types of cosmetic preparations and side effects of cosmetic raw materials and/or preparations on skin and skin appendages.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Experimental in Perfumes and Cosmetics</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 will be able to:
-define basic terms associated with chemistry and creation of fragrances
- specify perfumery materials of natural origin, methods used to extract ingredients from their natural sources and the most common natural sources
- specify and recognize some, the most common synthetic fragrant compounds according to their structural formula
- define terms cosmetics and cosmetology
- differentiate main classes of ingredients for cosmetics production and specify the most important representatives of each class
- differentiate cosmetics according to utilization and specify typical products belonging to each class</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (2 hours weekly):
1st week: Introduction to course (course content, students responsibilities, terms and conditions for passing exam). Definitions of terms such as fragrance, fragrant or aroma compound, olfactology, olfaction.
2nd week: Olfactory system. Olfactory system disorders. History of discovery, production and use of fragrances.
3th week: Perfume types. Classification of fragrances by the origin of the ingredients. Natural, nature-identical, synthetic. The structure of an fragrance. Classification of fragrances by olfactive family.
4th week: Olfactive families. Classification by H&R. Classification by M. Edwards – so-called „fragrance wheel“. Classification by fragrance manufacturers.
5th week: Fragrance ingredients. Natural ingredients. Methods of natural ingredients isolation. Distillation. Expression. Solvent extraction.
6th week: Definitions of natural fragrance ingredients. Aromatics sources. Plant sources. Bark. Flowers. Fruits.
7th week: Plant sources. Leaves and twigs. Roots, rhizomes and bulbs. Seeds. Woods. Resins and balsams.
8th week: Animal sources. Other natural sources. Fragrant compounds. Classification of synthetic ingredients. Classification by functional groups. Alcohols.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Aldehydes. Ketones.
9th week: C13 norisoprenoids.. esters. Lactones. Musks. Phenolics. Hydrocarbons. Heterocyclic compounds.
10th week: Definition of terms cosmetics and cosmetology. Significance and classification of cosmetology. Skin and skin appendages. Cosmetics ingredients. Natural ingredients. Inorganic ingredients.
11th week: Organic ingredients. Ingredients of plant origin. Ingredients of animal origin. Biogenic stimulants: hormones, vitamins and enzymes.
12th week: Semisynthetic ingredients. Synthetic ingredients. Active ingredients and adjuvants. Tensides. Emollients. Thickeners. Preservatives. Antioxidants. Dyes. Sunscreen preparations.
13th week: Cosmetic preparations. Definitions of basic terms andclassification. Cleansing products.
14th week: Skin care products. Creams, lotions, gels and oils for skin and hair care.
15thwek: Decorative cosmetics.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">X lectures
X seminars and workshops
☐exercises
☐on linein entirety
☐partial e-learning
☐field work</td><td colspan="3">☐independent assignments
X multimedia
☐laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="6">Students are required to attend lectures in the amount of at least 80% of the times scheduled. Active participation in teaching process will be also evaluated in the final score.</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>(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></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 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 the entire exam by taking and passing two partial exams (tests) during the semester. Test passing score is 60%. Each test constitute 45% of the final exam score. Attendance to the lectures participate in the final score with 10%. Any of the partial exams passed during the semester is valid throughout the academic year.
Students who do not pass one of the partial exam or both of them have to take an written exam in the regular examination periods. Exam passing score is 60%.
Grades depending on the test score: 60% - 69% - satisfactory, 70% -79% - good, 80% -89% very good, 90% -100% - 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 colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">The Chemistry of Fragrances, 2nd edition, edited by C. S. Sell, RSC Publishing, Cambridge, 2006.</td><td>-</td><td colspan="2">Yes, personal property of the lecturer</td></tr>
<tr><td colspan="3">M. Čajkovac, Kozmetologija, Naklada Slap, Zagreb, 2000.</td><td>1</td><td colspan="2">-</td></tr>
<tr><td>Optional literature (at the time of</td><td colspan="6">Poucher's Perfumes, Cosmetics and Soaps, 10th edition, edited by Hilda Butler,</td></tr>
</table>

submission of study programme proposal)	Kluwer Academic Publishers, Dordrecht, 2000. Tehnička enciklopedija, vol. 5, str. 360-370, JLZ, Zagreb, 1976. Tehnička enciklopedija, vol. 7, str. 311-319, JLZ, Zagreb, 1980. J. Buckle, Clinical Aromatherapy, Essential Oils in Practice, 2nd edition, Churchill Livingstone, Edinburgh, 2003.
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University Level, conducting surveys of students on teaching quality; (2) Faculty Level, by Quality Control Committee; (3) Lecturer's Level, monitoring and accepting suggestions of students and colleagues
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Experimental in Perfumes and Cosmetics</td></tr>
<tr><td>Code</td><td>KTG318</td><td>Year of study</td><td colspan="5">3.</td></tr>
<tr><td>Course teacher</td><td>PhD, Ani Radonić, associate prof.</td><td>Credits (ECTS)</td><td colspan="5">1.0</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>0</td><td>0</td><td>15</td><td></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="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Acquisition of basic knowledge and application of laboratory methods and techniques for isolation of fragrant constituents which are used in fragrant preparations creation.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Enrolled in or passed the course Perfumes and Cosmetics</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">After passing the course students will be able to:
- perform independently laboratory exercises according to laboratory procedures
- set up appropriate apparatus for performing isolation of natural ingredients which are used in creation of fragrant preparations
- apply basic laboratory procedures and techniques for isolation of natural ingredients which are used in creation of fragrant preparations and cosmetics
- propose laboratory procedures for isolation of natural ingredients from plant material based on knowledge gained throughout lectures (connect theoretical knowledge with experimental work)</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Exercises (1 hour weekly joined together in 5 lab periods):
1. Isolation of fragrant compounds from flowers (such as lavender, broom…) by hydrodistillation – obtaining of flower” oil
2. Extraction of fragrant compounds from flowers in Soxhlet apparatus – obtaining of concrete
3. Hydrodistillation of concrete – obtaining of so-called concrete oil
4. Processing of concrete and obtaining of absolute. Thin-layer chromatography of flower oil, concrete oil and absolute.
5. Synthesis of selected fragrant compound.</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="4">☐independent assignments
☐multimedia
x laboratory
☐work with mentor
☐ (other)</td></tr>
<tr><td>Studentresponsibilities</td><td colspan="7">Students have to complete all planned laboratory exercises (100% of the times scheduled) and active participate in laboratory work.</td></tr>
<tr><td rowspan="4">Screening student work(name the proportion of ECTS credits for eachactivity so that the total number of ECTS credits is</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>0.5</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></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
</table>

equal to the ECTS value of the course)	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Students are evaluated based on their commitment during experimental work and the results achieved during work in organic-chemistry lab.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, KTF-Split, 2009.			-	Yes, web site of the institution	
Optional literature (at the time of submission of study programme proposal)	V. Rapić, Postupci priprave i izolacije organskih spojeva, Školska knjiga, Zagreb, 1994. S. Borčić, O. Kronja, Praktikum preparativne organske kemije, Školska knjiga, Zagreb, 1991.					
Quality assurance methods that ensure the acquisition of exit competences	Monitoring of quality assurance will be performed at three levels: (1) University Level, conducting surveys of students on teaching quality; (2) Faculty Level, by Quality Control Committee; (3) Lecturer's Level, monitoring and accepting suggestions of students and colleagues					
Other (as the proposer wishes to add)						

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Chemistry in pharmacology</td></tr>
<tr><td>Code</td><td>KTG 319</td><td>Year of study</td><td colspan="5">3st</td></tr>
<tr><td>Course teacher</td><td>PhD, Marija Bralić, associate prof.</td><td>Credits (ECTS)</td><td colspan="5">4.0</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></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">Introducing chemical characteristics of drug substances. Basic divisions and characteristics of certain classes of drugs.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled in or passed the course Exercise of chemistry in pharmacology</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After course students will be able to :
1. definition of basic concepts and distribution of certain classes of drugs
2. physicochemical properties of drugs
3. effect and mechanism of drugs
4. Development and mode of action of drugs
5. adverse effects of drugs and their resistance
6. interactions with other drugs</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lecture 1: Introduction: definition and application

Lecture 2: Chemical structures and stereochemical characteristics of drug substances

Lecture 3: Chemical structures and stereochemical characteristics of drug substances

Seminar 1 (2 hours): Introduction to the legislation of drugs

Lecture 4: Physico-chemical properties of drugs
Seminar 2 (2 hours): Distribution of drugs by pharmacological groups

Lecture 5: Physico-chemical properties of drugs

Seminar 3 (2 hours): The pharmacokinetics of drugs

Lecture 6: Chemical stability and incompatibility drugs

Lecture 7: Chemical stability and incompatibility drugs

Lecture 8: Activity and mechanism of action

Seminar 4 (2 hours): The pharmacodynamics of drugs

Lecture 9:. Division according pharmacological groups</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Seminar 5 (2 hours): analgesics

Lecture 10: The properties of certain classes of drugs

Seminar 6 (2 hours): anxiolytics

Lecture 11: Development and explanation of drug action
Seminar 7 (2 hours): antibiotics

Lecture 12: The main stages of drug action: absorption, distribution, metabolic processes, removal

Lecture 13: The main stages of drug action: absorption, distribution, metabolic processes, removal

Lecture 14: Introduction to side effects, resistance, interactions with other drugs

Lecture 15: Introduction to side effects, resistance, interactions with other drugs

Seminar 8 (1 hour): Minerals in pharmaceuticals, Chromatography and detection of drugs</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>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>0.5</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></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 tests 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>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**	
	J.B. Stenlake, Foundations of Molecular Pharmacology: Chemical Basis of Drug Action, 1979		1 copy in the Department
	K.A. Connors, Chemical Stability of Pharmaceuticals: A Handbook for Pharmacists, 1986.		1 copy in the Department
	Kent and Riegel's, Handbook of industrial chemistry and biotechnology, Volume I, Springer Science+Business Media, LLC, 2007.		1 copy in the Department
	Eiichiro Ochiai, Chemicals for Life and Living, Springer-Verlag Berlin Heidelberg 2011		1 copy in the Department
Optional literature (at the time of submission of study programme proposal)	T.C. Marrs, R.L. Maynard, F.R. Sidell, Chemical Warfare Agents: Toxicology and Treatment, 1996; L. Poller, Oral Anticoagulants: Chemical and Biological Preperties and Clinical Applications, 1996.		
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)			

NAME OF THE COURSE	Exercise of chemistry in pharmacology							
Code	KTG 320	Year of study	3st					
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	25	5		
Status of the course	Elective	Percentage of application of e-learning						

COURSE DESCRIPTION

Course objectives	Supplement theoretically acquired knowledge pertaining to the analysis of pharmacological preparations.
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Chemistry in pharmacology
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the training, students are expected to know: 1. basic methods of obtaining chemical compounds defined as a drug 2. way of identifying the active ingredients 3. determination of the active ingredients in the composition 4. evaluation of technological perfection and preparation method of packing, compared to the durability, handling and contamination of the drug 5. opinion on the quality of the drug on the basis of the laboratory tests
Course content broken down in detail by weekly class schedule (syllabus)	**Lab course 1 (5 hour):** Getting acetylenic acid **Lab course 2 (5 hour):** Getting Bi-subgallate **Lab course 3 (5 hour):** Getting caffeine **Lab course 4 (5 hour):** Formation of calcium carbonate **Lab course 5 (5 hour):** Determination of the aqueous extract and tablets **Field work** (JGL, Belupo Koprivnica)
Format of instruction	☐lectures ☐seminars and workshops x exercises ☐*on line*in entirety ☐partial e-learning ☐field work ☐independent assignments ☐multimedia x 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	Research		Practical training	
	Experimental work	1.0	Report	0.3	Preparation for the exam of exercises	0.2
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and	During the semester students will be evaluated through six Laboratory test.					

<table>
<tr><td>evaluating student work in class and at the final exam</td><td colspan="3">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="2">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>B.Zorc, I.Butula, Vježbe iz farmaceutske kemije, Zagreb, 1995.</td><td></td><td>1 copy in the Department</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">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="3"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">Chemistry of polymers</td></tr>
<tr><td>Code</td><td>KTG321</td><td>Year of study</td><td colspan="5">3.</td></tr>
<tr><td>Course teacher</td><td>PhD, Matko Erceg, associate 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></td><td></td><td></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">- knowledge about the most important properties of different types of polymers
- understanding the relation between structure and specific properties of the polymers
- basic knowledge of the methods of preparation of synthetic polymers
- introduction to the basic methods of polymer characterization</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 polymer chemistry</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 be able to:
- distinguish and explain basic types of polymers and their properties
- explain the specific structure of the polymer
- argue correlation between structure and properties of polymers
- distinguish and explain the polymerization reactions
- identify and characterize polymeric materials using modern instrumental techniques</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1st week: : Introduction. The nomenclature of the polymer. The classification of polymers (thermoplastics, thermosets, elastomers).
2nd week: Types of bonds in polymers. Configuration of the polymers. Conformation of the polymers.
3rd week: Super-molecular structure of the polymer. Polymer liquid crystals.
4th week: The rheological properties of the polymer.
5th week: Polymer solutions: swelling, solubility, method of calculating the solubility parameters, Hansen's theory.
6th week: Molecular weight of the polymer. Viscosimetric determination of molecular weights.
7th week: Fractionation of the polymer. Methods of fractionation. Gel permeation chromatography.
8th week: Step-growth polymerization: properties, rate of step-growth polymerization, polymers synthesized by step-growth polymerization.
9th week: Chain growth poli. Radical polymerization: properties, rate of radical polymerization, polymers synthesized by radical polymerization.
10th week: Cationic and anionic polymerization: properties, rate of cationic and anionic polymerization, polymers synthesized by cationic and polymerization polymers
11th week: Coordination polymerization: properties, the rate of coordination polymerization, polymers synthesized by coordination polymerization.
12th week: Methods of polymerization. Natural polymers. Cellulose, cellulose fibers, cellulose modification. Starch.
13th week: Protein, protein fibers. Structure and properties of natural rubber. Synthetic rubbers. Biosynthetic polymers.
14th week: Infrared Spectroscopy.
15th week: Thermal methods - differential scanning calorimetry (DSC) and thermogravimetry (TG). Glass transition temperature, melting temperature, thermal stability of polymers.</td></tr>
</table>

<table>
<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">☐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>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 colspan="6"></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="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">Y. Gnanou, M. Fontanille, Organic and Physical Chemistry of Polymers, John Wiley & Sons, Inc., Hoboken, New Jersey, 2008.</td><td>1</td><td></td></tr>
<tr><td colspan="3">T. Kovačić, Struktura i svojstva polimera, Faculty of Chemistry and Technology, Split, 2010.</td><td>5</td><td>WEB library of KTF</td></tr>
<tr><td colspan="3">B. Andričić, Prirodni polimerni materijali, Faculty of Chemistry and Technology, Split, 2009.</td><td></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">Z. Janović, Polimerizacije i polimeri, HDKI-Kemija u industriji, Zagreb, 1997.; B. Stuart, Infrared Spectroscopy - Fundamentals and Applications, John Wiley & Sons, Ltd., Chichester, 2004.; J. D. Menzel, R. B. Prime, Thermal Analysis of Polymers - Fundamentals and Applications, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009.</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>

NAME OF THE COURSE	Exercises in polymer chemistry				
Code	KTG322	Year of study	3.		
Course teacher	PhD, Matko Erceg, associate prof.	Credits (ECTS)	2.0		
Associate teachers		Type of instruction (number of hours)	L	S	E	F
					30	
Status of the course	Elective	Percentage of application of e-learning			

COURSE DESCRIPTION

Course objectives	- acquiring practical knowledge about polymerization of polymers in laboratory - identification and characterization of polymers by using complex methods and instruments - report writing
Course enrolment requirements and entry competences required for the course	Enrolled in or passed the course Polymer chemistry
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: - synthesize polymer in the laboratory - create the procedure for analysis of polymers using modern analytical methods - use the appropriate standards in analysis - analyze and discuss the obtained experimental results - write a report
Course content broken down in detail by weekly class schedule (syllabus)	Exercise 1. Swelling of the polymer Exercise 2. Fractionation of polymer by fractional precipitation Exercise 3. Viscometric determination of polymer molecular weight Exercise 4. Polyesterification of adipic acid with diethylene glycol Exercise 5. Suspension polymerization of styrene Exercise 6. Identification of polymer by infrared spectroscopy Exercise 7. Determination of the thermal characteristics of the polymer by using differential scanning calorimetry and thermogravimetry
Format of instruction	☐lectures ☐seminars and workshops ☐exercises ☐*on line* in entirety ☐partial e-learning ☐field work x independent 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 total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work	1.0	Report	0.2	Preparation for experimental work	0.5
	Essay		Seminar essay		(Other)	
	Tests	0.3	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student	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.

<table>
<tr><td>work in class and at the final exam</td><td colspan="3">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%).</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>T. Kovačić, B. Andričić, Struktura i svojstva polimera, Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2007.</td><td></td><td>Department of Organic Technology</td></tr>
<tr><td>I. Klarić, N. Stipenanelov Vrandečić, Internal script for laboratory exercises, Faculty of Chemistry and Technology, Split, 2008.</td><td></td><td>Department of Organic Technology</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">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="3"></td></tr>
</table>

COURSE NAME	Nanochemistry					
Course code	KTG323	Year of study	3 st			
Course lecturer	PhD, Magdi Lučić Lavčević, associate prof.	Credits (ECTS)	3			
Assistants		Type of instruction	P	S	V	T
			30	0	0	0
Course status	Elective	Application of e-learning (percentage)				

COURSE DESCRIPTION

Course objectives	Proposing and explaining how the principles of chemistry could be applied to the bottom-up synthesis of advanced functional materials and hierarchical construction principles, by using molecular/nano-scale building blocks programmed with chemical information.
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 teaching process, the student should: - Know the characteristics of basic nanostructures and methods for analyzing their morphology; - Be able to apply the principles of chemistry in the so-called "bottom-up" synthesis, in which the molecules or particles of nanometer dimensions as building elements, "programmed" to spontaneously self-organize, organize themselves in a hierarchical structures; - Be able to explain the relationship between structure / dimensionality and specific properties as well as functionality of nanostructures, for the given examples; - Be able to assess the applicability of nanostructures in scientific research and new technologies.
Course content broken down in detail by weekly class schedule (syllabus)	Starting ideas of nanochemistry. Creating nanostructures.(3). Specifics of nanostructures: surface, size, shape, and self-organization (3). Examples of nanostructures of carbon, silicon, metals and metal oxides and organic nanostructures (6). Synthesis of organized nanostructures (4). Hierarchical systems (2). Experimental characterization techniques (4). Selected examples of properties of nanostructures - fundamental and practical significance of the "size and shape effect"(6). Bio-nano interface: nanochemistry as a link between the natural and life sciences (2).

Format of instruction		
	x lectures	☐ independent assignments
	☐ seminars and workshops	**x** multimedia
	☐ exercises	☐ **l**aboratory
	☐ *on line* in entirety	☐ **work with mentor**
	☐ partial e-learning	**x** group and individual tutorials
	☐ field work	☐ seminars

Student responsibilities						
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is*	Class attendance	0.5	Research		Practical training	
	Experimental work		Report		Pre-test preparation classes	
	Essay		Seminar	0.5	(Other)	

equal to the ECTS value of the course)			essay			
	Tests	1	Oral exam	1	(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester, the final exam can be substituted by midterm tests and a seminar essay. In the final exam perods the final exam shall be taken after the presentation of the seminar essay. Grades: 55-64% - sufficient; 65-79% - good, 80-89% - very good; 90-100% - excellent.

	Book title	**Number of books in the library**	**Available via other media**
Required literature (available in the library and via other media)	M. Lučić Lavčević, Nanostrukture , internal script		Personal web-site
	Cademartiri, G. A.Ozin, Concepts of Nanochemistry, Wiley VCH, 2009.	*1 coming soon*	-
			-

Optional literature	Selected web-sites
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	1961.
Total square area in m^2	3000

3.2. List of teachers and associate teachers

Course	Teachers and associate teachers
Analysis of real samples	PhD, Ante Prkić, assistant prof.
Analytical Chemistry I	PhD, Josipa Giljanović, assocate prof.
Analytical Chemistry II	PhD, Lea Kukoč Modun, assistant prof. Maja Biočić, assistant
Biochemistry I	PhD, Mila Radan, assistant prof.
Biochemistry I laboratory	PhD, Mila Radan, assistant prof.
Biochemistry II	PhD, Mila Radan, assistant prof.
Catalysis	PhD, Branka Andričić, prof. PhD, Matko Erceg, assocate prof.
Chemistry in pharmacology	PhD, Marija Bralić, assocate prof. Mislav Šolić, assistant
Chemistry of polymers	PhD, Matko Erceg, assocate prof.
Computer application	PhD, Dražan Jozić, assocate prof.
Elementary chemical engineering	PhD, Nenad Kuzmanić, prof. Renato Stipišić, lecturer, Antonija Kaćunić, assistant
English	
Environmental Chemistry	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Enzyme kinetics	PhD, Olivera Politeo, associate prof. PhD, Franko Burčul, Ivana Carev, assistant
Enzyme kinetics exercise	PhD, Olivera Politeo, associate prof. PhD, Franko Burčul, Ivana Carev, assistant
Exercise of chemistry in pharmacology	PhD.,Marija Bralić, associate prof.

	Mislav Šolić, assistant
Exercise of Analysis of real samples	PhD, Ante Prkić, assistant prof.
Exercise of Analytical Chemistry I	PhD, Josipa Giljanović, associate prof.
Exercises in Analytical Chemistry II	PhD, Lea Kukoč Modun, assistant prof. Maja Biočić, assistant, Ivana Panžić, assistant
Exercises in General Chemistry	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
Exercises in Inorganic Chemistry	PhD, Zoran Grubač, prof., PhD, Slobodan Brinić, associate prof.
Exercises in Inorganic Chemistry II	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
Exercises in Instrumental Methods of Analysis	PhD, Lea Kukoč Modun, assistant prof. Maja Biočić, assistant, Andrea Anđić, assistant, Azra Đulović, assistant
Exercises in Physical Chemistry II	PhD, Renato Tomaš, associate prof.
Exercises in Physics I	PhD, Magdi Lučić Lavčević, associate prof.
Exercises in polymer chemistry	Dr. Matko Erceg, assoc. prof.
Exercises in Pysics II	PhD, Magdi Lučić Lavčević, associate prof., PhD, Matko Marušić, lecturer, Lucija Matković, assistant
Exercises of elementary chemical engineering	Renato Stipišić, lecturer
Exercises of Environmental Chemistry	PhD, Marija Bralić, associate prof. PhD, Maša Buljac, assistant prof.
Experimental in Natural Products	PhD, Ani Radonić, associate prof.
Experimental in Perfumes and Cosmetics	PhD, Ani Radonić, associate prof.
Experimental Organic Chemistry II	PhD, Ani Radonić, associate prof.
Final work	
General Biology	PhD, Nada Bezić, prof. PhD, Valerija Dunkić, associate prof.
General Chemistry	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
German	
Inorganic chemistry I	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
Inorganic Chemistry II	PhD, Slobodan Brinić, associate prof., PhD, Zoran Grubač, prof.
Instrumental Methods of Analysis	PhD, Lea Kukoč Modun, assistant prof. Maja Biočić, assistant
Laboratory exercises in organic chemistry I	PhD, Igor Jerković, prof.
Mathematics 1	Mr. Branka Gotovac, lecturer Lucija Ružman, assistant
Mathematics 2	Mr. Branka Gotovac, lecturer Lucija Ružman, assistant
Nanochemistry	PhD, Magdi Lučić Lavčević, associate prof.
Natural Products	PhD, Ani Radonić, associate prof.
Organic chemistry I	PhD, Igor Jerković, prof.Dr. Ani Radonić, assoc. prof.

Organic Chemistry II	PhD, Ani Radonić, associate prof.
Perfumes and Cosmetics	PhD, Ani Radonić, associate prof.
Physical chemistry I	PhD, Vesna Sokol, associate prof.
Physical Chemistry II	PhD, Renato Tomaš, associate prof.
Physics I	PhD, Magdi Lučić Lavčević, associate prof. Lucija Matković, assistant
Physics II	PhD, Magdi Lučić Lavčević, associate prof. Lucija Matković, assistant
Proffesional practice	
Selected processes of chemical industry	PhD, Jelica Zelić, prof. PhD, Miće Jakić, assistant
Selected processes of chemical industry-laboratory	PhD, Jelica Zelić, prof. PhD, Miće Jakić, assistant PhD, Mario Nikola Mužek, assistant
Sociology of contemporary society	

3.3. Curriculum vitae of the course teacher

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. 1667-1670. 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	**PhD, Marija Bralić, associate prof.**
The course he/she teaches in the proposed study programme	Environmental Chemistry (US) Chemistry in pharmacology (US)
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) Exercises in Analytical chemistry (GS) Exercises in Process analysis (GS) Exercises in Instrumental analysis (GS)
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic	**Bralić, Marija**; Buzuk, Marijo; Buljac, Maša; Brinić, Slobodan.

articles published in the last five years in the field of the course (5 works at most)	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 Inorganic Chemistry I Inorganic Chemistry II Exercises in General Chemistry Exercises in Inorganic Chemistry I Exercises in Inorganic Chemistry II
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	Solid State Chemistry, graduate study of chemistry General Chemistry, undergraduate study of chemistry

title of course, study programme where it is/was offered, and level of study programme)	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, Dražan Jozić, associat prof.r**
The course he/she teaches in the proposed study programme	Computer application
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, Matko Erceg, associate prof.**
The course he/she teaches in the proposed study programme	Catalysis (KTG 212) Chemistry of Polymers (KTG 321) Exercises in Chemistry of Polymers (KTG 322)
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 of last rank appointment	Associate professor, 17. 7. 2012.
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	**PhD,Josipa giljanović, assocoate prof.**
The course he/she teaches in the proposed study programme	Analitical chemistry I Exercises of analytical chemistry I
GENERAL INFORMATION ON COURSE TEACHER	
Address	Pujanke 69, Split
Telephone number	+38521329 476
E-mail address	josipa@ktf-split.hr
Personal web page	http://www.ktf-split.hr/~josipa
Year of birth	1959
Scientist ID	119831
Research or art rank, and date of last rank appointment	Senior Research, December 18, 2013
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor: 5 th february 2014
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, Split,
Date of employment	First July 1984
Name of position (professor, researcher, associate teacher, etc.)	professor
Field of research	Designe and construction of potentiometric sensors, UV-VIS spectroscopy and AAS, FIA,
Function	Head of the department for Analytical Chemistry
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D
Institution	Faculty of Chemistry and Technology,
Place	Split
Date	January 30, 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
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, sufficient
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 methods of analysis, Methods of separation and speciation, Accreditation and organisation of laboratories, graduate study chemistry Analytical chemistry, Professional Study of Chemical Technology Quality assurance of food graduate study of Chemical Technology;

	Mediterranean culture; Analysis of food products, food quality assurance, the Professional Study of Chemical Technology,
Authorship of university/faculty textbooks in the field of the course	J. Giljanović, Qualitative analysis- practicum, university manual, 2009th, J. Giljanović, Analysis of food products: instructions for exercises, professional studies, food technology J. Giljanović, Ensuring food quality: guidelines for exercise, professional studies, food technology J. Komljenović, Exercises in analytical chemistry, reviewed material for students of university study biology and ecology, 2004th E. Generalić S. Krka, M. Bralić J. Komljenović, Analytical Chemistry, practicum, 2003rd
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. T. Vukušić, A. Prkić, **J. Giljanović**, V. Sokol, P. Bošković, Direct Potentiometric Determination of Penicillamine in Real Samples by Using Copper ISE., *Croatica chemica acta*. 88 (2015) , 3; 255-258; 2. M. Brkljača, J. Giljanović, A. Prkić: Determination of Metal sin Olive Oil by Electrothermal Atomic Apsorption Spectrometry: Validation and Uncertainity Measurements, Analytical letters; **46** (2013) ; 2912**-**2926. 3. **J. Giljanović,** A. Prkić, M. Bralić, M. Brkljača, Determination of Fluoride Content in Tea Infusion by Using Fluoride Ion-Selective Electrode.; International journal of electrochemical Science, **7** (2012), 4; 2918-2927. 4. A. Prkić, **J. Giljanović,** M. Bralić, K. Boban, Direct Potentiometric Determination of Fluoride Species by Using Ion-Selective Fluoride Electrode., International Journal of Electrochemical Science. **7** (2012); 1170-1179. 5. **J. Giljanović,** M. Brkljača, A. Prkić, Flow injection spectrophotometric determination of N-Acetyl-L-cysteine as a complex with palladium(II)., Molecules, **16** (2011), 9; 7224-7236.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	Book chapter: Ivka Klarić, Višnja Katalinić, Josipa Giljanović and Jana Šurjak, Design and Construction of Food Premises, 158714-TEMUS-ES-TEMPUS-JPHES, Improving Academia-Industry Links in Food Safety and Quality, (ur Javier Arántegui Jiminéz) Split, 2011. str: 76-81; 85-90;91-103;; e-learning course: Total quolity menagement system; e- learning; www.foodlinks.eu; and elearning.foodlinks.eu (Quality management system (ISO 9001)
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Tempus project 158714- Improvin academia-industry links in food safety and quality, ,Universidad de Lleida, Spain, 2010-2013.
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?	Analytical Chemistry, University course (lecture, seminars and laboratory 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	**Mr, Branka Gotovac, lecturer**
The course he/she teaches in the proposed study programme	Mathematics I, Mathematics II PK
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 Inorganic Chemistry I Inorganic Chemistry II Exercises in General Chemistry Exercises in Inorganic Chemistry I Exercises in Inorganic Chemistry II
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	Courses: General Chemistry and Inorganic Chemistry at Undergraduate Study of Chemistry and Undergraduate Study

title of course, study programme where it is/was offered, and level of study programme)	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, Igor Jerković, prof.**
The course he/she teaches in the proposed study programme	Organic chemistry I Organic Chemistry II Laboratory exercises in organic chemistry I
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35, 21000 Split
Telephone number	00385 21 329 436
E-mail address	igor@ktf-split.hr
Personal web page	-
Year of birth	1975
Scientist ID	226253
Research or art rank, and date of last rank appointment	Research adviser (16 February 2011)
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	full professor (07. December 2012)
Area and field of election into research or art rank	scientific area of natural sciences, scientific filed chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	01 September 1998
Name of position (professor, researcher, associate teacher, etc.)	full professor
Field of research	natural organic compounds
Function	dean
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D. (chemistry)
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	28 May 2004
INFORMATION ON ADDITIONAL TRAINING	
Year	2005 (three months); (2010.-2015. occasionally)
Place	Rome and Cagliari, Italy
Institution	Universita degli studi di Roma „La Sapienza“ and Universita degli studi di Cagliari, Italia
Field of training	natural organic compounds
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)	Italian (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)	Chemistry and technology of aromatic plants (graduate study in Chemistry), Flavour chemistry (graduate study in 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)	• I. Jerković, J. Družić, Z. Marijanović, M. Gugić, S. Jokić and M. Roje, GC-FID/MS Profiling of Supercritical CO_2 Extracts of Peels from *Citrus aurantium*, *C. sinensis* cv. Washington navel, *C. sinensis* cv. Tarocco and *C. sinensis* cv. Doppio Sanguigno from Dubrovnik Area (Croatia), Natural Product Communications 10 (2015) 1315-1318. • P. M. Kuś, Z. Marijanović and I. Jerković, Evaluation of HS-SPME and ultrasonic solvent extraction for monitoring of plant flavours added by the bees to herbhoneys: traceability biomarkers, *Food Additives and Contaminants* 32 (2015) 1761-1771. • I. Jerković and P. M. Kuś, Terpenes in Honey: Occurence, Origin and Their Role as Chemical Biomarkers, *RSC Advances* 4 (2014) 31710-31728. • I. Jerković, M. Obradović, P. M. Kuś and M. Šarolić, Bioorganic Diversity of Rare *Coriandrum sativum* L. Honey: Unusal Chromatographic Profiles Containing Derivatives of Linalool/Oxygenated Methoxybenzene, *Chemistry & Biodiversity* 10 (2013) 1549-1558. • I. Jerković, M. Marasović, Z. Marijanović, K. Hazler Pilepić, Ž. Maleš and M. Miloš, Chemical Composition of Hypericum richeri subsp. grisebachii Essential Oil from Croatia, *Natural Product Communications* 8 (2013) 231-233.
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 research project HRZZ-IP-11-2013-8547: *Research of Natural Products and Flavours: Chemical Fingerprinting and Unlocking the Potential (NaPro-Flav)*, Croatian Science Foundation (01 June 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	• The award for scientific achievement, "Ruđer Bošković", University of Split on November 29, 2013. • The award for special achievements in scientific and educational work, Faculty of Chemical Technology in Split, October 22, 2011. • The "Leopold (Lavoslav) Ružička" Award of Croatian Chemical Society for young scientists for outstanding results achieved in the field of chemistry of natural compounds,

	Zagreb, October 19, 2006.
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, Lea Kukoč Modun, assistant prof.**
The course he/she teaches in the proposed study programme	Analitical chemistry II Instrumental methods of analysis Exercises in Analytical Chemistry II Exercises in Instrumental Methods of Analysis
GENERAL INFORMATION ON COURSE TEACHER	
Address	Hrvatske mornarice 1 K, Split
Telephone number	098706693
E-mail address	kukoc@ktf-split.hr
Personal web page	///
Year of birth	1977.
Scientist ID	250621
Research or art rank, and date of last rank appointment	Research associate, 30.03.2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 30.12.2012.
Area and field of election into research or art rank	Natural sciences, chemistry, analytical chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of chemistry and technology
Date of employment	01.02.2002.
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	analytical chemistry
Function	///
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph:D.
Institution	Faculty of Chemical Engineering and Technology
Place	Zagreb
Date	16.10.2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	2004.
Place	Monza, Italy
Institution	Centar Perkin-Elmer
Field of training	Atomic absorption spectrometry
Year	2005.
Place	Graz, Austria
Institution	Karl-Franzens Universitat
Field of training	Electroanalytical methoda
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, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	Analytical chemistry I, Undergraduate Study, Chemistry Analytical chemistry I, Study of Pharmacy Analytical chemistry II, Study of Pharmacy

where it is/was offered, and level of study programme)	Instrumental methods of analysis in pharmacy, Study of Pharmacy
Authorship of university/faculty textbooks in the field of the course	1. Radić, Njegomir; Kukoč Modun, Lea; Introduction to Analytical Chemistry Školska knjiga, Zagreb, 2016. (*In press*). 2. Radić, Njegomir; Kukoč Modun, Lea; Introduction to Analytical Chemistry Part I ; Split : Redak, 2013 3. Radić, Njegomir; Kukoč Modun, Lea; Kinetic Methods of Analysis with Potentiometric and Spectrophotometric Detectors – Our Laboratory Experiences // Analytical Chemistry / Ira S. Krull (ur.).; Rijeka : InTech, 2012. Str. 73-92.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. L. Kukoc-Modun, D. Tsikas, M. Biocic, Nj. Radić, Flow Injection Analysis of *N*-acetyl-L-cysteine based on the reduction of copper(II)-neocuproine reagent, *Analytical Letters*, 49 (2016) 607-617. 2. Lejla Klepo, Amira Copra-Janicijevic, Lea Kukoc-Modun, A New Indirect Spectrofluorimetric Method for Determination of Ascorbic Acid with 2,4,6-Tripyridyl-S-Triazine in Pharmaceutical Samples, *Molecules*, 21(1), (2016) 101- 3. Radić, Njegomir; Kukoc-Modun, Lea; Biočić, Maja; Kinetic Spectrophotometric Determination of *N*-acetyl-L-cysteine based on the reduction of copper(II)-neocuproine reagent; *Croatica chemica acta*. 86 (2013) 65-71 4. Kukoc-Modun, Lea; Biočić, Maja; Radić, Njegomir; Indirect method for spectrophotometric determination of ascorbic acid in pharmaceutical preparations with 2, 4, 6-tripyridyl-s-triazine by flow-injection analysis; *Talanta*. 96 (2012) 174-179 5. Kukoc-Modun, Lea; Plazibat, Ivana; Radić, Njegomir; Flow-injection spectrophotometric determination of *N*-Acetyl-L-cysteine based on coupled redox-complexation reaction; *Croatica chemica acta*. 84 (2011) 81-85
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 011-0000000-3217: «Determination of tiol compounds using potentiometric sensors and spectroscopy ». MZOS RH from 2007. to 2013., collaborator
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	University Educational Course of Educators, gained knowledge from the following areas of education: methods of teaching, team learning, PBL, Microteaching, Communication skils, Searching of scientific databases.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Award for the Hot article in journal Analytical Sciences: “Kinetic Spectrophotometric Determination of N-acetyl-L-cysteine Based on Coupled Redox-Complexation Reaction”
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	Introduction to chemical engineering Exercises in Introduction to chemical engineering
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)	Leader of scientific project 011-0112247-2241: Optimization of mixing and transport phenomena in solid-liquid agitated systems (2007-2013) Leader of 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

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 Physics II Nanochemistry Exercises in Physics I Exercises in Physics 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?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	

First and last name and title of teacher	**PhD, Olivera Politeo, asociate prof.**
The course he/she teaches in the proposed study programme	**ENZYME KINETICS** Enzyme kinetics exercise
GENERAL INFORMATION ON COURSE TEACHER	
Address	Rudjera Boskovica 35
Telephone number	
E-mail address	olivera@ktf-split.hr
Personal web page	
Year of birth	1969
Scientist ID	259103
Research or art rank, and date of last rank appointment	Senior scientific associate (Natural Science / Chemistry) 18.12.2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor (Natural Science / Chemistry / Biochemistry and Medicinal Chemistry) 05.02.2014.
Area and field of election into research or art rank	Natural Science / Chemistry / Biochemistry and Medicinal Chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology
Date of employment	Decembre 01 2003.
Name of position (professor, researcher, associate teacher, etc.)	Assoc. Prof. Department of Biochemistry
Field of research	Chemistry and biochemistry of natural products
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Science
Place	Zagreb,Croatia
Date	March 09 2007
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, 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)	Biochemistry 1 and Biochemistry 2 (Undergraduate study of Chemistry), Biochemistry (Graduate study of Chemical Technology), General Biochemistry and Applied Biochemistry (Integrate Undergraduate and Graduate Study of Pharmacy), Introduction to molecular biology (Graduate 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)	Siracusa Laura, Kulišić-Bilušić Tea, Politeo Olivera, Krause Ingolf, Dejanović Branka, Ruberto Giuseppe. Phenolic composition and antioxidant acivity of aqueous infusions from Capparis spinosa L. and Crithmum maritimum L. before and the after submission to a two-step in vitro digestion model. // Journal of agricultural and food chemistry. 59 (2011), 23; 12453-12459. **Olivera Politeo, Mirjana Skocibusic, Franko Burcul, Ana Maravic, Ivana Carev, Mirko Ruscic, Mladen Milos. Campanula portenschlagiana Roem. et Schult.: Chemical and Biological Profile. Chemistry & biodiversity 10, 2013, 1072-1080.** **Olivera Politeo**, Irena Botica, Tea Bilusic, Mila Jukic, Ivana Carev, Franko Burcul, Mladen Milos. Chemical composition and evaluation of acetylcholinesterase inhibition and antioxidant activity of essential oil from Dalmatian endemic species Pinus nigra Arnold ssp. dalmatica (Vis.) Franco. Journal of Medicinal Plants Research **5** (30), 2011, 6590-6596. **Olivera Politeo**, Mirjana. Skocibusic, Ana Maravic, Mirko Ruscic, Mladen Milos. Chemical Composition and Antimicrobial Activity of the Essentail Oil of Endemic Dalmatian Black Pine (Pinus nigra ssp. dalmatica).Chemistry & Biodiversity 8, 2011, 540-547. Mila Jukić, **Olivera Politeo**, Milka Maksimovic, Mia Milos, Mladen Milos. In Vitro acetylcholinesterase inhibitory properties of thymol, carvacrol and their derivatives thymoquinone and thymohydroquinone. Phytotherapy Research **21,** 2007, 259-261.
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 study of bioactive compounds from Dalmatian plants: their antioxidant character and impact on enzyme inhibition and health" HRZZ: IP-2014-09-6897, 2015-today. "Antioxidant compounds and cholinesterase inhibitors from aromatic plants" (011-2160547-1330), Ministry of Science, Croatia, 2008 -2014. "Antioxidant effect of volatile compounds from aromatic plants" (0011003), Ministry of Science, Croatia, 2003-2007.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-	Methodical, Psychological and Didactic Courses (Graduate study of Chemistry and Biology). Teching (Chemistry) and Government Institution Licence, 1996

didactic-pedagogical group of competences?-pedagoškekompetencije?	
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, Ante Prkić, assistant prof.**
The course he/she teaches in the proposed study programme	Analysis of Real Sampels Exercise in Analysis of Real Samples
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	Assistant for various experimental teachings in Analytical Chemistry

study programme)	
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, Mila Radan, assistant prof.**
The course he/she teaches in the proposed study programme	Biochemistry I Biochemistry II Biochemisty I laboratory
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35
Telephone number	021 329-439
E-mail address	mradan@ktf-split.hr
Personal web page	
Year of birth	23.9.1972.
Scientist ID	3119068
Research or art rank, and date of last rank appointment	Scientific associate
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 28.5.2014.
Area and field of election into research or art rank	Natural sciences, scientific field chemistry, branch biochemistry and medicinal chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of chemistry and technology
Date of employment	June 2001
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Isolation and identification of biologically active compounds
Function	Head of biochemistry department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Doctorate degree
Institution	Faculty of chemistry and technology
Place	Split, Croatia
Date	11.6.2007.
INFORMATION ON ADDITIONAL TRAINING	
Year	10/2005 - 12/2005
Place	Rome, Italy
Institution	INRAN (Istituto Nacionale di ricerca per gli alimenti e la nutrizione)
Field of training	Nurition and oxidative stress
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)	Italian (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	Modern methods in biochemistry Graduate chemistry study program

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)	Mila Jukić, FrankoBurčul, Ivana Carev, Olivera Politeo, MladenMiloš. Screening for acetylcholinesterase inhibition and antioxidant activity of selected plants from Croatia. Natural Product Research **26** (18), 2012, 1703**-**1707. Olivera Politeo, Irena Botica, Tea Bilušic, Mila Jukić,Ivana Carev, Franko Burčul, Mladen Miloš. Chemical composition and evaluation of acetylcholinesterase inhibition and antioxidantactivity of essential oil from Dalmatian endemic species *Pinus nigra* Arnold ssp. *Dalmatica (Vis.) Franco.* Journal of Medicinal Plants Research**5** (30), 2011, 6590**-**6596.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	2015-2019: researcher o project "**The studyof bioactive compounds from Dalmatian plants**: **their antioxidant character and impact on enzyme inhibition and health"**Croatian science foundation:IP-2014-09-6897 2008-2013: researcher on national project "Antioxidative compounds and cholinesterase inhibitors form aromatic plants" (011-2160547-1330).
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?	Ten years teaching experience on an undergraduate and graduate level at Faculty of chemistry, Faculty of pharmacy and Faculty of medicine (including teaching at study program in English).
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)	Between 4.5-5.0 (out of 5)

First and last name and title of teacher	**PhD, Ani Radonić, associate prof.**
The course he/she teaches in the proposed study programme	Organic Chemistry I, Organic Chemistry II, Natural Products, Perfumes and Cosmetics
GENERAL INFORMATION ON COURSE TEACHER	
Address	Teslina 10/V, 21000 Split
Telephone number	++385 329 432
E-mail address	radonic@ktf-split.hr
Personal web page	/
Year of birth	1966.
Scientist ID	3119068
Research or art rank, and date of last rank appointment	Research Scientist; March 30th, 2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor; May 24th, 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	October 1st, 1992.
Name of position (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Natural organic compounds: • Volatile and semi-volatile compounds (essential oils and aroma compounds): monoterpenes, sesquiterpenes, phenylpropanoids; isolation methods; fractionation methods of complex volatile isolates; analysis of volatile isolates by gas chromatography-mass spectrometry (GC-MS). • Glycosidically bound volatile compounds - water-soluble, non-volatile aroma precursors: methods of isolation, purification and hydrolvsis (enzymatic, acid); identification of aglycones by GC-MS. • Glucosinolates (thioglucosides) and their degradation products from wild-growing *Brassicaceae* plants: methods of isolation and degradation (thermal degradation, enzymatic degradation); analysis of liberated volatile degradation products by GC-MS. • Evaluation of antioxidant potential of natural products (natural compounds and their mixtures such as different volatile isolates) using different methods: antiradical activity determination method (DPPH assay), total antioxidant activity determination mjethod (FRAP assay), β-carotene bleaching method, thiobarbituric acid method (TBA method) and method for determination of oxidative stability (Rancimat method).
Function	Head of Department of Organic Chemistry (2011. - 2013.; 2013. - 2015.; 2015. -)
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD

Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	September 14th, 2005.
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. Undergraduate study of Chemistry: Organic Chemisry I, Organic Chemistry II, Natural Products, Perfumes and Cosmetics 2. Graduate study of Chemistry Synthesis of Biologically Active Compounds 3. Graduate study of Pharmacy: Organic Chemistry I, Organic Chemistry II, Pharmacognosy
Authorship of university/faculty textbooks in the field of the course	I. Jerković, A. Radonić, Praktikum iz organske kemije, Udžbenici Sveučilišta u Splitu, Split, 2009.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. I. Jerković, M. Kranjac, Z. Marijanović, M. Zekić, A. Radonić, C. I. G. Tuberoso, Screening of *Satureja subspicata* Vis. Honey by HPLC-DAD, GC-FID/MS and UV/VIS: Prephenate Derivatives as Biomarkers, *Molecules* **21** (2016) 377. 2. I. Jerković, A. Radonić, M. Kranjac, M. Zekić, Z. Marijanović, S. Gudić, M. Kliškić, Red clover (Trifolium pratense L.) honey: Volatiles chemical-profiling and unlocking antioxidant and anticorrosion capacity, *Chem Paper* 70 (2016) in press. 3. I. Jerković, Z. Marijanović, M. Kranjac, A. Radonić, Comparison of Different Methodologies for Detailed Screening of *Taraxacum officinale* Honey Volatiles, *Nat Prod Commun* 10 (2015) 357-360. 4. 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, *Maced J Chem Chem En* **33** (2014) 13-25. 5. A. Radonić, I. Blažević, J. Mastelić, M. Zekić, M. Skočibušić, A. Maravić, Phytochemical Analysis and Antimicrobial Activity of *Cardaria draba* L. Desv. volatiles, *Chem. Biodivers*. **8** (2011) 1170-1181.
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-11-2013-8547) "Research of Natural Products and Flavours: Chemical Fingerprinting and Unlocking the Potential (NaPro-Flav)" Croatian Science Foundation, 2014. - 2018. • Science project No. 011-0982929-1329: "Essential oils and flavours - biological active compounds and their modifications", Ministry of Science, Education and Sports, 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	
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	**Renato Stipišić, lecturer**
The course he/she teaches in the proposed study programme	Exercises in Introduction to chemical engineering
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, Vesna Sokol, associate prof.**
The course he/she teaches in the proposed study programme	Physical Chemistry I
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 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	Physical Chemistry I, Undergraduated study of chemistry Physical Chemistry, Undergraduated study of chemical technology

where it is/was offered, and level of study programme)	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, Renato Tomaš, associate prof.**
The course he/she teaches in the proposed study programme	Undergraduate study of chemistry: Physical Chemistry 2 Excercises in Physical Chemistry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 35 Split
Telephone number	00385 98 921 35 64
E-mail address	rtomas@ktf-split.hr
Personal web page	www.ktf.unist.hr
Year of birth	1967
Scientist ID	226242
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 of physical chemistry, 2014
Area and field of election into research or art rank	Chemistry, Physical Chemistry
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Chemistry and Technology, University of Split
Date of employment	1994
Name of position (professor, researcher, associate teacher, etc.)	professor
Field of research	Physical Chemistry of Solutions
Function	Head of Department of Physical Chemistry (2007-2009, 2011-2013)
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D. degree in Natural Sciences, Chemistry
Institution	Faculty of Chemistry and Technology, University of Split
Place	Split
Date	2002
INFORMATION ON ADDITIONAL TRAINING	
Year	2008
Place	Zagreb
Institution	Faculty of Science, University of Zagreb
Field of training	Thermodynamics of calixarene 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 (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	Lecturer in Selected Topics in Physical Chemistry of Environmental to Ph.D. students of chemistry; lecturer in Physical Chemistry to undergraduate and graduate students

of study programme)	of chemistry, chemical technology, pharmacy, and biology and chemistry; seminar teacher to undergraduate and graduate students taking courses in Physical Chemistry; lecturer and seminar in Elements of Physical Chemistry on the professional study of chemical technology; laboratory teacher in Physical chemistry and Physical Chemistry of Electrolyte Solutions
Authorship of university/faculty textbooks in the field of the course	J. Radošević, V. Sokol, R. Tomaš, P. Boškovi, Excercises in Physical Chemistry, University of Split, in review
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. R. Tomaš, T. Jovanović, M. Bešter-Rogač, Viscosity B-coefficient for sodium chloride in aqueous mixtures of 1,4-dioxane at different temperatures, *Acta Chimica Slovenica*, **62** (2015) 531-537. 2. M. Tranfić Bakić, D. Jadreško, T. Hrenar, G. Horvat, J. Požar, N. Galić, V. Sokol, R. Tomaš, S. Alihodžić, M. Žinić, L. Frkanec, V. Tomišić, Fluorescent phenanthridine-based calix(4)arene derivatives: synthesis and thermodynamic and computational studies of their complexation with alkali-metal cations, *Royal Society of Chemistry Advances*, **5** (2015) 23900-23914. 3. R. Tomaš, V. Sokol, P. Bošković, A. Turudić, Transference Numbers of Sodium Chloride in Formamide + Water Mixtures at 298.15 K from Potential Difference Measurements, *International Journal of Electrochemical Science*, **8** (2013) 7669-7679. 4. A. Bald, Z. Kinart, R. Tomaš, Volumetric studies of aqueous solutions of monosodium salts of some aliphatic dicarboxylic acids at 298.15 K. A new method of data analysis, *Journal of Molecular Liquids*, **178**(2) (2013) 94-98. 5. N. Galić, N. Burić, R. Tomaš, L. Frkanec, V. Tomišić, Synthesis and cation binding properties of fluorescent calix[4]arene derivatives bearing tryptophan units at the lower rim, *Supramolecular Chemistry*, **23** (5) (2011) 389-397.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	R. Tomaš, R. Vladušić, Significance of experiment in the teaching process – application of potentiometric experiment as example, International Educational Technology Conference (lecture), Dubai, UAE, 2016.
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. EXchange on Ionic Liquids (EXIL) - COST PROJECT CM1206; COST is supported by the EU Framework Programme Horizon 2020: STSM PROJECT TITLE (**R. Tomaš**): STUDIES OF MOLECULAR INTERACTIONS OF SOME IMIDAZOLIUM CHLORIDE IONIC LIQUIDS IN WATER BY VISCOMETRIC AND VOLUMETRIC MEASUREMENTS AT DIFFERENT TEMPERATURES, University of Ljubljana, Slovenia, 1.3.-15.4.2016. 2. 2015 -: Croatian science foundation, Project “Development of Supramolecular Receptors for Cations and Anions”
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)	Results are positive.

First and last name and title of teacher	**PhD, Jelica Zelić, full prof.**
The course he/she teaches in the proposed study programme	**Selected processes of chemical industry (KTG311, KTJ318)**
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 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)	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 at the Undergraduate study who can be enrolled in one year of study in terms of space, equipment and number of full-time teachers is 30 (this represents the enrollment quota).

3.5. Estimate of costs per student

Average annual cost of studying per one student is aproximately 31,500.00 kunas.

3.6. Plan of procedures of study programme quality assurance

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.	
Documentation on which the quality assurance system of the constituent part of the University is based:	
• Regulations on the quality assurance system of the constituent part (enclose if existing)	
• Handbook on the quality assurance system of the constituent part (enclose if it exists)	
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.	
Evaluation of the work of teachers and part-time teachers	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.
Monitoring of grading and harmonization of grading with anticipated learning outcomes	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 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.