Univerza v Mariboru

Fakulteta za kemijo
in kemijsko tehnologijo

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika I
Course title:	Mathematics I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
UNI 1. stopnja	Kemija	1.	zimski
UNI 1st level	Chemistry	1.	Autumn

Vrsta predmeta / Course type	T
Univerzitetna koda predmeta / University course code:	UK01

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		30			165	8

Nosilec predmeta / Lecturer:	Žigert Pleteršek Petra

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
ne	none

Vsebina:

- **Osnovni pojmi:**
  množice, funkcije, algebrske strukture, števila.
- **Realne funkcije:**
  definicija, osnovni pojmi, graf, pregled elementarnih funkcij in njihovih lastnosti, zaporedja in vrste (realne, kompleksne), potenčne vrste, limita funkcije, zveznost funkcij.
- **Diferencialni račun:**
  definicija odvoda, diferenciabilnost, pravila za

Content (Syllabus outline):

- **Basic concepts:**
  sets, functions, algebraic structures, numbers.
- **Real functions:**
  definition, basic concepts, graph, review of elementary functions and their properties, sequences and series (real, complex), power series, limit of the function, continuity of the function.
- **Differential calculus:**
  definition of the derivative, differentiability,

odvajanje, odvajanje eksplicitnih, implicitnih in parametričnih funkcij, izreki o srednji vrednosti, uporaba odvoda (tangenta na krivuljo, Taylorjeva formula, Taylorjeva vrsta, L'Hospitalovo pravilo, monotonost, ekstremi funkcije).	derivation rules, derivatives of explicit, implicit and parametric functions, mean value theorems (Rolle, Lagrange, Cauchy), use of the derivative (tangent to a curve, Taylor formula, Taylor series, L'Hospital rule, monotonicity, maxima and minima of a function).

Temeljni literatura in viri / Readings:

- P. Žigert Pleteršek, M. Črepnjak, Visokošolski učbenik z rešenimi nalogami: Matematika 1, FKKT, Maribor, 2013, e-gradivo: *http://www.fkkt.uni-mb.si/ukemat/Ucbenik_Matematika1.pdf.*
- B. Butinar, Matematika I, naloge z rešitvami, FKKT Maribor, 2004.
- P. M. Oblak, Matematika, 1.del, FS Ljubljana, 2001.
- M. Mencinger, Zbirka nalog iz matematične analize in algebre, FG Maribor, 2006.

Cilji in kompetence:	**Objectives and competences:**
- študent naj pridobi in utrdi znanja s področja diferencialnega računa realnih funkcij, - študent je seznanjen z uporabo računalnika za numerično in simbolno računanje, - študent je sposoben samostojnega študija po študijskih virih.	- the student should gain and establish the basic mathematical knowledge of calculus, - the student is informed about usage of computer for numerical and symbolic calculations, - the student is capable of an individul study.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: - študent obvlada temelje diferencialnega računa realnih funkcij, - študent razume idejo dokazovanja v matematiki, - študent zna uporabljati študijske vire. Prenesljive/ključne spretnosti in drugi atributi: - uporaba odvoda, - samostojni študij.	Knowledge and Understanding: - the student knows basic concept of differential calculus, - the student understand the idea of a mathematical proof, - the student knows how tu use textbooks and other study resources. Transferable/Key Skills and other attributes: - the use of the derivative, - individual work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
- predavanja in seminarske vaje, - demonstracija računalniškega programa za simbolno računanje, - domače naloge.	- lectures and exercises, - the demonstration of a computer program for algebraic manipulaton, - homework.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit je opravljen, če sta opravljeni obveznosti: • računski del izpita in • teoretični del izpita. Računski in teoretični del tvorita celoto in se preverjata hkrati. Izpit se lahko nadomesti s sprotnimi testi.	60 40	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part and • the theoretical part of the exam. The calculus and the theoretical part of exam are performed simultaneously. The exam can be replaced with partial exams.

Reference nosilca / Lecturer's references:

ŽIGERT PLETERŠEK, Petra, BERLIČ, Martina. Lucas cubes and resonance graphs of cyclic polyphenanthrenes. *MATCH Communications in Mathematical and in Computer Chemistry*, ISSN 0340-6253, 2012, vol. 68, no. 1, str. 79-90. http://www.pmf.kg.ac.rs/match/content68n1.htm. [COBISS.SI-ID 16050198]

IMRICH, Wilfried, LIPOVEC, Alenka, PETERIN, Iztok, ŽIGERT PLETERŠEK, Petra. Fast recognition of subclasses of almost-median graphs. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2007, vol. 307, iss. 3-5, str. 464-471. http://dx.doi.org/10.1016/j.disc.2006.07.011, doi: 10.1016/j.disc.2006.07.011. [COBISS.SI-ID 14180697],

KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Fibonacci cubes are the resonance graphs of fibonaccenes. *The Fibonacci quarterly*, ISSN 0015-0517, 2005, vol. 43, no. 3, str. 269-276. [COBISS.SI-ID 13865049]

DOBRYNIN, Andrey A., GUTMAN, Ivan, KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Wiener index of hexagonal systems. *Acta applicandae mathematicae*, ISSN 0167-8019, 2002, vol. 72, issue 3, str. 247-294. [COBISS.SI-ID 11934297]

KLAVŽAR, Sandi, VESEL, Aleksander, ŽIGERT PLETERŠEK, Petra, GUTMAN, Ivan. Binary coding of Kekulé structures of catacondensed benzenoid hydrocarbons. *Computers & Chemistry*, ISSN 0097-8485. [Print ed.], 2001, vol. 25, issue 6, str. 569-575. [COBISS.SI-ID 11202393]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Splošna kemija
Course title:	General Chemistry

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija / 1. stopnja Chemistry/1. level		1.	zimski Autumn

Vrsta predmeta / Course type	Obvezni/Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
60		45	60		195	12

Nosilec predmeta / Lecturer:	Irena Ban

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ni	None

Vsebina:	**Content (Syllabus outline):**
Predmet zajema osnove in razširjene vsebine splošne kemije • **Snovi** (lastnosti snovi, zakonitosti kemijskih sprememb) • **Materija v plinskem stanju** (plinski zakoni, idealni in realni plin, Kinetična teorija plinov) • **Termokemija** (prvi in drugi zakon termodinamike, entalpija, entropija, mrežna energija) • **Periodni sistem** (periodni sistem elementov, izvor elementov, zgradba atoma in elementarni delci, elektronska zgradba atoma, elektronegativnost)	The subject comprises the elementary and extended chapters of general chemistry **Matter** (properties of matter, chemical formulas and equations) **Gases** (the gas laws, nonideal behavior of gases, Kinetic theory of gases) **Thermochemistry** (first and the second law of thermodynamics, lattice enthalpy) **Periodic properties** (the periodic law, origin of the elements, atomic structure, electronic structure of an atom, electronegativity) **Chemical bonding** (chemical bonds and their properties)

- **Vezi med atomi** (kemijske vezi in njihove lastnosti)
- **Teorija molekulskih orbital**
- **Vodik kisik in njune spojine-reprezentativni elementi**
- **Raztopine** (topnost, hidratacija, koloidne raztopine, koligativne lastnosti, kisline in baze ter definicije)
- **Kisline in baze: Lewis-ove kisline, Reakcije in lastnosti, Aplikacije.**
- **Kemijska kinetika**
- **Kemijsko ravnotežje in zakon o vplivu mas** (kisline in baze, disociacija šibkih kislin in baz, ionski produkt, definicija pH, hidroliza, pufri)
- **Elektrokemija** (vodikov peroksid, redoks reakcije, redoks potenciali, galvanski členi, elektroliza, korozija)
- **Kemijska ekstrakcija elementov (kemijska redukcija,TD vidik: Ellinghamovi diagrami, Kemijski procesi, kemijska oksidacija)**
- **Žlahtni plini in van der Waalsove vezi** (pridobivanje in lastnosti žlahtnih plinov, inermolekularne sile)
- **Koordinacijske spojine**
- **Zgradba kristalov**
- **Elektronska struktura trdnih snovi**
- **Difrakcijske metode**

Laboratorijske vaje
Formule kemijskih spojin, plinski zakoni, priprava raztopin, topnost, elektrolitska disociacija, kemijsko ravnotežje, topnostni produkt, reakcije - oksidacije in redukcija

Molecular orbital theory
Hydrogen, oxygen and their compounds-representative elements
Solutions (nature of solutions, concentration of solutions, colligative properties of solutions, acids and bases and definitions)
Acids and bases, Lewis acidity, Reactions and properties, Applications.
Chemical equilibrium and law of mass conservation (weak acids and weak bases, common ion effect, definition of pH, hydrolysis, buffer solutions)
Electrochemistry (hydrogen peroxide,oxidation and reduction, electrical terms, galvanic cells)
Chemical extraction of elements (Kemijska redukcija, TD-vidik: Ellingham diagram, Survey of processes, Chemical oxidation)
Noble gases and van der Waals forces (acquiring of noble gases and their properties, intermolecular forces)
Coordination compounds
Structure of crystals
The electronic structures of solids
Diffraction methods

Laboratory work
Chemical stoichiometry, the gas laws, preparation of solutions, solubility, electrolytic dissociation, chemical equilibrium, solubility product, oxidation-reduction reactions

Temeljni literatura in viri / Readings:

M. Drofenik, »Splošna in anorganska kemija«, Fakulteta za kemijo in kemijsko tehnologijo – Univerza v Mariboru (2013)
D. F. Shriver, P.W.Atkins, Inorganic Chemistry,Oxford-University Press (1999)
J. C. Kotz, P. Traichel, Jr.,«Chemistry and Chemical Reactivity«, Sounders College Publishing, Philadelphia (1996)
D. W. Oxtoby, H. B. Gillis, Norman H. Nachtrieb, » Principles of Modern Chemistry «, Sounders College Publishing, ,Philadelphia (1999)
L.N. Kinsland, »Problem solving in General Chemistry«, Sounders College Publishing, (1996)
F. Lazarini in J. Brenčič: »Splošna in Anorganska kemija«, Založba FKKT, Ljubljana (2011)

Cilji in kompetence:

Objectives and competences:

Kandidat bo seznanjen z osnovnimi pojmi splošne kemije, ki mu bodo omogočali obvladati osnovno kemijsko računanje potrebno za delo v kemijskih laboratorijih.	The candidate will be acquainted with the basic conception of general chemistry. The student acquire knowledge needed for chemical calculation during working in a chemical Lab.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Samostojno kemijsko računanje osnovano na kemijskih enačbah in osnovnih kemijskih konceptih Samostojno načrtovanje osnovnih kemijskih procesov Prenesljive/ključne spretnosti in drugi atributi: Pridobitev kemijskih znanj potrebno za razumevanje ostalih kemijskih predmetov (organska, analizna in fizikalna kemija) Pridobitev splošnega kemijskega znanja za sodelovanje pri ostalih tehnoloških predmetih.	Knowledge and Understanding: Autonomous calculation based on chemical equations and concepts Autonomous planning of basic comical processing Transferable/Key Skills and other attributes: Acquirement of elementary chemical knowledge needed for attending other chemical courses (analytic, physical and organic chemistry) and chemical engineering courses.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Seminarske vaje Uporaba predstavitev s Power Point-om Uporaba interneta Uporaba interaktivnih vsebin iz splošne kemije	Oral lectures Desk exercises Power-Point presentations Use of internet Use of Interactive General Chemistry

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pogoj za pristop k **teoretičnemu delu izpita** sta opravljena **dva delna pisna testa** (vsak opravljen z najmanj 50% možnih točk) oz. **Zaključni pisni test** iz vaj (opravljen z najmanj 50% možnih točk), ki predstavljajo **računski del izpita**, ter v celoti opravljene laboratorijske vaje. **Izpit je opravljen, če so pozitvno opravljene vse naslednje obveznosti:**		Conditions to access to the **the calculus part of exam** are two partial written tests or final test from laboratory course (each min. 50% of all possible points), which represents the **calculus part of exam** and completely performed laboratory course. **Student passes the examination if s(he) successfully passed all the following obligations:**
računski del izpita (vaje)	20	**the calculus part of exam (lab course)**
računski del izpita (seminar)	30	**the calculus part of exam (tutorial)**
teoretični del izpita	50	**the theoretical part of the exam.**

Reference nosilca / Lecturer's references:

STERGAR, Janja, BAN, Irena, DROFENIK, Mihael, FERK, Gregor, MAKOVEC, Darko. Synthesis and characterization of silica-coated Cu[sub](1-x)Ni[sub]x nanoparticles. *IEEE trans. magn.*, 2012, vol. 48, 1344-1347, doi: 10.1109/TMAG.2011.2173168

FERK, Gregor, BAN, Irena, STERGAR, Janja, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. A facile route to the synthesis of coated maghemite nanocomposites for hyperthermia applications. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2012, vol. 59, no. 2, str. 366-374. http://acta.chem-soc.si/59/59-2-366.pdf. [COBISS.SI-ID 16097046]

BAN, Irena, KRISTL, Matjaž, DANČ, Valerija, DANČ, Anita, DROFENIK, Mihael. Preparation of cadmium telluride nanoparticles from aqueous solutions by sonochemical method. *Materials letters*, ISSN 0167-577X. [Print ed.], 15. Jan. 2012, vol. 67, iss. 1, str. 56-59, doi: 10.1016/j.matlet.2011.09.001. [COBISS.SI-ID 15371798]

STERGAR, Janja, FERK, Gregor, BAN, Irena, DROFENIK, Mihael, HAMLER, Anton, JAGODIČ, Marko, MAKOVEC, Darko. The synthesis and characterization of copper-nickel alloy nanoparticles with a therapeutic Curie point using the microemulsion method. *Journal of alloys and compounds*, ISSN 0925-8388. [Print ed.], 5. nov. 2013, vol. 576, str. 220-226, ilustr., doi: 10.1016/j.jallcom.2013.04.130. [COBISS.SI-ID 16893718]

FERK, Gregor, STERGAR, Janja, DROFENIK, Mihael, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, BAN, Irena. The synthesis and characterization of copper-nickel alloy nanoparticles with a narrow size distribution using sol-gel synthesis. *Materials letters*, ISSN 0167-577X. [Print ed.], 2014, vol. 124, str. 39-42, ilustr., doi: 10.1016/j.matlet.2014.03.030. [COBISS.SI-ID 17817110]

Univerza v Mariboru

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizika I
Course title:	Physics I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
BU10 Kemija		**1**	**zimski**
BU10 Chemistry		**1**	**Autumn**

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individual work	ECTS
45		**15**			**90**	**5**

Nosilec predmeta / Lecturer: Samo Korpar

Jeziki / Languages: S

Predavanja / Lectures: **Samo Korpar**

Vaje / Tutorial: **Marko Bračko**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Znanje srednješolske matematike.

Prerequisites:

Knowledge of high-school mathematics.

Vsebina:

Content (Syllabus outline):

• Kinematika: opazovalni sistem, premo gibanje, krivo gibanje, kroženje, sinusno nihanje, relativno gibanje. • Dinamika: sila, Newtonovi zakoni, teža, trenje, kroženje, inercialni in neinercialni opazovalni sistemi, sistem točkastih teles, gibanje težišča, vrtenje togega telesa, izrek o ravnovesju, gibalna količina, ohranitev gibalne količine, vrtilna količina, ohranitev vrtilne količine, delo in kinetična energija, potencialna energija, ohranitev energije, trki, gravitacija. • Elastomehanika: napetost, Hookov zakon, elastične konstante, strižne deformacije. • Mehanika tekočin: tlak, hidrostatični tlak, vzgon, Bernoullijeva enačba, linearni in kvadratni zakon upora, viskoznost. • Termodinamika: temperatura, temperaturno raztezanje, notranja energija, toplota, prvi zakon termodinamike, prevajanje toplote, kinetična teorija plinov, idealni plini, toplotni stroji, entropija, drugi zakon termodinamike. • Seminarske vaje: reševanje problemov iz obravnavane snovi.	• Kinematics: reference frames, 1-D kinematics, 2-D and 3-D motion, circular motion, simple harmonic motion, relative motion. • Dynamics: force, Newton's laws, weight, friction, circular motion, inertial and non-inertial frames, system of particles, centre of mass, rigid-body rotation, equilibrium of rigid bodies, momentum, conservation of momentum, angular momentum, conservation of angular momentum, work, kinetic energy, potential energy, conservation of energy, collisions, gravitation. • Elasticity: tension, Hook's law, elastic constants, shearing. • Fluid mechanics: pressure, hydrostatic pressure, Archimedes' principle, Bernoulli's equation, drag force, viscosity. • Thermodynamics: temperature, thermal expansion, internal energy, heat, first law of thermodynamics, heat transfer, kinetic theory of gases, ideal gases, heat engines, entropy, second law of thermodynamics. • Tutorial: solving problems covered by the subject.

Temeljni literatura in viri / Readings:

• A. Stanovnik: Fizika I – zapiski predavanj, 4. izd., Univerza v Ljubljani, Fakulteta za elektrotehniko, Ljubljana, 2006.
• D. Halliday, R. Resnick, J. Walker: Fundamentals of Physics, Sixth Edition, John Wiley & Sons, Inc., New York, 2001.
• S. Korpar, M. Bračko: Arhiv pisnih izpitov in kolokvijev iz fizike, 1998-2012, Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 01. 03. 2013. Vir je dostopen v elektronski obliki na naslovu http://fizika.fkkt.uni-mb.si/~www/literatura/fizika.

Cilji in kompetence:	**Objectives and competences:**
Cilja tega predmeta sta: sistematična obravnava osnov fizike − mehanike in termodinamike − z obravnavo izbranih poskusov in dosledno uporabo infinitezimalnega in vektorskega računa ter pridobitev osnovnih znanj za razumevanje ostalih naravoslovnih predmetov.	Objectives of this course are: to provide a systematic treatment of elementary physics phenomena (mechanics and thermodynamics) by making use of selected experiments, as well as calculus and vectors; to acquire foundations for the understanding of other natural-science courses.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben: • izkazati znanje in razumevanje osnovnih fizikalnih zakonitosti, • sestaviti matematični opis fizikalnih problemov in najti ustrezne rešitve.	Knowledge and understanding: On completion of the course a student will be able to: • Demonstrate knowledge and understanding of basic principles in physics. • Mathematically formulate problems and find appropriate solutions.

Prenesljive/ključne spretnosti in drugi atributi:	Transferable/Key Skills and other attributes:
• Spretnosti komuniciranja: pisno izražanje pri pisnem izpitu, ustno izražanje pri ustnem izpitu. • Spretnosti računanja: reševanje računskih nalog pri seminarskih vajah in izpitih. • Reševanje problemov: modeliranje problemov z uporabo poenostavitev in izbiro potrebnih podatkov, interpretacija meritev.	• Communication skills: manor of expression at both written and oral examination. • Calculation skills: solving numerical problems at tutorial and written examination. • Problem solving: modelling problems using simplifications and necessary data selection, interpretation of measurements.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• klasična predavanja, • obravnava izbranih poskusov in • reševanje nalog.	• lectures, • treatment of selected experiments and • problem solving.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Student passes the examination if s/he successfully passed all the following obligations:
• pisni izpit (ali dva testa),	**40**	• written examination (or two tests),
• ustni izpit.	**60**	• oral examination.

Reference nosilca / Lecturer's references:

1. Belle Collaboration, FRATINA, Saša, BITENC, Urban, BIZJAK, Ilija, BRAČKO, Marko, GOLOB, Boštjan, GORIŠEK, Andrej, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže. Evidence for CP Violation in B[sup]0 [to] D[sup]+ D[sup]- decays. Phys. rev. lett., 2007, vol. 98, no. 22, str. 221802-1-221802-6. [COBISS.SI-ID 20796455]
2. Belle Collaboration, STARIČ, Marko, GOLOB, Boštjan, BITENC, Urban, BRAČKO, Marko, FRATINA, Saša, GORIŠEK, Andrej, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, ZUPANC, Anže. Evidence for D[sup]0 -(D[bar])[sup]0 mixing. Phys. rev. lett., 2007, vol. 98, no. 21, str. 211803-1-211803-6. [COBISS.SI-ID 20795943]
3. Belle Collaboration, GO, A., BITENC, Urban, BIZJAK, Ilija, BRAČKO, Marko, FRATINA, Saša, GOLOB, Boštjan, GORIŠEK, Andrej, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže. Measurement of Einstein-Podolsky-Rosen-type flavor entanglement in [Upsilon](4S) [to] B[sup]0 (B[bar])[sup]0 decays. Phys. rev. lett., 2007, vol. 99, no. 13, str. 131802-1-131802-6. [COBISS.SI-ID 21109287]
4. Belle Collaboration, LIN, S.-W., BITENC, Urban, BRAČKO, Marko, FRATINA, Saša, GOLOB, Boštjan, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže. Difference in direct charge-parity violation between charged and neutral B meson decays. Nature (Lond.), 2008, vol. 452, str. 332-335. [COBISS.SI-ID 21553703]
5. KORPAR, Samo. Status and perspectives of solid state photon detectors. Nucl. instrum, methods phys res., Sect. A, Accel.. [Print ed.], 2011, vol. 639, no. 1, str. 88-93, doi: 10.1016/j.nima.2010.10.154. [COBISS.SI-ID 24868135]
6. KORPAR, Samo, DOLENEC, Rok, KRIŽAN, Peter, PESTOTNIK, Rok, STANOVNIK, Aleš. Study of TOF PET using Cherenkov light. Nucl. instrum, methods phys res., Sect. A, Accel.. [Print ed.], 2011, vol. 654, no. 1, str. 532-538, doi: 10.1016/j.nima.2011.06.035. [COBISS.SI-ID 25039655]
7. Belle Collaboration, BONDAR, A., BRAČKO, Marko, GOLOB, Boštjan, KORPAR, Samo, KRIŽAN, Peter, PETRIČ, Marko, SMERKOL, Peter, STARIČ, Marko, ZUPANC, Anže. Observation of two charged bottomoniumlike resonances in [Upsilon](5S) decays. Phys. rev. lett., 2012, vol. 108, no. 12, str. 122001-1-122001-6, doi: 10.1103/PhysRevLett.108.122001. [COBISS.SI-ID 25989159]

8. PROJEKT J1-9340 (D): Kombinirana metoda za identifikacijo delcev (temeljni raziskovalni projekt);
VODJA: Korpar Samo (TRAJANJE: 1.1.2007 – 31.12.2009)

Univerza v Mariboru

Fakulteta za kemijo
in kemijsko tehnologijo

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Računalništvo v kemiji
Course title:	Computer Science in Chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija 1. stopnja		1.	zimski
Chemistry 1. Level			Autumn

Vrsta predmeta / Course type obvezni/obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			**30**		**75**	**5**

Nosilec predmeta / Lecturer: Zorka Novak Pintarič

Jeziki / Languages:	
Predavanja / Lectures:	**slovenski/Slovene**
Vaje / Tutorial:	**slovenski/Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Srednješolsko znanje anorganske kemije in matematike. Kriterij za pristop k računalniškim vajam: 35 % rešenih problemov na 1. pisnem testu.

Prerequisits:

General knowledge of anorganic chemistry and mathematics. The criterion for the approach to computational work: 35% of solved problems in the first written test.

Vsebina:

Predavanja:

- Elektronsko učno okolje Moodle.
- Uvod v programiranje:
  - algoritmi in diagrami poteka,
  - spremenljivke, konstante,
  - branje in pisanje podatkov,
  - matematični izrazi,
  - pogojni stavki,
  - zanke,
  - podprogrami.
- Uporaba programa Excel:
  - obdelava in prikaz podatkov,
  - formule in funkcije,

Content (Syllabus outline):

Lectures:

- E-learning environment Moodle.
- Introduction to programming:
  - algorithms and flowcharts,
  - variables, constants,
  - data reading and writing,
  - mathematical expressions,
  - conditional statements,
  - loops,
  - subprograms.
- Using Excel for:
  - data processing,
  - formulas and functions,

- regresijska analiza,
- pogojno formatiranje in pogojni stavki.

- Uporaba programa Matlab:
  - aritmetične operacije
  - zanke in if stavki
  - funkcije in skripti,
  - solverji za reševanje (ne)linearnih enačb in sistemov (ne)linearnih enačb

<u>Računalniške vaje</u>:
Reševanje problemov iz kemije s programi:
- prevajalnik in urejevalnik Force za programiranje,
- Excel in Matlab za obdelavo podatkov in računanje,
- programi za risanje diagramov poteka, procesnih shem in kemijskih formul,
- Word za pisanje poročil.

- regression analysis,
- conditional formatting and if statements.

- Using Matlab:
  - arithmetic operations,
  - loops and if statements
  - scripts and functions,
  - solvers for (non)linear equations and systems of (non)linear equations.

<u>Computational work</u>:
Solving application problems in chemistry by using:
- the compiler and editor Force for programming,
- Excel and Matlab for data processing and computing,
- software for drawing flowcharts, process schemes, and chemical formulas,
- Word for writing reports.

Temeljni literatura in viri / Readings:

- M. Krajnc, Računalništvo v kemiji, zbrano gradivo, FKKT Univerze v Mariboru, 2014.
- S. Oreški, Računalništvo v kemiji – Navodila za računalniške vaje, 1. izdaja, FKKT Maribor, 2012.
- M. MacDonald, Excel 2010. The Missing Manual, O'Reilly Media, Inc., 2010.
- S. Oreški, Programsko okolje Force 3.0, Kratek priročnik za uporabo, 1. izdaja, FKKT Maribor, 2012.

Cilji in kompetence:

Spoznati uporabo elektronskih učnih pripomočkov. Osvojiti osnove programiranja za reševanje kemijskih problemov. Razvijati sposobnosti za reševanje kemijskih problemov s programoma Excel in Matlab.
Spoznati programe za obdelavo podatkov, reševanje numeričnih problemov, risanje in pisanje poročil.

Objectives and competences:

Adopt the usage of electronic tools. Knowing the basis of programming languages for solving chemical problems.
Build the skills for solving chemical problems by using Excel and Matlab. Knowing the basis of programs for data processing, numerical problem solving, drawing and report writing.

Predvideni študijski rezultati:

Znanje in razumevanje:
Do rezultatov vodi sistematično, ustvarjalno delo. Elektronska učna okolja omogočajo učinkovitejše učenje. Programiranje omogoča logično razmišljanje. Obstoječi programi omogočajo lažje reševanje kemijskih in tehniških problemov.

Prenesljive/ključne spretnosti in drugi atributi:
Uporaba računalniških programov za reševanje problemov v kemiji in kemijski tehnologiji, priprava pisnega poročila.

Intended learning outcomes:

Knowledge and Understanding:
Systematic and creative work leads to results. E-learning environments enable efficient study. Programming makes possible logical thinking. Commercial programs facilitate chemical and engineering problem solving.

Transferable/Key Skills and other attributes:
Utilizing computer software for chemistry and chemical engineering problem solving, preparing written report.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, demonstracije računalniških programov, računalniške vaje, priprava pisnih poročil.	Lectures, demonstration of computer programs, computer exercises, report writing.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so pozitvno opravljene vse naslednje obveznosti: - pisni izpit ali 2 pisna testa, - računalniške vaje.	 **75** **25**	Student passes the examination if s(he) successfully passed all the following obligations: - written exam or 2 written tests, - computational work.

Reference nosilca / Lecturer's references:

NOVAK-PINTARIČ, Zorka, KASAŠ, Mihael, KRAVANJA, Zdravko. Sensitivity analyses for scenario reduction in flexible flow sheet design with a large number of uncertain parameters. *AIChE journal*, ISSN 0001-1541. [Print ed.], Avg. 2013, vol. 59, iss. 8, str. 2862-2871, doi: 10.1002/aic.14061. [COBISS.SI-ID 16795926]

TOKOS, Hella, NOVAK-PINTARIČ, Zorka. Development of a MINLP model for the optimization of a large industrial water system. *Optimization and engineering*, ISSN 1389-4420, 2012, vol. 13, iss. 4, str. 625-662, doi: 10.1007/s11081-011-9162-2. [COBISS.SI-ID 15125014]

NOVAK-PINTARIČ, Zorka, KRAVANJA, Zdravko. Identification of critical points for the design and synthesis of flexible processes. *Computers & chemical engineering*, ISSN 0098-1354. [Print ed.], July 2008, vol. 32, iss. 7, str. 1603-1624. http://dx.doi.org/10.1016/j.compchemeng.2007.08.003, doi: 10.1016/j.compchemeng.2007.08.003. [COBISS.SI-ID 11658518]

KRAVANJA, Zdravko, NOVAK-PINTARIČ, Zorka, ŠKOF, Gorazd. *Sinteza optimalnega procesa čiščenja odpadnih oljnih emulzij : programska oprema*. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, Laboratorij za procesno sistemsko tehniko in trajnostni razvoj, 2013. 1 CD-ROM. [COBISS.SI-ID 17120278]

NOVAK-PINTARIČ, Zorka, KRAVANJA, Zdravko. *A novel bi-level optimization method for the identification of critical points in flow sheet synthesis under uncertainty*. [S. l.: s. n.], 2012. http://www.minlp.org/library/problem/index.php?i=143&lib=MINLP. [COBISS.SI-ID 17231126]

Univerza v Mariboru

Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika II
Course title:	Mathematics II

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
UNI 1. stopnja	Kemija	1.	letni
UNI 1st level	Chemistry	1.	spring

Vrsta predmeta / Course type T

Univerzitetna koda predmeta / University course code: UK02

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		30			165	8

Nosilec predmeta / Lecturer: Žigert Pleteršek Petra

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Znanje Matematike I

Prerequisits:

Knowledge of Mathematics I.

Vsebina:

- **Linearna algebra:**
  sistemi linearnih enačb, Gaussova eliminacijska metoda, seštevanje in množenje matrik, množenje matrik s skalarji, algebrske strukture nad matrikami, determinanta kvadratne matrike, Cramerjev izrek.
- **Integralni račun:**
  definicija in osnovne lastnosti nedoločenega integrala, integracijske metode, Riemannova definicija določenega integrala, osnovni izrek integralnega računa, računanje določenega integrala (Newton-Leibnizova formula, trapezna in Simpsonova formula), nepravi

Content (Syllabus outline):

- **Linear algebra:**
  sistems of linear equations, Gaussian elimination, definition of matrices, adding and multiplying matrices, scalar multiplication, algebraic structure in sets of matrices, determinant of an square matrix, Cramer's rule.
- **Integral calculus:**
  definition and basic concepts of antiderivative, integration methods, Riemann's definition of the definite integral, fundamental theorem of calculus, calculation of definite integrals (Newton-Leibniz rule, trapezoidal and

določeni integral.

- **Navadne diferencialne enačbe (NDE):** uvod in osnovni pojmi, Eulerjeva numerična metoda za reševanje začetne naloge, analitično reševanje nekaterih NDE enačb 1. reda, linearne NDE višjega reda, reševanje linearnih NDE s konstantnimi koeficienti, reševanje linearnih NDE s potenčnimi vrstami.

Simpson's rule), improper integrals.

- **Ordinary differential equations (ODE):** introduction and first definitions, Euler method for solving an initial value problem, some methods for solving ODE of first order, linear ODE of higher order, method of solving linear ODE with constant coefficients, use of power series in solving linear ODE.

Temeljni literatura in viri / Readings:

- B. Butinar, Matematika, 1. del, FKKT, Maribor, 2006.
- B. Butinar, Matematika 2.del, FKKT, Maribor, 2007.
- F. Brešar, Matematika 3.del, FKKT, Maribor, 1997.
- B. Butinar, Matematika I, naloge z rešitvami, FKKT Maribor, 2004
- P. M. Oblak, Matematika, 1.del, FS Ljubljana, 2001
- M. Mencinger, Zbirka nalog iz matematične analize in algebre, FG Maribor, 2006

Cilji in kompetence:

- študent naj pridobi in utrdi temeljna znanja s področja integralnega računa realnih funkcij, matričnega računa in diferencialnih enačb,
- študent je seznanjen z uporabo računalnika za numerično in simbolno računanje,
- študent je sposoben samostojnega študija po študijskih virih.

Objectives and competences:

- the student should gain and establish the basic mathematical knowledge of calculus, linear albegra and ordinary differential equations and know how to use them at other courses,
- the student is informed about usage of computer for numerical and symbolic calculations,
- the student is capable of an individul study.

Predvideni študijski rezultati:

Znanje in razumevanje:

- študent zna računati z matrikami in jih uporabljati, zna reševati navadne diferencialne enačbe,
- študent zna uporabljati računalnik za numerično in simbolno računanje,
- študent zna uporabljati študijske vire.

Prenesljive/ključne spretnosti in drugi atributi:

- uporaba določenega integrala, matričnega računa in navadnih diferencialnih enačb,
- samostojni študij.

Intended learning outcomes:

Knowledge and Understanding:

- the student has knowledge of calculus, matrix calculus and ordinary differential equations,
- the student is able to use computer for numerical and symbolic calculations,
- the student knows how tu use textbooks and other study resources.

Transferable/Key Skills and other attributes:

- the use of calculus, matrices and ordinary differential equations,
- individual work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
- predavanja in seminarske vaje, - demonstracija računalniškega programa za simbolno računanje, - domače naloge	- lectures and exercises, - the demonstration of a computer program for symbolic calculations, - homework.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če sta opravljeni obveznosti: • računski del izpita in • teoretični del izpita. Računski in teoretični del tvorita celoto in se preverjata hkrati. Izpit se lahko nadomesti s sprotnimi testi.	60 40	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part and • the theoretical part of the exam. The calculus and the theoretical part of exam are performed simultaneously. The exam can be replaced with partial exams.

Reference nosilca / Lecturer's references:

ŽIGERT PLETERŠEK, Petra, BERLIČ, Martina. Lucas cubes and resonance graphs of cyclic polyphenanthrenes. *MATCH Communications in Mathematical and in Computer Chemistry*, ISSN 0340-6253, 2012, vol. 68, no. 1, str. 79-90. http://www.pmf.kg.ac.rs/match/content68n1.htm. [COBISS.SI-ID 16050198]

IMRICH, Wilfried, LIPOVEC, Alenka, PETERIN, Iztok, ŽIGERT PLETERŠEK, Petra. Fast recognition of subclasses of almost-median graphs. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2007, vol. 307, iss. 3-5, str. 464-471. http://dx.doi.org/10.1016/j.disc.2006.07.011, doi: 10.1016/j.disc.2006.07.011. [COBISS.SI-ID 14180697],

KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Fibonacci cubes are the resonance graphs of fibonaccenes. *The Fibonacci quarterly*, ISSN 0015-0517, 2005, vol. 43, no. 3, str. 269-276. [COBISS.SI-ID 13865049]

DOBRYNIN, Andrey A., GUTMAN, Ivan, KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Wiener index of hexagonal systems. *Acta applicandae mathematicae*, ISSN 0167-8019, 2002, vol. 72, issue 3, str. 247-294. [COBISS.SI-ID 11934297]

Univerza v Mariboru

Fakulteta za kemijo
in kemijsko tehnologijo

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Anorganska kemija
Course title:	Inorganic chemistry

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija / 1. stopnja Chemistry/1. level		1.	poletni Spring

Vrsta predmeta / Course type	Obvezni/Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
60		15			45	4

Nosilec predmeta / Lecturer:	Irena Ban

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ne	None

Vsebina:	**Content (Syllabus outline):**
Predmet zajema osnove anorganske kemije **Periodni sistem** kot osnova sistematike elementov in anorganskih spojin. **Elementi 7. skupine**. Spojine elementov 7. skupine z vodikom. Spojine s kisikom, oksokisline in oksosoli. Medhalogenske spojine. Nomenklatura. **Elementi 6. skupine**. Spojine elementov 6. skupine z vodikom. Oksidi in oksospojine žvepla, selena in telurja. Spojine s halogeni. Nomenklatura. **Elementi 5. skupine**. Spojine elementov 5. skupine z vodikom. Sinteza amoniaka: vpliv	The subject covers basic principles of inorganic chemistry **Periodic table** as a basis of the systematic of elements and inorganic compounds. **Elements of Group 7**. Compounds of Group 7 elements with hydrogen. Compounds with oxygen, oxo-acids and oxo-salts. Interhalogen compounds. Nomenclature. **Elements of Group 6**. Compounds of Group 6 elements with hydrogen. Oxides and oxo-compounds of sulfur, selenium and tellurium. Compounds with halogens. Nomenclature. **Elements of Group 5**. Compounds of Group 5

reakcijskih pogojev in katalizatorja na ravnotežje in hitrost reakcije. Oksidi in oksospojine. Spojine elementov V. skupine s halogeni in žveplom. Nomenklatura.
Elementi 4. skupine. Spojine elementov 4. skupine z vodikom. Oksidi, oksospojine in soli. Boudouardovo ravnotežje. Halogenidi in sulfidi elementov 4. skupine. Ogljikov dioksid v vodni raztopini. Silikati. Nomenklatura.
Elementi 3. skupine. Bor in spojine bora. Struktura boranov. Aluminij in spojine aluminija. Pregled lastnosti spojin galija, indija in talija. Nomenklatura.
Elementi 1. in 2. skupine. Lastnosti zemeljskoalkalijskih kovin in njihovih spojin. Lastnosti alkalijskih kovin in njihovih spojin. Nomenklatura.
Elementi 8. skupine. Spojine žlahtnih plinov in njihove lastnosti.

Pregled kemije prehodnih elementov. d-orbitale in njihova vloga v kemiji prehodnih elementov. Pregled lastnosti prve vrste kovin prehoda. Pregled lastnosti druge in tretje vrste kovin prehoda. Lantanoidi in aktinoidi. Jedrske reakcije. Pregled elementov in njihovih spojin po skupinah. Oksidi, hidroksidi in oksokisline prehodnih elementov. Koordinacijske spojine.

Bioanorganska kemija

- Biološki cikli (N,H)
- Biomineralizacija
- Kemija elementov v medicini

Kemija trdnega stanja in materialov

- Sodobne metode sinteze materialov
- Kovinski oksidi, fluoridi, nitridi
- Interkalacijske spojine

elements with hydrogen. Synthesis of ammonia: the influence of reaction conditions and catalyst on the equilibrium and velocity of reaction. Oxides and oxo-compounds. Compounds of group 5 elements with halogens and sulfur. Nomenclature.
Elements of Group 4. Compounds of Group 4 elements with hydrogen. Oxides oxo-compounds and salts. Influence of reaction conditions on the equilibrium of CO and CO_2 Halogenides and sulfides of the Group 4 elements. Carbonic acid in aqueous solution. Silicates. Nomenclature.
Elements of Group 3. Boron and boron compounds. Structures of boranes. Aluminum and aluminum compounds. Survey of the properties of gallium, indium and thallium compounds. Nomenclature.
Elements of Groups 1 and 2. Properties of earth-alkali metals and their compounds. Properties of alkali metals and their compounds. Nomenclature.
Elements of Group 8. Compounds of noble gases and their properties.

Survey of the chemistry of transition elements. d-orbitals and their role in the transition elements chemistry. Survey of the properties of the first row of transition elements. Survey of the properties of the second and third row of transition elements. Lanthanoids and actinoids. Nuclear reactions. Survey of the groups of transition elements. Oxides, hydroxides and oxo-acids of the transition elements Coordination compounds.

Biological inorganic chemistry

- Biological cycles (N,H)
- Biomineralization
- The chemistry of elements in medicine

Solid-state chemistry and material chemistry

- Modern Methods for Formation of Solids
- Metal oxides, fluorides, nitrides
- Intercalation compounds

Temeljni literatura in viri / Readings:

- M. Drofenik, Splošna in anorganska kemija, Fakulteta za kemijo in kemijsko tehnologijo – Univerza v Mariboru (2013)
- F. Lazarini in J. Brenčič, Splošna in Anorganska kemija, Založba FKKT, Ljubljana (2011)
- N. N. Greenwood , A. Earnshaw Chemistry of the Elements, Second Edition Paperback – Elsevier Butterworth-Heinemann, 2009
- D. F. Shriver, P.W.Atkins: *Inorganic Chemistry*,Oxford-University Press, 1999.

Cilji in kompetence:	**Objectives and competences:**
Kandidat bo seznanjen z osnovnimi lastnostmi reprezentativnih elementov periodnega sistema. Znanje mu bo pomagalo pri aktivni vključitvi v problematiko s področja anorganske kemije.	The candidate will be acquainted with the basic properties of representative elements what will enable him to follow the other subjects connected with inorganic chemistry.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Samostojno načrtovanje osnovnih kemijskih procesov Prenesljive/ključne spretnosti in drugi atributi: Pridobitev kemijskih znanj potrebnih za razumevanje ostalih kemijskih predmetov (organska, analizna in fizikalna kemija) Pridobitev splošnega kemijskega znanja za sodelovanje pri ostalih tehnoloških predmetih	Knowledge and Understanding: Autonomous planning of basic chemical processing Transferable/Key Skills and other attributes: Acquirement of elementary chemical knowledge needed for attending other chemical courses (analytic, physical and organic chemistry) and chemical engineering courses.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in seminarske vaje Uporaba predstavitev s Power Point-om Uporaba interneta Uporaba »virtualne« splošne kemije	Oral lectures and Desk exercises Power-Point presentations Use of internet Use of Interactive General Chemistry

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so opravljene naslednje obveznosti: • računski in seminarski del • teoretični del izpita. Računski, seminarski in teoretični del	 30 70	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part and tutorial • the theoretical part of the exam.

tvorijo celoto in se preverjajo hkrati.		The calculus, tutorial and the theoretical part of exam are performed simultaneously.

Reference nosilca / Lecturer's references:

KRISTL, Matjaž, BAN, Irena, DANČ, Anita, DANČ, Valerija, DROFENIK, Mihael. A sonochemical method for the preparation of cadmium sulfide and cadmium selenide nanoparticles in aqueous solutions. *Ultrasonics Sonochemistry*, ISSN 1350-4177, June 2010, vol. 17, iss. 5, str. 916-922, doi: 10.1016/j.ultsonch.2009.12.013. [COBISS.SI-ID 13766422], [JCR, SNIP, WoS do 3. 7. 2014: št. citatov (TC): 15, čistih citatov (CI): 9, normirano št. čistih citatov (NC): 8, Scopus do 25. 3. 2014: št. citatov (TC): 16, čistih citatov (CI): 10, normirano št. čistih citatov (NC): 9]

BAN, Irena, DROFENIK, Mihael, MAKOVEC, Darko. The synthesis of iron-nickel alloy nanoparticles using a reverse micelle technique. *Journal of Magnetism and Magnetic Materials*, ISSN 0304-8853. [Print ed.], Dec. 2006, vol. 307, iss. 2, str. 250-256. http://dx.doi.org/10.1016/j.jmmm.2006.04.010. [COBISS.SI-ID 10488342], [JCR, SNIP, WoS do 8. 6. 2014: št. citatov (TC): 20, čistih citatov (CI): 20, normirano št. čistih citatov (NC): 12, Scopus do 8. 6. 2014: št. citatov (TC): 21, čistih citatov (CI): 21, normirano št. čistih citatov (NC): 13]

BAN, Irena, KRISTL, Matjaž, DROFENIK, Mihael, POPOVIĆ, Arkadije. Hydroxylammonium fluorogermanates. *Thermochimica acta*, ISSN 0040-6031. [Print ed.], 2004, vol. 419, iss. 1/2, str. 253-257. http://dx.doi.org/10.1016/j.tca.2004.02.016. [COBISS.SI-ID 8703766], [JCR, SNIP, WoS do 24. 3. 2014: št. citatov (TC): 6, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2, Scopus do 15. 4. 2013: št. citatov (TC): 6, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2]

BAN, Irena, STERGAR, Janja, DROFENIK, Mihael, FERK, Gregor, MAKOVEC, Darko. Synthesis of chromium-nickel nanoparticles prepared by a microemulsion method and mechanical milling. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2013, vol. 60, no. 4, str. 750-755. http://acta.chem-soc.si/60/60-4-750.pdf. [COBISS.SI-ID 17438998], [JCR, SNIP, WoS do 24. 3. 2014: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 24. 3. 2014: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]

Univerza v Mariboru

Fakulteta za kemijo
in kemijsko tehnologijo

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Analizna kemija I
Course title:	Analytical Chemistry I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja		**1.**	Poletni
Chemistry / 1st level		**1.**	Spring

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			60		135	**8**

Nosilec predmeta / Lecturer:	Mladen Franko

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovene
	Vaje / Tutorial:	Slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnovno znanje splošne in anorganske kemije, matematike in fizike.	Basic knowledge of general and inorganic chemistry, mathematics and physics.

Vsebina:	**Content (Syllabus outline):**
• Obdelava in interpretacija rezultatov: sistematske in slučajne napake, uporaba statistike za ovrednotenje meritev. • tipi, selektivnost in občutljivost reagentov in kemijskih reakcij. • ravnotežja v homogenih in heterogenih sistemih, nevtralizacija, oksidacija in redukcija, obarjanje ter tvorba kompleksov kot osnova analiznih metod. • Volumetrija. • titrimetrija z vizuelnimi indikatorji: priprava standardnih raztopin, acidi in alkalimetrične titracije, redukcijsko-oksidacijske, obarjalne in komplekso-metrične titracije, titracija v nevodnem mediju. • Gravimetrija.	• Evaluation and interpretation of results, systematic and random errors, statistical methods for evaluation of measurements. • Types, selectivity and sensitivity of reagents and chemical reactions. • Equilibrium in homogeneous and heterogeneous systems, neutralization, oxidation and reduction, precipitation and formation of complexes as a base of analytical methods. • Volumetry. • Titrimetry using visual indicators: preparation of standard solutions, acid/base titrations, oxidation/reduction titrations, precipitation titrations, complex formation titrations, titrations in nonaqueous media.

Laboratorijske vaje gravimetrija - titrimetrija z vizuelnimi indikatorji (priprava standardnih raztopin, acidi-in alkalimetrične titracije, redukcijsko oksidacijske, obarjalne in kompleksometrične titracije).	• Gravimetry. Laboratory work Gravimetry -Titrimetry using visual indicators (preparation of standard solutions, acid/base titrations, oxidation/reduction titrations, precipitation titrations, complex formation titrations).

Temeljni literatura in viri / Readings:

- D.A. Skoog, D.M. West, F.J. Holler: *Fundamentals of Analytical Chemistry*, Saunders College Publishing, 8. izdaja, N.Y.2003.
- D.A. Skoog, , F.J. Holler S.R. Crouch: *Analytical Chemistry An Introduction*, John Wiley, 7. izdaja, New York, 2000.
- G.D. Christian: *Analytical Chemistry*, John Wiley, New York, 2003.
- D.Brodnjak Vončina, Analizna kemija 1, zapiski predavanj, UM FKKT 2011
- M. Kolar, Laboratorijske vaje iz Analizne kemije I, UM FKKT 2003

Cilji in kompetence:	**Objectives and competences:**
Predmet daje popolni pregled znanja ter teoretskih osnov in uporabe analiznih klasičnih analiznih metod kot je gravimetrija in volumetrija. Analiza je osnova za vrednotenje kvalitete hrane, okolja in živih bitij. Analizna kemija obravnava zato področje kemijske analize teoretično poglobljeno, praktično pa tako usmerjeno, da usposobi slušatelje ne samo za razumevanje, temveč tudi za reševanje analiznih problemov. Predmet daje integralni pregled teorij in metod uporabnih za identifikacijo in rešitev vrste realnih problemov kemijske analize. Primeri iz področij anorganske kemije, organske kemije in biokemije se uporabljajo za razumevanje kemijskih in fizikalnih procesov, ki spremljajo analizni postopek, z vidikov kemijskih ravnotežij in kinetike. Znanje se širi in poglablja z računskimi pristopi baziranimi na fiziki ter z aplikacijo znanj anorganske in organske kemije.	Subject gives the complete overview of knowledge and the theoretical basis concerning applications of classical analytical methods such as gravimetry and volumetry Analysis is the basis for quality evaluation of food, environment and living organisms. The analytical chemistry gives the complete theoretical overview and during practical work gives the knowledge not only for understanding but also for solving analytical problems. The subject gives the integral overview of theories and methods used for identification and quantitative determination of real problems of chemical analysis. Examples from inorganic chemistry, organic chemistry and biochemistry are used for understanding of chemical and physical processes which accompany the analytical procedure from the view of chemical equilibrium and kinetics. Knowledge is spread and improved using calculation principles based on knowledge of physics and using applications from inorganic and organic chemistry.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben • razumeti osnove kemijske analize osnovnih klasičnih analiznih meritev . • spoznati osnovne principe in zakone na katerih temeljijo gravimetrične in titrimetrične analizne metode • spoznati kvantitativno ovrednotenje rezultatov meritev.	Knowledge and Understanding: On completion of this course the student will be able to • understand the base of chemical analysis of classical analytical measurements • recognize basic principles and laws on which gravimetric and titrimetric analytical methods are based. • Recognize quantitative evaluation of measurements results.

Prenesljive/ključne spretnosti in drugi atributi: Ročne spretnosti, predvsem sposobnost praktičnega dela z laboratorijsko steklovino in opremo. Reševanje analiznih problemov, od enostavnejših do bolj zapletenih in reševanje računskih nalog z uporabo stehiometričnih razmerij in ravnotežnih reakcij. Računanje merilne negotovosti.	Transferable/Key Skills and other attributes: Manual skills, preferable the capability of practical work with laboratory glassware and equipment. Solving analytical problems, from simple to more complex ones and calculations using stoichiometric ratios and equilibrium equations. Calculation of measurement uncertainty.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje	• Lectures • Lab work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pristopni pogoji za opravljanje vaj: opravljene vaje iz Anorganske kemije in dva kolokvija Pristopni pogoji za opravljanje izpita: Opravljene vaje iz Analizne kemije I. in zaključni kolokvij Izpit je opravljen, če so pozitvno opravljene vse naslednje obveznosti: Ocenjevanje predmeta • Računske naloge • Ustni izpit Ocenjevanje lab. vaj • Pisni test po zaključenih laboratorijskih vajah	 **30** **40** **30**	Conditions to access the laboratory work: Concluded lab work of Inorganic chemistry and two written tests Conditions to access the examination: Concluded lab. work and written test of lab. work in Analytical Chemistry I. Student passes the examination if s(he) successfully passed all the following obligations: Assesment of the subject • Coursework, analytical calculations • Oral examination Assesment of lab work • Writen test after conclusion of lab work

Reference nosilca / Lecturer's references:

MARTELANC, Mitja, ŽIBERNA, Lovro, PASSAMONTI, Sabina, **FRANKO, Mladen**. Direct determination of free bilirubin in serum at sub-nanomolar levels. *Analytica chimica acta*, ISSN 0003-2670. [Print ed.], 2014, vol. 809, str. 174-182, doi: 10.1016/j.aca.2013.11.041. [COBISS.SI-ID 2983675]

LUTEROTTI, Svjetlana, BICANIC, Dane Danijel, MARKOVIĆ, Ksenija, **FRANKO, Mladen**. Carotenes in processed tomato after thermal treatment. *Food control*, ISSN 0956-7135. [Print ed.], 2015, vol. 48, str. 67-74, doi: 10.1016/j.foodcont.2014.06.004. [COBISS.SI-ID 3536891]

JOVANOV, Pavle, GUZSVÁNY, Valeria (pisar), **FRANKO, Mladen**, LAZIĆ, Sanja, SAKAČ, Marijana, MILOVANOVIĆ, Ivan, NEDELJKOVIĆ, Nataša. Development of multiresidue DLLME and QuEChERS based LC-MS/MS method for determination of selected neonicotinoid insecticides in honey liqueur. *Food research international*, ISSN 0963-9969, 2014, vol. 55, str. 11-19, doi: 10.1016/j.foodres.2013.10.031. [COBISS.SI-ID 2931707]

LUTEROTTI, Svjetlana, MARKOVIĆ, Ksenija, **FRANKO, Mladen**, BICANIC, Dane Danijel, MADŽGALJ, Azamela, KLJAK, Kristina. Comparison of spectrophotometric and HPLC methods for determination of carotenoids in foods. *Food chemistry*, ISSN 0308-8146. [Print ed.], 2013, vol. 140, no 1/2, str. 390-397, doi: 10.1016/j.foodchem.2013.02.003. [COBISS.SI-ID 2701819]

JOVANOV, Pavle, GUZSVÁNY, Valeria**, FRANKO, Mladen**, LAZIĆ, Sanja, SAKAČ, Marijana, ŠARIĆ, Bojana, BANJAC, Vojislav. Multi-residue method for determination of selected neonicotinoid insecticides in honey using optimized dispersive liquid-liquid microextraction combined with liquid chromatography-tandem mass spectrometry. *Talanta*, ISSN 0039-9140. [Print ed.], 2013, vol. 111, str. 125-133, doi: 10.1016/j.talanta.2013.02.059. [COBISS.SI-ID 2710011]

Univerza v Mariboru

Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizika II
Course title:	Physics II

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
BU10 Kemija		1.	poletni
BU10 Chemistry		1.	Spring

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individual work**	**ECTS**
45		15	30		90	6

Nosilec predmeta / Lecturer: Samo Korpar

Jeziki / Languages: S

Predavanja / Lectures: Samo Korpar

Vaje / Tutorial: Marko Bračko

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Znanje iz predmeta Fizika I.

Prerequisites:

Knowledge of Physics I.

Vsebina:

Content (Syllabus outline):

• Električno polje: el. naboj, Coulombov zakon, el. polje točkastih nabojev, el. dipol, Gaussov zakon, el. potencial, prevodnik v el. polju, kondenzator in kapaciteta, dielektriki, energija el. polja. • Enosmerni tok: el. tok, el. upornost, enosmerni el. krogi, gonilni člen, I. in II. Kirchhoffov zakon, ampermeter in voltmeter, kondenzator v el. krogu. • Magnetno polje: magn. polje, magn. sila, Hallov pojav, navor na tokovno zanko, magn. dipol, Biot-Savartov zakon, Amperov zakon, indukcija, Faradayev zakon, tuljave in induktanca, el. krog s tuljavo, energija magn. polja, diamagnetizem, paramagnetizem, feromagnetizem, Maxwellove enačbe. • Izmenični tok: el. krog z izmeničnim tokom, el. krog RLC, kazalčni diagrami, transformatorji. • Mehanična nihanja in valovanja: enostavna nihala, energija sinusnega nihanja, dušeno sinusno nihanje, vsiljeno nihanje, resonanca, 1D valovanje, transverzalno in longitudinalno valovanje, valovna dolžina in frekvenca, hitrost, energija in moč potujočih valov, interferenca, stoječe valovanje in resonanca, 2D valovanje, odboj in lom valovanja, Dopplerjev pojav, udarni val, 3D valovanje, zvočno valovanje, hitrost in jakost zvoka. • Elektromagnetna nihanja in valovanja: el. nihajni krog (LC), dušen el. nihajni krog (RLC), potujoče EM valovanje, energija EM valov, svetlobni tlak, polarizacija, odboj in lom svetlobe, optični instrumenti, interferenca in uklon. • Moderna fizika: osnovni pojmi relativnosti, kvantne mehanike in zgradbe snovi. • Seminarske vaje: reševanje nalog iz obravnavane snovi. • Laboratorijske vaje: praktično opravljanje izbranih vaj iz snovi Fizike I in II.	• Electricity: el. charge, Coulomb's law, el. fields, el. dipole, Gauss' law, el. potential, conductor in el. field, capacitor and capacitance, dielectrics, energy of el. field. • Direct current: el. current, resistance, DC circuits, emf device, Kirchhoff's voltage and current laws, ammeter and voltmeter, RC circuits. • Magnetism: magn. field, magn. force, Hall effect, torque on a current loop, magn. dipole, law of Biot and Savart, Ampere's law, induction, Faraday's law, inductors and inductance, RL circuits, energy of magn. field, diamagnetism, paramagnetism, ferromagnetism, Maxwell's equations. • Alternating currents: AC circuits, RLC circuits, phasors, transformers. • Mechanical oscillations and waves: pendulums, energy in simple harmonic motion, damped simple harmonic motion, forced oscillations, resonance, 1D waves, transverse and longitudinal waves, wavelength and frequency, speed, energy and power of travelling wave, interference, standing waves and resonance, 2D waves, reflection and refraction, Doppler effect, shock wave, 3D waves, sound waves, speed of sound, sound intensity. • Electromagnetic oscillations and waves: LC oscillations, RLC circuit, travelling EM wave, energy of EM waves, radiation pressure, polarization, reflection and refraction, optical instruments, interference and diffraction. • Modern physics: basic principles of relativity, quantum mechanics and atomic structure. • Tutorial: solving problems covered by the subject. • Laboratory work: practical work in selected areas of Physics I and II.

Temeljni literatura in viri / Readings:

• A. Stanovnik: Fizika I – zapiski predavanj, 4. izd., Fizika II – zapiski predavanj, 3. izd., Univerza v Ljubljani, Fakulteta za elektrotehniko, Ljubljana, 2006.
• D. Halliday, R. Resnick, J. Walker: Fundamentals of Physics, Sixth Edition, John Wiley & Sons, Inc., New York, 2001.
• S. Korpar, M. Bračko: Arhiv pisnih izpitov in kolokvijev iz fizike, 1998-2012, Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 01. 03. 2013. Vir je dostopen v elektronski obliki na naslovu http://fizika.fkkt.uni-mb.si/~www/literatura/fizika.
• S. Korpar, M. Bračko: *Navodila za laboratorijske vaje iz fizike*, Univerza v Mariboru, FKKT, Maribor, 01. 03. 2013. Vir je dostopen v elektronski obliki: http://fizika.fkkt.uni-mb.si/~www/literatura/fizikalni_praktikum.

Cilji in kompetence:	**Objectives and competences:**

Cilji tega predmeta so: sistematična obravnava osnov elektromagnetizma, nihanja in valovanja ter optike z opisi izbranih poskusov in dosledno uporabo infinitezimalnega in vektorskega računa ter pridobitev osnovnih znanj za razumevanje ostalih naravoslovnih predmetov; pridobitev osnovnih spretnosti za izvedbo in obravnavo meritev.	Objectives of this course are: to provide a systematic treatment of elementary physics (electromagnetism, oscillations, waves and optics) by description of selected experiments and usage of calculus and vectors; to acquire foundations for understanding of other natural-science courses; to acquire basic skills for conducting and evaluating measurements.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben: • izkazati znanje in razumevanje osnovnih fizikalnih zakonitosti, • sestaviti matematični opis fizikalnih problemov in najti ustrezne rešitve, • izvesti meritev in ovrednotiti rezultat ter napako meritve. Prenesljive/ključne spretnosti in drugi atributi: • Spretnosti komuniciranja: izražanje pri pisnem in ustnem izpitu, pisanje poročil o laboratorijskih vajah in ustni zagovor teh poročil. • Spretnosti računanja: reševanje računskih nalog pri seminarskih vajah in izpitih, izračunavanje rezultatov in ocenjevanje negotovosti pri laboratorijskih meritvah. • Reševanje problemov: modeliranje problemov z uporabo poenostavitev in izbiro potrebnih podatkov, interpretacija meritev.	Knowledge and understanding: On completion of the course a student will be able to: • Demonstrate knowledge and understanding of basic principles in physics. • Mathematically formulate problems and find appropriate solutions, • perform a measurement and evaluate its result and uncertainty. Transferable/Key Skills and other attributes: • Communication skills: manor of expression at both written and oral examination, writing reports on laboratory work, oral laboratory work defence. • Calculation skills: solving numerical problems at tutorial and written examination, calculation of results and estimation of experimental uncertainties for laboratory measurements. • Problem solving: modelling problems using simplifications and necessary data selection, interpretation of measurements.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• klasična predavanja, • obravnava izbranih poskusov in • reševanje nalog, • laboratorijske vaje.	• lectures, • treatment of selected experiments and • problem solving, • laboratory work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pristopna pogoja za opravljanje izpita sta opravljen izpit iz predmeta Fizika I in opravljene lab. vaje. Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • pisni izpit (ali dva testa), • laboratorijske vaje (dnevnik, zagovor), • ustni izpit.	 **30** **30** **40**	Conditions to access the examination are successful completion of Physics I and completion of the lab. work. Student passes the examination if s/he successfully passed all the following obligations: • written examination (or two tests), • laboratory work (lab reports, defence), • oral examination.

Reference nosilca / Lecturer's references:

1. Belle Collaboration, FRATINA, Saša, BITENC, Urban, BIZJAK, Ilija, BRAČKO, Marko, GOLOB, Boštjan, GORIŠEK, Andrej, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže. Evidence for CP Violation in B[sup]0 [to] D[sup]+ D[sup]- decays. Phys. rev. lett., 2007, vol. 98, no. 22, str. 221802-1-221802-6. [COBISS.SI-ID 20796455]
2. Belle Collaboration, STARIČ, Marko, GOLOB, Boštjan, BITENC, Urban, BRAČKO, Marko, FRATINA, Saša, GORIŠEK, Andrej, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, ZUPANC, Anže. Evidence for D[sup]0 -(D[bar])[sup]0 mixing. Phys. rev. lett., 2007, vol. 98, no. 21, str. 211803-1-211803-6. [COBISS.SI-ID 20795943]
3. KORPAR, Samo, CHAGANI, Hassan, DOLENEC, Rok, KRIŽAN, Peter, PESTOTNIK, Rok, STANOVNIK, Aleš. A module of silicon photo-multipliers for detection of Cherenkov radiation. Nucl. instrum, methods phys res., Sect. A, Accel.. [Print ed.], 2010, vol. 613, no. 2, str. 195-199. [COBISS.SI-ID 23339559]
4. Belle Collaboration, LIN, S.-W., BITENC, Urban, BRAČKO, Marko, FRATINA, Saša, GOLOB, Boštjan, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže. Difference in direct charge-parity violation between charged and neutral B meson decays. Nature (Lond.), 2008, vol. 452, str. 332-335. [COBISS.SI-ID 21553703]
5. KORPAR, Samo. Status and perspectives of solid state photon detectors. Nucl. instrum, methods phys res., Sect. A, Accel.. [Print ed.], 2011, vol. 639, no. 1, str. 88-93, doi: 10.1016/j.nima.2010.10.154. [COBISS.SI-ID 24868135]
6. KORPAR, Samo, DOLENEC, Rok, KRIŽAN, Peter, PESTOTNIK, Rok, STANOVNIK, Aleš. Study of TOF PET using Cherenkov light. Nucl. instrum, methods phys res., Sect. A, Accel.. [Print ed.], 2011, vol. 654, no. 1, str. 532-538, doi: 10.1016/j.nima.2011.06.035. [COBISS.SI-ID 25039655]
7. Belle Collaboration, BONDAR, A., BRAČKO, Marko, GOLOB, Boštjan, KORPAR, Samo, KRIŽAN, Peter, PETRIČ, Marko, SMERKOL, Peter, STARIČ, Marko, ZUPANC, Anže. Observation of two charged bottomoniumlike resonances in [Upsilon](5S) decays. Phys. rev. lett., 2012, vol. 108, no. 12, str. 122001-1-122001-6, doi: 10.1103/PhysRevLett.108.122001. [COBISS.SI-ID 25989159]
8. PROJEKT J1-9340 (D): Kombinirana metoda za identifikacijo delcev (temeljni raziskovalni projekt); VODJA: Korpar Samo (TRAJANJE: 1.1.2007 – 31.12.2009)

Univerza v Mariboru

Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Kemijsko računanje
Course title:	Chemical Calculation

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija / 1. stopnja	**Kemija**	**1.**	**poletni**
Chemistry/1. level			**spring**

Vrsta predmeta / Course type	obvezni/obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
30			**30**		**60**	**4**

Nosilec predmeta / Lecturer:	doc. dr. Majda Krajnc/Assistant Professor

Jeziki / Languages:	**Predavanja / Lectures:**	**slovenski/ Slovene**
	Vaje / Tutorial:	**slovenski/Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje anorganske kemije, matematike, računalništva v kemiji.	Knowledge of anorganic chemistry, mathematics, computer in chemistry.

Vsebina:

Predavanja:

- vrste kemijskih procesov (šaržni kontinuirni),
- pretvarjanje enot veličin,
- različni načini reševanja masnih bilanc posameznih procesnih enot (brez in z kemijsko reakcijo),
- sekvenčni in modularni način reševanja masnih bilanc sistemov procesnih enot,
- značilni tokovi v kemijskem procesu (obtok, mimotok, odtok),
- linearna interpolacija in regresija,
- numerično reševanje algebrskih enačb.

Računalniške vaje:

Na osnovi osvojene teorije študentje uporabljajo različne načine in orodja pri reševanju masnih bilanc procesnih enot in sistemov procesnih enot. Pri reševanju matematičnih in kemijskih problemov uporabljajo različne numerične metode ter programe Polymath, Excel in Aspen Plus.

Content (Syllabus outline):

Lectures:

- chemical processes (batch, continuous),
- conversion of units,
- different approaches of solving material balances for single process units (without and with chemical reaction),
- sequential and modular approaches of solving material balances for chemical processes,
- different streams in chemical processes (recycle, bypass, purge),
- linear interpolation and regression,
- solving algebraic equations with numerical methods.

Computational work:

On the basis of the learned theory students use different approaches and tools for solving material balances of process units and systems of process units.
They also use different numerical methods and programs: Polymath, Excel and Aspen Plus for solving mathematical and chemical problems.

Temeljni literatura in viri / Readings:

1. R. M. Felder, R. W. Rousseau, Elementary Principles of Chemical Processes, John Wiley & Sons, Inc., New York, 2000.
2. M. Krajnc, S. Oreški, F. Purkeljc, Procesne bilance, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 2012.
3. M. Krajnc, Procesne bilance, zbirka rešenih nalog, zbrano gradivo, FKKT Maribor, 2011.
4. S. Oreški, Procesne bilance – računalniške vaje, 2. del, Numerične metode, snovne bilance sistemov brez in s kemijsko reakcijo, FKKT, Maribor, 2007.

Cilji in kompetence:

Sistematično reševanje masnih bilanc v kemijskih procesih, samostojna uporaba programskih paketov Aspen Plus, Excel in Polymath.

Objectives and competences:

Systhematic solving of material balances in chemical processes, the use of programs Aspen Plus, Excel and Polymath.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje: Do rezultatov vodi sistematično reševanje masnih bilanc.	**Knowledge and understanding:** Systhematic work leads to the material balances results.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Aktivno poučevanje in učenje, skupinsko (sodelovalno) delo, e-izobraževanje, domače delo, e-izobraževanje, formativno preverjanje znanja z interaktivnim multimedijskim učnim gradivom in e-testi.	Active teaching and learning, cooperative learning, e-learning, home work, formative assessment of knowledge with interactive multimedia learning material and e-tests.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Kriterij za pristop k računalniškim vajam: 35 % rešenih problemov na 1. pisnem testu. Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: - pisni izpit ali 2 pisna testa, - ustno izpraševanje ali 2 e-testa, - računalniške vaje.	 **40** **20** **40**	The criterion for the approach to computational work: 35% of solved problems in the first written test. Student passes the examination if s(he) successfully passed all the following obligations: - written exam or 2 written tests, - oral examination or 2 e-tests, - computational work.

Reference nosilca / Lecturer's references:

1. LUKMAN, Rebeka, KRAJNC, Majda. Exploring non-traditional learning methods in virtual and real-world environments. *Educ. technol. soc.*, 2012, vol. 15, no. 1, str. 237-247. http://www.ifets.info/journals/15_1/21.pdf.

2. KRAJNC, Majda. E-learning environment integration in the chemical engineering educational process. *Int. j. eng. educ.*, 2009, vol. 25, no. 2, str. 349-357. http://www.ijee.ie/latestissues/Vol25-2/s18_ijee2119.pdf.

3. KRAJNC, Majda, OREŠKI, Severina. Reševanje problemov v kemijski tehniki s programskim paketom POLYMATH. *Kem. šoli*, marec 2006, letn. 18, št. 1, str. 12-19

4. KRAJNC, Majda. Uvajanje e-izobraževanja v študijski proces. *Kem. šoli*, junij 2006, letn. 18, št. 2, str. 14-19.

5. KRAJNC, Majda, GORŠEK, Andreja. Vrste kemijskih procesov. *Kem. šoli*, september 2000, letn. 12, št. 3, str. 9-16, ilustr.

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika III
Course title:	Mathematics III

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja	Kemija	2.	zimski
Chemistry/1. level	Chemistry	2.	Autumn

Vrsta predmeta / Course type	T
Univerzitetna koda predmeta / University course code:	UK11

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		30			105	6

Nosilec predmeta / Lecturer:	Žigert Pleteršek Petra
Jeziki / Languages: Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisits:
Znanje iz Matematike I in Matematike II	Knowledge of Mathematics I and Mathematics II

Vsebina:	Content (Syllabus outline):
• **Diferencialni račun vektorskih funkcij:** definicija vektorskih funkcij in osnovni pojmi; skalarne funkcije vektorske spremenljivke, diferenciabilnost, gradient, odvod v smeri, Taylorjeva formula, lokalni in vezani ekstremi; vektorske funkcije vektorske spremenljivke, diferenciabilnost, Jacobijeva matrika, reševanje sistemov nelinearnih enačb, uvod v diferencialno geometrijo. • **Laplaceova transformacija in diferencialne enačbe:** osnovni pojmi in lastnosti, uporaba tabele, reševanje linearnih NDE, reševanje sistemov	. • **Differential calculus of vector functions:** definition of vector functions and basic concepts; scalar functions of vector variable, differentiability, gradient, directional derivative, Taylor formula, local extremas, constrained optimizing; vector functions of vector variable, differentiability, Jacobi's matrix, systems of nonlinear equations, introduction to the differential geometry. • **Laplace transform and differential equations:**

linearnih NDE; uvod v parcialne diferencialne enačbe, PDE 1. reda, rešitev problemov nihanja strune in prevajanja toplote.

- **Linearna algebra:**
  vektorski prostor kot algebrska struktura, linearna neodvisnost, baza, zamenjava baze, rang matrike, evklidski prostori, ortogonalna baza, Fourierjeva vrsta; linearne transformacije, matrika linearne transformacije, lastne vrednosti in lastni vektorji, diagonalizacija kvadratne matrike, reševanje sistemov homogenih linearnih NDE 1. reda.

basic concepts and properties, use of table, solution of linear ODE, solution of systems of linear ODE;
partial differential equations (PDE) – basic concepts, PDE of first order, wave equation and heat conduction.

- **Linear algebra:**
  vector space as an algebraic structure, linear independence, base, change of basis, rank of a matrix, Euclidean spaces, orthogonal basis, Fourier series, linear transformations, matrix of a linear transformation, eigenvalues and eigenvalues vectors, diagonalization of a square matrix, solution of a system of homogeneous linear ODE with constant coefficients

Temeljni literatura in viri / Readings:

- B. Butinar, Matematika 2.del, FKKT, Maribor, 2007.
- F. Brešar, Matematika 3.del, FKKT, Maribor, 1997.
- P. M. Oblak, Matematika, 2. del, FS, Ljubljana, 1997.
- P. M. Oblak, Matematika, 3.del, FS, Ljubljana, 1989.
- M. Mencinger, P. Šparl, B. Zalar, Zbirka rešenih nalog iz Matematike II, FG, Maribor, 2007.

Cilji in kompetence:

- študent naj pridobi in utrdi znanja s področja linearne algebre, vektorskih funkcij in diferencialnih enačb,
- študent je seznanjen z uporabo računalnika za numerično in simbolno računanje,
- študent je sposoben samostojnega študija po študijskih virih.

Objectives and competences:

- the student should gain and establish the basic mathematical knowledge of linear algebra, vector functions and differential equations,
- the student is informed about usage of computer for numerical and symbolic calculations,
- the student is capable of individul study.

Predvideni študijski rezultati:

Znanje in razumevanje:

- študent zna uporabiti elemente linearne algebre in diferencialnega računa vektorskih funkcij pri reševanju nelinearnih sistemov enačb in sistemov diferencialnih enačb,
- študent zna uporabljati računalnik za numerično in simbolno računanje,
- študent zna uporabljati študijske vire.
-

Intended learning outcomes:

Knowledge and Understanding:

- the student is able to use elements of linear algebra at solving simultaneous nonlinear equations and simultaneous differential equations,
- the student is able to use computer for numerical and symbolic calculations,
- the student knows how to use textbooks and other study resources.

Prenesljive/ključne spretnosti in drugi atributi: - uporaba linearne algebre, vektorskih funkcij in diferencialnih enačb, - samostojni študij.	Transferable/Key Skills and other attributes: - the use of linear algebra, vector functions and differential equations, - individual work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
- predavanja in seminarske vaje, - demonstracija računalniškega programa za simbolno računanje, - domače naloge.	- lectures and exercises, - the demonstration of a computer program for symbolic calculations, - homework.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če sta opravljeni obveznosti: • računski del izpita in • teoretični del izpita. Računski in teoretični del tvorita celoto in se preverjata hkrati. Izpit se lahko nadomesti s sprotnimi testi.	60 40	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part and • the theoretical part of the exam. The calculus and the theoretical part of exam are performed simultaneously. The exam can be replaced with partial exams.

Reference nosilca / Lecturer's references:

ŽIGERT PLETERŠEK, Petra, BERLIČ, Martina. Lucas cubes and resonance graphs of cyclic polyphenanthrenes. *MATCH Communications in Mathematical and in Computer Chemistry*, ISSN 0340-6253, 2012, vol. 68, no. 1, str. 79-90. http://www.pmf.kg.ac.rs/match/content68n1.htm. [COBISS.SI-ID 16050198]

IMRICH, Wilfried, LIPOVEC, Alenka, PETERIN, Iztok, ŽIGERT PLETERŠEK, Petra. Fast recognition of subclasses of almost-median graphs. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2007, vol. 307, iss. 3-5, str. 464-471. http://dx.doi.org/10.1016/j.disc.2006.07.011, doi: 10.1016/j.disc.2006.07.011. [COBISS.SI-ID 14180697],

KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Fibonacci cubes are the resonance graphs of fibonaccenes. *The Fibonacci quarterly*, ISSN 0015-0517, 2005, vol. 43, no. 3, str. 269-276. [COBISS.SI-ID 13865049]

DOBRYNIN, Andrey A., GUTMAN, Ivan, KLAVŽAR, Sandi, ŽIGERT PLETERŠEK, Petra. Wiener index of hexagonal systems. *Acta applicandae mathematicae*, ISSN 0167-8019, 2002, vol. 72, issue 3, str. 247-294. [COBISS.SI-ID 11934297]

KLAVŽAR, Sandi, VESEL, Aleksander, ŽIGERT PLETERŠEK, Petra, GUTMAN, Ivan. Binary coding of Kekulé structures of catacondensed benzenoid hydrocarbons. *Computers & Chemistry*, ISSN 0097-8485. [Print ed.], 2001, vol. 25, issue 6, str. 569-575. [COBISS.SI-ID 11202393]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizikalna kemija I
Course title:	Physical Chemistry I

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija / 1. stopnja		2.	zimski
Chemistry/1. level		2.	Autumn

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
60					60	4

Nosilec predmeta / Lecturer:	Urban Bren

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnovno znanje matematike in fizike.	Basic knowledge of mathematics and physics.

Vsebina:	**Content (Syllabus outline):**
• Lastnosti plinov: Idealni plin in realni plini, Interakcije med molekulami • Prvi zakon termodinamike: Notranja energija, Entalpija, Toplotne kapacitete, Termokemija • Drugi zakon termodinamike: Entropija in prosta energija, Pogoji za ravnotežje v zaprtem sistemu • Tretji zakon termodinamike • Fizikalne pretvorbe čistih snovi: Stabilnost faz in fazni prehodi, Površinske lastnosti tekočin • Enostavne mešanice: Parcialne molske količine, Idealne in realne raztopine • Fazni diagrami • Kemijsko ravnotežje • Ravnotežna elektrokemija: Ionske raztopine, Debye – Hückelova teorija, Elektrode in	• The properties of gases :Perfect gas and real gases, Molecular interactions • The first law: Internal energy, Enthalpy, Heat capacity, Thermochemistry • The second law:Entropy and free energy, Criteria for equilibrium in closed systems • The third law • Physical transformations of pure substances:Phase stability and phase transitions, The physical liquid surface • Simple mixtures: Partial molar quantities, Ideal and real solutions • Phase diagrams • Chemical equlibrium • Equilibrium electrochemistry: Ionic solutions,

elektrokemijski členi	Debye – Hückel theory, Electrodes and the electrochemical cell

Temeljni literatura in viri / Readings:

- P. W. Atkins, J. de Paula: *Physical Chemistry, 8th Ed.*, Oxford University Press, 2006.
- P. W. Atkins, J. de Paula: *Physical Chemistry, 7th Ed.*, Oxford University Press, 2002.
- P. W. Atkins: *Physical Chemistry, 6th Ed.*, Oxford University Press, 1998.
- Aljana Petek: *Zapiski predavanj* – interno študijsko gradivo (Course notes), 2007.

Cilji in kompetence:	**Objectives and competences:**
Razumeti fizikalni pomen fizikalno-kemijskih zakonov in formul ter povezave med njimi in to znati uporabiti pri reševanju enostavnih znanstvenih problemov.	Have more insight in the physical meaning of the physicochemical principles and formulas and the links between them and apply these when solving simple scientific problems.

Predvideni študijski rezultati:	**Intended learning outcomes:**
<u>Znanje in razumevanje:</u> Po zaključku tega predmeta bo študent sposoben: • razumeti pojme in zakone kemijske termodinamike in njihove uporabe v fizikalnem in kemijskem ravnotežju; • razumeti osnovne pojme v termodinamiki raztopin elektrolitov in ravnotežni elektrokemiji. <u>Prenesljive/ključne spretnosti in drugi atributi</u>: Študenti bodo razvili spretnost pisnega komuniciranja, reševanja problemov, kritičnega in logičnega razmišljanja, kot tudi sposobnost samostojnega študija.	<u>Knowledge and Understanding</u>: On completion of this course the student will be able to: • understand the concepts, laws and ways of thinking of chemical thermodynamics and its applications to physical and chemical equilibrium; • have insight into fundamental concepts of thermodynamics of electrolyte solutions and equlibrium electrochemistry. <u>Transferable/Key Skills and other attributes</u>: Students will develop written communication skills, problem solving, critical and logicall thinking, as will the ability to study independently.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, reševanje problemov, domače naloge.	Classroom lectures, Classroom problem solving sessions, homework assigments.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če sta opravljeni obveznosti: • računski del izpita in • teoretični del izpita. Računski in teoretični del tvorita celoto in se preverjata hkrati. Izpit se lahko nadomesti s sprotnimi testi.	50 50	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part and • the theoretical part of the exam. The calculus and the theoretical part of exam are performed simultaneously. The exam can be replaced with partial exams.

Reference nosilca / Lecturer's references:

1. BREN, Urban, LAH, Jurij, BREN, Matevž, MARTÍNEK, Václav, FLORIÁN, Jan. DNA duplex stability : the role of preorganized electrostatics. The journal of physical chemistry. B, Condensed matter, materials, surfaces, interfaces & biophysical, ISSN 1520-6106, 2010, vol. 114, no. 8, str. 2876-2885, doi: 10.1021/jp9064246. [COBISS.SI-ID 33744645], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 22, čistih citatov (CI): 18, čistih citatov na avtorja (CIAu): 3.60, normirano št. čistih citatov (NC): 6, Scopus do 30. 7. 2014: št. citatov (TC): 22, čistih citatov (CI): 18, čistih citatov na avtorja (CIAu): 3.60, normirano št. čistih citatov (NC): 6]
kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICN
točke: 20, št. avtorjev: 5

2. BROWN, Kyle L., BREN, Urban, STONE, Michael P., GUENGERICH, F. Peter. Inherent stereospecificity in the reaction of aflatoxin B1 8, 9-epoxide with deoxyguanosine and efficiency of DNA catalysis. Chemical research in toxicology, ISSN 0893-228X. [Print ed.], 2009, vol. 22, no. 5, str. 913-917. [COBISS.SI-ID 4132890], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 10, čistih citatov (CI): 8, čistih citatov na avtorja (CIAu): 2.00, normirano št. čistih citatov (NC): 3, Scopus do 22. 7. 2014: št. citatov (TC): 9, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 1.75, normirano št. čistih citatov (NC): 3]
kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICN
točke: 31.32, št. avtorjev: 4

3. UDOMMANEETHANAKIT, Thanyarat, RUNGROTMONGKOL, Thanyada, BREN, Urban, FRECER, Vladimir, MIERTUS, Stanislav. Dynamic behavior of avian influenza A virus neuraminidase subtype H5N1 in complex with oseltamivir, zanamivir, peramivir, and their phosphonate analogues. Journal of chemical information and modeling, ISSN 1549-9596. [Print ed.], 2009, vol. 49, no. 10, str. 2323-2332. http://pubs.acs.org/doi/abs/10.1021/ci900277r, doi: 10.1021/ci900277r. [COBISS.SI-ID 4257306], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 36, čistih citatov (CI): 35, čistih citatov na avtorja (CIAu): 7.00, normirano št. čistih citatov (NC): 24, Scopus do 22. 7. 2014: št. citatov (TC): 38, čistih citatov (CI): 37, čistih citatov na avtorja (CIAu): 7.40, normirano št. čistih citatov (NC): 103]
kategorija: 1A1 (Z1, A'', A', A1/2); uvrstitev: SCI, Scopus (d,h), MBP; tipologijo je verificiral OSICN
točke: 33.36, št. avtorjev: 5

4. ZHANG, Huidong, BREN, Urban, KOZEKOV, Ivan D., RIZZO, Carmelo J., STEC, Donald F., GUENGERICH, F. Peter. Steric and electrostatic effects at the C2 atom substituent influence replication and miscoding of the DNA deamination product deoxyxanthosine and analogs by DNA polymerases. Journal of molecular biology, ISSN 0022-2836, 2009, vol. 392, no. 2, str. 251-269. [COBISS.SI-ID 4199450], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 7, čistih citatov (CI): 5, čistih citatov na avtorja (CIAu): 0.83, normirano št. čistih citatov (NC): 1, Scopus do 22. 7. 2014: št. citatov (TC): 8, čistih citatov (CI): 6, čistih citatov na avtorja

(CIAu): 1.00, normirano št. čistih citatov (NC): 2]
kategorija: 1A2 (Z1, A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICN
točke: 16.33, št. avtorjev: 6

5. PERDIH, Andrej, BREN, Urban, ŠOLMAJER, Tomaž. Binding free energy calculations of N-sulphonyl-glutamic acid inhibitors of MurD ligase. Journal of molecular modeling, ISSN 1610-2940, 2009, vol. 15, no. 8, str. 983-996. [COBISS.SI-ID 4090650], [JCR, SNIP, WoS do 6. 10. 2014: št. citatov (TC): 30, čistih citatov (CI): 23, čistih citatov na avtorja (CIAu): 7.67, normirano št. čistih citatov (NC): 16, Scopus do 26. 8. 2014: št. citatov (TC): 32, čistih citatov (CI): 25, čistih citatov na avtorja (CIAu): 8.33, normirano št. čistih citatov (NC): 17]
kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICT
točke: 37.71, št. avtorjev: 3

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UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Organska kemija I
Subject Title:	Organic chemistry I

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Kemija Chemistry		2.	zimski Autumn

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45					75	**4**

Nosilec predmeta / Lecturer: Peter Krajnc

Jeziki / Languages:	
Predavanja / Lecture:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Znanje splošne kemije.

Prerequisits:

Knowledge of general chemistry.

Vsebina:

Uvod: definicija, področja, namen in cilji organske kemije.
Osnovni tipi organskih spojin- tvorba vezi (hibridizacija in teorija molekulskih orbital).
Osnovni tipi organskih spojin-funkcionalne skupine.
IUPAC nomenklatura organskih spojin.
Izomerija, stereokemija, tavtomerija.
Resonanca in vplivi substituentov.
Tipične reakcije organskih spojin-predstavitev.
Proton transfer-kisline in baze, pomen pKa, pKa lestvica.
Kaj je reakcijski mehanizem; intermediati, kinetika in termodinamika v organski kemiji.

Content (Syllabus outline):

Introduction: definition, fields, goals of organic chemistry.
Types of organic compounds-bond formation (hybridization and MO theory).
Types of organic compounds-functional groups.
IUPAC nomenclature of organic compounds.
Isomery, stereochemistry, tautomery.
Resonance and influence of substituents.
Typical organic reactions-introduction.
Proton transfer-acids and bases, pKa meaning and table.
Reaction mechanism; reaction intermediates, kinetics and thermodynamics applied to organic chemistry.

Temeljni literatura in viri / Textbooks:

M. Tišler, Organska kemija, DZS Ljubljana, 1982.
S. Pine, Organic chemistry, McGraw-Hill, New York, 1987.

M. A. Fox, J. K. Whitesell, Organic Chemistry, Jones and Barlett, Boston, 1997.
P. Y. Bruice, Organic chemistry, Prentice Hall, 2006.
M. B. Smith, J. March, March's Advanced Organic Chemistry, Wiley, 2007.

Cilji:

Spoznati obseg in cilje organske kemije ter vpetost vede v procese žive in nežive narave.
Poznati principe povezovanja atomov v organskih molekulah ter tipe geometrije organskih molekul.
Poznati nomenklaturo organskih spojin, v skladu z IUPAC pravili znati poimenovati spojino ter narisati ustrezno formulo, razpoznati različne izomere.
Razumeti vplive skupin na reaktivnost molekule in predvidevati spremembe nastale zaradi spremenjene strukture.
Poznati osnovne tipe organskih reakcij; substitucije, adicije, eliminacije.
Razumeti pomen prenosa protona in vpliv pKa vrednosti.

Objectives:

To know:
the goals and reach of organic chemistry, its role in living and non-living processes,
the principles of atom bonding in organic molecules and types of molecule geometry,
the rules of IUPAC nomenclature for organic compounds and to apply them for formulae naming,
the differences in isomeric compounds,
the basic types of organic reactions; substitutions, additions, eliminations.
To understand the influences of functional groups on the molecule stability and reactivity.
To understand the proton transfer importance and the influence of pKa value.

Predvideni študijski rezultati:

Znanje in razumevanje:
Študent pozna obseg in cilje organske kemije.
Pozna principe povezovanja atomov v organskih molekulah, tipe hibridizacij.
Zna uporabljati pravila IUPAC nomenklature za organske spojine.
Razume vplive skupin na stabilnost in reaktivnost molekul.
Pozna osnovne tipe organskih reakcij.
Razume mehanizme kemijskih reakcij priprave.
Zna razvrščati organske spojine med kisline in baze ter razume vpliv pKa vrednosti
Prenesljive/ključne spretnosti in drugi atributi:
Poznavanje ciljev in osnov organske kemije.

Intended learning outcomes:

Knowledge and Understanding:
Student knows the goals and reach of organic chemistry. Knows the principles of atom bonding in organic molecules and types of molecule geometry, types of hybridization. Student can apply the rules of IUPAC nomenclature to organic compounds thus naming them appropriately.
Understands the influences of functional groups on the molecule stability and reactivity.
Student is able to place organic compounds between bases and acids and realizes the importance of pKa value.
Transferable/Key Skills and other attributes:
Knowledge of goals and bases of organic chemistry

Metode poučevanja in učenja:

Predavanja, seminarsko delo, laboratorijske vaje

Learning and teaching methods:

Lectures, seminar work, laboratory experiments

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations:
Pisni izpit	60	Written exam
Ustni izpit	20	Oral exam
Laboratorijske vaje	20	Experimental course

Opomba: **Navedene sestavine so obvezna sestavina učnega načrta predmeta kot ga določajo Merila za akreditacijo visokošolskih zavodov in študijskih programov v 7. členu (Ur. l. RS, št. 101/2004).**

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Analizna kemija II
Course title:	Analytical Chemistry II

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja		**2.**	Zimski
Chemistry / 1st level		**2.**	Autumn

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			30		105	**6**

Nosilec predmeta / Lecturer:	Mladen Franko

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovene
	Vaje / Tutorial:	Slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnovno znanje klasične analizne kemije, matematike in fizike	Basic knowledge of classical analytical chemistry, mathematics and physics

Vsebina:	**Content (Syllabus outline):**
Predavanja -Statistično ovrednotenje analiznih rezultatov, napake v analizni kemiji, natančnost, točnost, merilna negotovost -Elektrokemijske metode Potenciometrija (ionoselektivne elektrode) - elektrode s stekleno membrano, elektrode s kristalinično homogeno in heterogeno membrano, elektrode s tekočinsko membrano, Voltametrija - direktna in pulzna polarografija, stripping analiza, ciklična voltametrija, amperometrične titracije Konduktometrija Elektrogravimetrija in kulometrija - elektroliza pri konstantni napetosti in pri	Lectures -Statistical evaluation of analytical results, errors in analytical chemistry, precision, accuracy, measurement uncertainty -Electrochemical methods Potentiometry, ion-selective electrodes, glass electrodes, solid state crystalline homogeneous and heterogeneous membrane electrodes, liquid membrane electrodes Voltammetry Direct and pulse polarography, stripping analysis, cyclic voltammetry, amperometric titrations Conductometry Electrogravimetry and coulometry Constant cathode potential gravimetry, constant

konstantnem toku, elektroliza pri kontroliranem potencialu, potenciostatična kulometrija, kulometrične titracije - Spektroskopske metode Atomska absorpcijska spektrometrija, atomska emisijska spektrometrija, molekulska spektrometrija ICP spektrometrija, masna spektrometrija Separacijske metode Ekstrakcijske metode, ekstrakcija na trdni fazi Tankoplastna kromatografija, plinska kromatografija, tekočinska kromatografija, ionska kromatografija, sklopljene tehnike z masno spektrometrijo Laboratorijske vaje Vaje zajemajo praktične primere izvedbe analiznih postopkov na področjih elektrokemijskih, spektroskopskih in separacijskih metod	current gravimetry, potentiostatic coulometry, coulometric titrations -Spectroscopic methods Atomic absorption spectroscopy, atomic emission spectroscopy, molecular absorption spectroscopy, ICP spectroscopy, mass spectrometry -Separation methods Extraction methods, solid phase extraction, planar chromatography, gas liquid chromatography, high performance liquid chromatography, ion chromatography, hyphenated techniques with mass spectrometry Laboratory work Practical examples of analytical procedures in electrometric, spectrometric and separation methods

Temeljni literatura in viri / Readings:

- Douglas A. Skoog, F. James Holler, Stanley R. Crouch, "Principles of Instrumental Analysis, 6. Izdaja, 2006
- D. A. Skoog, F.J.Holler, T. A. Nieman: *Principles of Instrumental Analysis,* Saunders College Publishing, 5. izdaja, New York 1998,
- D.Brodnjak Vončina, Analizna kemija 2, zapiski predavanj, UM FKKT, 2010

Cilji in kompetence:	**Objectives and competences:**
Predmet daje poglobljeno znanje teoretskih osnov in aplikacij analiznih metod elektrokemijske analize, spektroskopske analize in separacijskih metod. Podatki o sestavi materialov vodijo vsak proizvodni proces v raznih fazah od surovin do končnih produktov. Analiza je osnova za vrednotenje hrane, okolja, delovanja organizmov. Predmet analizna kemija 2 obravnava zato področje kemijske analize teoretično poglobljeno, praktično pa tako usmerjeno, da usposobi slušatelje ne samo za razumevanje, temveč tudi za reševanje analiznih problemov. Predmet daje integralni pregled teorij in metod uporabnih za identifikacijo in rešitev vrste realnih problemov kemijske analize. Primeri iz področij anorganske kemije, organske kemije in biokemije se uporabljajo za razumevanje kemijskih in fizikalnih procesov, ki spremljajo analizni postopek.	Subject gives the complete overview of knowledge concerning the theoretical basis and applications of analytical methods in electrochemical, spectroscopic and separation methods. Data from the content of materials lead every production process in different phases from raw materials to final products. Analysis is the basis for quality evaluation of food, environment and living organisms. The analytical chemistry gives the complete theoretical overview and during practical work gives the knowledge not only for understanding but also for solving analytical problems. The subject gives the integral overview of theories and methods used for identification and quantitative determination of real problems of chemical analysis. Examples from inorganic chemistry, organic chemistry and biochemistry are used for understanding of chemical and physical processes which accompany analytical procedure.
Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje:

Po zaključku tega predmeta bo študent sposoben

- razumeti osnove kemijske analize, osnovnih instrumentalnih analiznih meritev.
- spoznati osnovne principe in zakone na katerih temeljijo instrumentalne analizne metode
- spoznati kvantitativno ovrednotenje rezultatov meritev

Prenesljive/ključne spretnosti in drugi atributi:

Ročne spretnosti, predvsem zmožnost praktičnega dela na instrumentih. Ovrednotenje rezultatov meritev in merilne negotovosti.

Knowledge and Understanding:

On completion of this course the student will be able to

- understand the base of chemical analysis and basic instrumental analytical measurements
- recognize basic principles and laws on which instrumental analytical methods are based.
- recognize quantitative evaluation of measurements results.

Transferable/Key Skills and other attributes:

iManual skills, preferable the capability of practical work with instruments. Evaluation of analytical results and measurement uncertainty.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje	• Lectures • Lab work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pristopni pogoji za opravljanje vaj: opravljene vaje iz Analizne kemije I in zaključni kolokvij Pristopni pogoji za opravljanje izpita: • Opravljene lab. vaje in test iz vaj Analizna kemija II. Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: Ocenjevanje predmeta • Računske naloge • Ustni izpit Ocenjevanje lab. vaj • Pisni test po zaključenih laboratorijskih vajah	**30** **40** **30**	Conditions to access the laboratory work: Concluded lab work of Analytical chemistry I and final written test Conditions to access the examination: • Concluded lab. work and written test of lab. work in Analytical Chemistry II. Student passes the examination if s(he) successfully passed all the following obligations: Assesment of the subject • Course work, analytical calculations • Oral examination Assesment of lab work • Written test after conclusion of lab work

Reference nosilca / Lecturer's references:

LIU, Mingqiang, **FRANKO, Mladen**. Thermal lens spectrometry under excitation of a divergent pump beam. *Applied physics. B, Lasers and optics*, ISSN 0946-2171. Tiskana izd., 2014, vol. 115, issue 2, str. 269-277, ilustr., doi: 10.1007/s00340-013-5601-4. [COBISS.SI-ID 2827515]

LIU, Mingqiang, **FRANKO, Mladen**. Progress in thermal lens spectrometry and its applications in microscale analytical devices. *Critical reviews in analytical chemistry*, ISSN 1040-8347, 2014, vol. 44, no. 4, str. 328-353, doi: 10.1080/10408347.2013.869171. [COBISS.SI-ID 3340539]

JOVANOV, Pavle, GUZSVÁNY, Valeria (pisar), **FRANKO, Mladen**, LAZIĆ, Sanja, SAKAČ, Marijana, MILOVANOVIĆ, Ivan, NEDELJKOVIĆ, Nataša. Development of multiresidue DLLME and QuEChERS based LC-MS/MS method for determination of selected neonicotinoid insecticides in honey liqueur. *Food research international*, ISSN 0963-9969, 2014, vol. 55, str. 11-19, doi: 10.1016/j.foodres.2013.10.031. [COBISS.SI-ID 2931707]

RADOVANOVIĆ, Tatjana, LIU, Mingqiang, LIKAR, Polona, KLEMENC, Matjaž, **FRANKO, Mladen**. Microfluidic flow injection analysis with thermal lens microscopic detection for determination of NGAL. *International journal of thermophysics*, ISSN 0195-928X, 8 str., 2014, doi: 10.1007/s10765-014-1699-9. [COBISS.SI-ID 3503099]

FRANKO, Mladen. Thermal lens spectrometric detection in flow injection analysis and separation techniques. *Applied spectroscopy reviews*, ISSN 0570-4928, jul.-avg. 2008, vol. 43, no. 4, str. 358-388. [COBISS.SI-ID 915451]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Meroslovje v kemiji
Course Title:	Metrology in chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja Chemistry/1. level		2.	zimski Autmn

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30		30			90	**5**

Nosilec predmeta / Lecturer:	Mitja Kolar

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Potrebno je predhodno osnovno znanje analizne kemije in osnov statistike.	Basic knowledge of analytical chemistry and basic statistics.

Vsebina:	**Content (Syllabus outline):**
- Uvod v meroslovje v kemiji (merjenje, merske enote, osnovne tehnične infrastrukture na nacionalnem in mednarodnem nivoju. - Osnove statistike (razporeditve, povprečna vrednost, standardni odmik, F-test, t-test, ANOVA, regresija). - Merilna negotovost (različni načini ovrednotenja merilne negotovosti, modelna enačba, izvori merilne negotovosti, kombinirana in razširjena merilna negotovost, poročanje). - Validacija analitskega postopka (terminologija, selektivnost, občutljivost, meja detekcije, linearno območje, robustnost, obnovljivost).	- Introduction to metrology in chemistry (measurements, measurement units and measurement infrastructure national and international). - Basic statistics (distributions, mean value, standard deviation, ANOVA, F-test, t-test, regression). - Measurement uncertainty (uncertainty sources, standard and expanded uncertainty, reporting). - Validation of analytical procedure (selectivity, sensitivity, detection limit, linear range, robustness, recovery). - Reference materials (types, application, storing, handling, CRM). - Traceability of measurement results and

- Referenčni materiali (terminologija, vrste uporabe, prizvodnja, stabilnost)
- Sledljivost merilnih rezultatov v kemiji (terminologija, zagotavljanje merilne sledljivosti)
- Medlaboratorijske primerjave (terminologija, vrste medlaboratorijskih primerjav).
- Zagotavljanje kvalitete rezultatov meritev glede na zahteve standarda EN ISO 17025 (uvod v zahteve standarda).

traceability in analytical chemistry.
- Interlaboratory comparisons.
- Quality and quality control according to standard EN ISO 17025 (inttroduction to).

Temeljni literatura in viri / Readings:

Statistics for Analytical Chemistry, Miller J.C., Miller J.N., Ellis Horwood, Fifth edition 2005.

D.L. Massart, B.G.M. Vandeginste, L.M.C. Buydens, S. De Jong, P.J. Lewi, J.Smeyers-Verbeke, /Handbook of Chemometrics and Qualimetrics: Part A/, Elsevier, Amsterdam, 1997.

An Introduction to Metrology, Laaneots R., Mathiesen O., Tut Press, 2006.

Cilji in kompetence:

Cilj predmeta je seznaniti študente z osnovami meroslovja:
- merilne negotovosti in statistike,
- validacijo analiznih postopkov,
- uporabo referenčnih materialov,
- sledljivostjo merilnih rezultatov,
- medlaboratorijskimi primerjavami,
- zagotavljanje kvalitete meritev.

Objectives and competences:

The aim of the subject is to provide basic metrology knowledge:
- measurement uncertainty and statistics,
- validation of analytical methods,
- reference materials,
- traceability of measurement results,
- interlaboratory comparisons,
- quality control in analytical laboratory.

Predvideni študijski rezultati:

Znanje in razumevanje:
- razumevanje meroslovja z osnovami statistike,
- kritično vrednotenje merilnih postopkov in rezultatov,
- zagotavljanje kvalitetnih meritev.

Prenesljive/ključne spretnosti in drugi atributi:
Predmet se dopolnjuje s predmeti, ki vsebujejo meroslovne vsebine, oziroma obravnavajo merilne postopke (meritve v kemiji, fiziki, bilogiji, biokemiji).

Intended learning outcomes:

Knowledge and Understanding:
- general understanding of metrology with basic statistics,
- critical evaluation of measurements and results,
- quality and quality control.

Transferable/Key Skills and other attributes:
The subject is related to contents that include metrology or subjects that include different typs of measurements in chemistry, physics, biology, biochemistry.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja v učilnici, ki je opremljena z osnovnimi avdio-vizualnimi pripomočki. Seminarsko delo v računaliniški učilnici.	Lectures in lecture room, equipped with basic audio-visual equipment Seminar work in computer room.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način ocenjevanja (izpraševanje - ustni izpit, seminarska naloga): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: - pisni izpit: - ustni izpit:	 70 30	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: - writen examination - oral examination

Reference nosilca / Lecturer's references:

BULSKA, Ewa, KOLAR, Mitja (avtor, prevajalec), MAJCEN, Nineta (avtor, urednik, redaktor prevoda), ŠNUDERL, Katja (redaktor prevoda), TURNŠEK, Urška (redaktor prevoda), BENEDIK, Ljudmila (prevajalec), BRODNJAK-VONČINA, Darinka (redaktor prevoda), DROLC, Andreja (prevajalec), INKRET, Monika (redaktor prevoda), et al. *TrainMiC presentations translated in Slovenian. Pt. 2, Interlaboratory comparisons, v. 3, Selection and use of reference materials, v. 3, Sampling as part of measurement procedure, v. 3 = TrainMiC predstavitve v slovenščini. Del 2, Medlaboratorijske primerjave, v. 3, Izbira in uporaba referenčnih materialov, v. 3, Vzorčenje kot del merilnega postopka, v. 3*, (JRC Scientific and Technical Reports). Geel: European Comission, Joint Research Centre, Institute for Reference Materials and Measurements, cop. 2011. 76 str., ilustr. ISBN 978-92-79-20615-3. ISBN 978-92-79-20616-0, doi: 10.2787/45449. [COBISS.SI-ID 15706390]

KOLAR, Mitja, MAJCEN, Nineta (avtor, urednik), ŠNUDERL, Katja, TURNŠEK, Urška, BENEDIK, Ljudmila, BRODNJAK-VONČINA, Darinka, DROLC, Andreja, INKRET, Monika, et al. *TrainMiC presentation translated in Slovenian. Pt. 1, Traceability of measurement results, Single laboratory validation of measurement procedures, Internal quality control = TrainMiC predstavitve v slovenščini. Del 1, Sledljivost merilnih rezultatov, Validacija merilnih postopkov v laboratoriju, Notranji nadzor kakovosti*, (JRC Scientific and Technical Reports). Geel: European Comission, Joint Research Centre, Institute for Reference Materials and Measurements, cop. 2010. 66 str., ilustr. ISBN 978-92-79-17086-7, doi: 10.2787/31295. [COBISS.SI-ID 34553605]

KOLAR, Mitja. *Razvoj in validacija kromatografskih metod za določanje analitov v realnih sistemih : končno poročilo o izvedenih projektnih aktivnostih za projekt*. Maribor: [s. n.], 2014. [8] f., ilustr. [COBISS.SI-ID 18174486]

KOLAR, Mitja. *Razvoj in validacija kromatografskih metod za določanje analitov v realnih sistemih : zbrano gradivo [z izvedene delavnice, 30. 9. 2014, na UM FKKT]*. [s. l.: s. n., 2014]. 51 f., pros. [COBISS.SI-ID 18192406]

KOLAR, Mitja. *Uporaba referenčnih materialov : izobraževanje za strokovnjake analitskih laboratorijev,*

Celje, 19. junij 2008. [s. l.: s. n., 2008]. 12 f., pros. [COBISS.SI-ID 13508886]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Organska kemija II
Course title:	Organic chemistry II

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		2.	Poletni
Chemistry/1. Level		2.	Spring

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
45			60		105	7

Nosilec predmeta / Lecturer:	Peter Krajnc

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne kemije in osnov organske kemije.	Knowledge of general chemistry and basic principles of organic chemistry.

Vsebina:	**Content (Syllabus outline):**

Organske reakcije: nukleofilne adicije na karbonilno skupino, nukleofilne substitucije in eliminacije na karbonilni skupini, nukleofilne substitucije in eliminacije na sp3 C atomu, polarne adicije. Aromatskost; elektrofilne aromatske substitucije, nukleofilne aromatske substitucije, vplivi substituentov na usmerjanje, radikalske reakcije. Sintetični in naravni polimeri; polimerizacija. Osnove spektroskopskih metod za organske spojine: NMR, IR, masna spektroskopija. Biološko pomembne organske spojine: ogljikovi hidrati. Biološko pomembne organske spojine: aminokisline in proteini. Biološko pomembne organske spojine: lipidi.	Organic reactions: Nu aditions to carbonyl group, Nu substitutions and eliminations to carbonyl group, Nu substitutions and eliminations to sp3 C atom, Polar additions. Aromaticity; electrophilic aromatic substitutions, nucleophilic aromatic substitutions, influence of substituents, radical (single electron transfer) reactions. Synthetic and natural polymers, polymerisations. Bases of spectroscopy of organic compounds: NMR, IR, mass spectroscopy. Biologically important organic compounds: carbohydrates. Biologically important organic compounds: amino acids and proteins. Biologically important organic compounds: lipids.

Temeljni literatura in viri / Readings:

1. M. Tišler, Organska kemija, DZS Ljubljana, 1982.
2. S. Pine, Organic chemistry, McGraw-Hill, New York, 1987.
3. M. A. Fox, J. K. Whitesell, Organic Chemistry, Jones and Barlett, Boston, 1997.
4. P. Y. Bruice, Organic chemistry, Prentice Hall, 2006.
5. M. B. Smith, J. March, March's Advanced Organic Chemistry, Wiley, 2007.

Cilji in kompetence:	**Objectives and competences:**
Spoznati vse osnovne tipe organskih reakcij. Razumeti in poznati vplive pogojev na potek reakcij. Znati teoretsko sintetizirati enostavne organske molekule. Znati uporabljati osnovne metode spektroskopije za identifikacijo organskih spojin. Poznati pomen organskih spojin za biološke sisteme.	To know: basic types of organic reactions, meaning of organic compounds for biological systems. To understand the synthetic strategies for simple organic molecules.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent pozna osnovne organske reakcije. Razume mehanizme kemijskih reakcij in vplivov pogojev na potek reakcije. Pozna spektroskopske metode za karakterizacijo organskih molekul. Zna načrtovati sinteze preprostih organskih molekul. Prenesljive/ključne spretnosti in drugi atributi: Poznavanje organskih reakcij in njihovih mehanizmov. Razumevanje vplivov strukture molekule.	Knowledge and understanding: Student knows basic organic reactions. Understands the mechanisms of organic reactions and influences of reaction conditions. Knows the spectroscopic methods for the characterisations of organic molecules. Can plan the synthesis of simple organic compounds. Transferable/Key Skills and other attributes: Knowledge of organic reactions and mechanisms. Understanding of molecule structure influences

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Laboratorijske vaje	Lectures Laboratory experiments

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Za pristop k opravljanju izpita je potreben opravljen izpit iz predmeta Organska kemija 1.		Prior to exam, exam from subject Organic Chemistry 1 needs to be passed.
Pisni izpit	80	Written exam Laboratory work
Laboratorijske vaje	20	

Reference nosilca / Lecturer's references:

KOVAČIČ, Sebastijan, KRAJNC, Peter, SLUGOVC, Christian. Inherently reactive polyHIPE material from dicyclopentadiene. *Chem. commun. (Lond., 1996)*, 2010, vol. 46, issue 40, str. 7504-7506, doi: 10.1039/C0CC02610G.

PULKO, Irena, WALL, Jennifer, KRAJNC, Peter, CAMERON, Neil R. Ultra-high surface area functional porous polymers by emulsion templating and hypercrosslinking : efficient nucleophilic catalyst supports. *Chemistry (Weinh., Print)*. [Print ed.], Feb. 2010, vol. 16, iss. 8, str. 2350-2354, doi: 10.1002/chem.200903043.

PULKO, Irena, SANDHOLZER, Martina, KOLAR, Mitja, SLUGOVC, Christian, KRAJNC, Peter. Removal of an olefin metathesis catalyst using 4-nitrophenyl acrylate based polymer supports. *Tetrahedron lett.*. [Print ed.], 2010, vol. 51, issue 44, str. 5827-5829, doi: 10.1016/j.tetlet.2010.08.114.

MAJER, Janja, KRAJNC, Peter. Cross-linked porous poly(acrylic acid-co-acrylamide) from high internal phase emulsions: preparation and functionalisation. *Acta chim. slov.*. [Tiskana izd.], 2009, vol. 56, št. 3, str. 629-634, ilustr.

PULKO, Irena, KRAJNC, Peter. Open cellular reactive porous membranes from high internal phase emulsions. *Chem. commun. (Lond., 1996)*, 2008, iss. 37, str. 4481-4483. http://dx.doi.org/10.1039/b807095d, doi: 10.1039/b807095d.

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Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizikalna kemija II
Course title:	Physical Chemistry II

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja Chemistry/1. Level		2.	poletni Spring

Vrsta predmeta / Course type Obvezni/Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
60			60		120	8

Nosilec predmeta / Lecturer: Urban Bren

Jeziki / **Languages:**		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnovno znanje matematike, fizike in fizikalne kemije	Basic knowledge of mathematics, physics and physical chemistry

Vsebina:	**Content (Syllabus outline):**
• Molekule v gibanju: Kinetičen model plina, Transportne lastnosti idealnega plina, Prevodnost raztopin elektrolitov, Difuzija • Kemijska kinetika: Eksperimentalna kinetika, Mehanizem reakcije, Kinetika kompleksnih reakcij, Reakcije v plinih, Reakcije v tekočinah • Procesi na trdnih površinah: Adsorpcija, Kataliza, Reakcije na površinah	• Molecules in motion: The kinetic model of gases, Transport propoerties of a perfect gas, The conductivities of electrolyte solutions, Diffusion • Chemical kinetics: Experimental kinetics, The reaction mechanism, The kinetics of complex reactions, Gas reactions, Liquid phase reactions • Processes at solid surfaces: Adsorption,

• Laboratorijske vaje: Kalorimetrija, Parni tlak in izparilna entalpija, Viskoznost, Površinska napetost, Parcialna molska prostornina, Krioskopija, Vrelni diagrami, Heterogeno ravnotežje, Galvanski členi, Prevodnost elektrolitov, Transportno število,Kemijska kinetika, Adsorpcija	Catalysis, Reaction at surfaces • Laboratory: Calorimetry, Vapour pressure and Enthalpy of vaporization, Viscosity, Surface tension, Partial molar volume, Cryoskopy, Temperature – composition diagrams, Heterogeneous equilibrium, Electrochemical cells, Conductivity of electrolyte solutions, Transport number, Chemical kinetics, Adsorption

Temeljni literatura in viri / Readings:

- P. W. Atkins, J. de Paula : *Physical Chemistry, 8th Ed*., Oxford University Press, 2006.
- P. W. Atkins, J. de Paula: *Physical Chemistry, 7th Ed*., Oxford University Press, 2002.
- P. W. Atkins: *Physical Chemistry, 6th Ed*., Oxford University Press, 1998.
- Aljana Petek: *Zapiski predavanj* – interno študijsko gradivo (Course notes), 2007.
- Več avtorjev: *Laboratorijske vaje iz fizikalne kemije*, FKKT – UL Ljubljana, 2000.

Cilji in kompetence:	**Objectives and competences:**
Razumeti fizikalni pomen fizikalno-kemijskih zakonitosti in formul ter povezave med njimi in to znati uporabiti pri reševanju enostavnih znanstvenih problemov. Pridobiti osnovne spretnosti za izvedbo in ovrednotenje eksperimentalnih meritev.	Have more insight in the physical meaning of the physicochemical principles and formulas and the links between them and apply these when solving simple scientific problems. Acquiring basic skills to conduct and evaluate experimental measurements.

Predvideni študijski rezultati:	**Intended learning outcomes:**
<u>Znanje in razumevanje:</u> Po zaključku tega predmeta bo študent sposoben: • določiti lastnosti idealnih plinov na osnovi kinetične molekularne teorije; • razumeti, kako izpeljemo iz eksperimentalnih podatkov hitrostne zakone, v kakšni povezavi so hitrostni zakoni in reakcijski mehanizmi in kako teoretično razložimo reakcijsko hitrost. <u>Prenesljive/ključne spretnosti in drugi atributi</u>: Študenti bodo razvili spretnost pisnega komuniciranja, reševanja problemov, kritičnega in logičnega razmišljanja, kot tudi sposobnost	<u>Knowledge and Understanding</u>: On completion of this course the student will be able to: • determine properties if ideal gases using kinetic molecular theory; • understand how rate equations are deduced from experimental data, how rate equations and reaction mechanisms are related and how the reaction rate is interpreted theoretically. <u>Transferable/Key Skills and other attributes</u>: Students will develop written communication skills, problem solving, critical and logicall thinking, as will the ability to study independently.

samostojnega študija.	

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, reševanje problemov, domače naloge, laboratorijske vaje	Classroom lectures, Classroom problem solving sessions, homework assigment, laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so opravljene obveznosti: • računski del izpita • teoretični del izpita • laboratorijske vaje Računski in teoretični del tvorita celoto in se preverjata hkrati. Izpit se lahko nadomesti s sprotnimi testi.	35 35 30	Student passes the examination if s(he) successfully passed all the following obligations: • the calculus part of the exam • the theoretical part of the exam • lab work The calculus and the theoretical part of exam are performed simultaneously. The exam can be replaced with partial exams.

Reference nosilca / Lecturer's references:

1. UDOMMANEETHANAKIT, Thanyarat, RUNGROTMONGKOL, Thanyada, FRECER, Vladimir, SENECI, Pierfausto, STANISLAV, Miertus, BREN, Urban. Drugs against avian influenza A virus : design of novel sulfonate inhibitors of neuraminidase N1. *Current pharmaceutical design*, ISSN 1381-6128, 2014, vol. 20, issue 21, str. 3478-3487. http://www.eurekaselect.com/114879/article, doi: 10.2174/13816128113199990629. [COBISS.SI-ID 5396250], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0, Scopus do 22. 7. 2014: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0]

2. GRAF, Michael, BREN, Urban, HALTRICH, Dietmar, OOSTENBRINK, Chris. Molecular dynamics simulations give insight into D-glucose dioxidation at C [sub] 2 and C [sub] 3 by Agaricus meleagris pyranose dehydrogenase. *Journal of computer-aided molecular design*, ISSN 0920-654X, 2013, vol. 27, iss. 4, str. 295-304, ilustr., doi: 10.1007/s10822-013-9645-7. [COBISS.SI-ID 5218330], [JCR, SNIP, WoS do 4. 6. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2, Scopus do 28. 5. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2]

3. BREN, Urban, OOSTENBRINK, Chris. Cytochrome P450 3A4 inhibition by ketoconazole : tackling the problem of ligand cooperativity using molecular dynamics simulations and free-energy calculations. *Journal of chemical information and modeling*, ISSN 1549-9596. [Print ed.], 2012, vol. 52, issue 6, str. 1573-1582. http://pubs.acs.org/doi/abs/10.1021/ci300118x, doi: 10.1021/ci300118x. [COBISS.SI-ID 4965658], [JCR, SNIP, WoS do 3. 9. 2014: št. citatov (TC): 15, čistih citatov (CI): 13, normirano št. čistih citatov (NC): 10, Scopus do 20. 8. 2014: št. citatov (TC): 15, čistih citatov (CI): 13, normirano št. čistih citatov (NC): 42]

4. BREN, Urban, JANEŽIČ, Dušanka. Individual degrees of freedom and the solvation properties of water. *The Journal of chemical physics*, ISSN 0021-9606, 2012, vol. 137, iss. 2, str. 024108-1-024108-11. http://jcp.aip.org/resource/1/jcpsa6/v137/i2/p024108_s1?isAuthorized=no. [COBISS.SI-ID 5014554], [JCR, SNIP, WoS do 4. 8. 2014: št. citatov (TC): 10, čistih citatov (CI): 9, normirano št. čistih citatov (NC): 4, Scopus do 13. 8. 2014: št. citatov (TC): 12, čistih citatov (CI): 11, normirano št. čistih citatov (NC): 5]

5. BREN, Matevž, JANEŽIČ, Dušanka, BREN, Urban. Microwave catalysis revisited : an analytical solution. *The journal of physical chemistry. A, Molecules, spectroscopy, kinetics, environment, & general theory*, ISSN

1089-5639, 2010, vol. 114, iss. 12, str. 4197-4202, ilustr. [COBISS.SI-ID 1851882], [JCR, SNIP, WoS do 8. 7. 2014: št. citatov (TC): 6, čistih citatov (CI): 5, normirano št. čistih citatov (NC): 3, Scopus do 12. 8. 2014: št. citatov (TC): 6, čistih citatov (CI): 5, normirano št. čistih citatov (NC): 3]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Gradiva
Course title:	Materials Engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja		2	Letni
Chemistry / 1. Level		2	Spring

Vrsta predmeta / Course type Obvezni/Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			30		75	6

Nosilec predmeta / Lecturer: Goršek Andreja

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Potrebna so znanja iz splošne in anorganske kemije, fizike, organske in fizikalne kemije.

Prerequisits:

Knowledge about general and inorganic chemistry, physics, organic and physical chemistry is required.

Vsebina:

Predavanja:
Zgradba **enofaznih** gradiv.
Kristalna zgradba.
Realna zgradba: točkaste, črtaste, ploskovne napake in amorfna gradiva.
Mehanske lastnosti gradiv: elastična in plastična deformacija.
Dinamične lastnosti gradiv: viskoelastičnost, prevodnost, difuzija, dielektričnost in magnetizem.
Ravnotežja v **večfaznih** gradivih.
Enofazne, večfazne mikrostrukture in sestavljena gradiva.
Kinetika faznih transformacij.
Utrjevanje.
Fazne strukture

Content (Syllabus outline):

Lectures:
Structure of **single phase** materials.
Crystal structure.
Real structure: point defects, line defects, surfaces and amorphous materials.
Mechanical properties of materials: elastic and plastic deformation.
Dynamic properties of materials: viscoelasticity, conductivity, diffusion, dielectricity, magnetization.
Multiphase equilibriums.
Single phase, multiphase microstructures and composites.
Kinetics of phase transformations.
Strengthening of materials.
Phase structures.

Laboratorijske vaje: Identifikacija polimerov. Lastnosti plastičnih mas. Hidroliza stekla. Priprava stekla. Metalografska preiskava kovin. Določanje mehanskih lastnosti gradiv.	Laboratory exercises: Identification of polymers. Characteristics of plastic materials. Hydrolysis of glass. Preparation of glass. Metallographic analysis of metals. Determination of mechanical characteristics of materials.

Temeljni literatura in viri / Readings:

- P. Glavič, Gradiva, UM, FKKT, Maribor, 2006.
- A. Goršek, P. Glavič. Laboratorijske vaje iz gradiv, UM FKKT, 2005.
- W. D. Callister, Materials Science and Engineering, 7th Ed., J. Wiley, New York, 2007.
- B. S. Mitchell, An Introduction to Materials Engineering and Science, Wiley-Interscience, Hoboken, 2003.

Cilji in kompetence:	**Objectives and competences:**
Poznavanje zgradbe in lastnosti trdnih gradiv (elementskih, spojinskih in molekulskih kristalov, amorfnih snovi, kompozitov). Pomen napak v lastnostih gradiv. Razumevanje termodinamskih ravnotežij in kinetskih sprememb v večfaznih gradivih. Poznavanje mehanizmov utrjevanja in mehanskega porušenja gradiv.	Structure and properties of solid construction materials (elements, compounds, polymers, glasses, composites). Defects, dislocations, boundaries in materials. Understanding of thermodynamic equilibriums and kinetic transformations in multiphase materials. Understanding strengthening processes and mechanical failure in materials.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • fizika, kemija in ekonomika trdnega stanja materialov za konstruiranje; • povezava zgradbe in lastnosti snovi.: • načrtovanje razvoja in uporaba gradiv; • okoljski vidik in trajnostni razvoj; • izrazje na področju gradiv. Prenosljive/ključne spretnosti in drugi atributi: • uporaba znanja pri načrtovanju proizvodov; • iskanje in uporaba podatkov o gradivih; • sposobnost reševanja praktičnih problemov; • laboratorijske izkušnje z gradivi.	Knowledge and Understanding: • Physics, chemistry and economics of solid state construction materials • Relations between structure and properties • Design and usage of materials • Environmental aspects and sustainability. • Materials science/engineering terminology Transferable/key skills and other attributes: • Knowledge application in design of products • Searching and using data about materials • Practical problem solving skills • Hands on experience from laboratory.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Diskusija o težje razumljivih delih vsebine. Zgledi za računsko reševanje problemov. Pomoč pri reševanju računskih nalog. Pisno testiranje sposobnosti reševanja nalog. Brskanje po internetnih straneh iz gradiv. Veličine, enote, simboli, pretvorniki. Laboratorijsko opredeljevanje gradiv in njihovih lastnosti.	Discussion of more difficult parts of contents. Example problems and solving techniques. Helping students at solving numerical problems. Written test on problem solving skills. Materials science/engineering internet pages search. Quantities, units, symbols, conversion factors. Identification of materials and determination of

	their properties in laboratory.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
- laboratorijsko delo, poročilo in pisni zagovor - reševanje računskih nalog (pisni izpit), - sprotno delo in ustni izpit.	**20** **40** **40**	- laboratory work, report and written test - problem solving skills (written exam) - every day work and oral examination

Reference nosilca / Lecturer's references:

1. PEČAR, Darja, SLEMNIK, Mojca, GORŠEK, Andreja. Testing the corrosion resistance of stainless steels during the fermentation of probiotic drink. *Journal of the Science of Food and Agriculture*, ISSN 0022-5142, May 2011, vol. 91, iss. 7, str. 1293-1297, doi: 10.1002/jsfa.4315. [COBISS.SI-ID 14809622]
2. KRIŽAN, Janja, PETRINIĆ, Irena, GORŠEK, Andreja, SIMONIČ, Marjana. Ultrafiltration of oil-in-water emulsion by using ceramic membrane : Taguchi experimental design approach. *Central European Journal of Chemistry*, ISSN 1895-1066, Feb. 2014, vol. 12, iss. 2, str. 242-249, ilustr., doi: 10.2478/s11532-013-0373-6. [COBISS.SI-ID 17373718]
3. LEŠER, Tadej, GORŠEK, Andreja. Study of enamel frit melting kinetics. *Glass technology*, ISSN 0017-1050, Oct. 2013, vol. 54, no. 5, str. 199-203. [COBISS.SI-ID 17385238]
4. LEŠER, Tadej, GORŠEK, Andreja, ANŽEL, Ivan. Struktura in lastnosti vodno atomiziranih frit = Structure and properties of water atomized frits. V: KRAVANJA, Zdravko (ur.), BOGATAJ, Miloš (ur.), NOVAK-PINTARIČ, Zorka (ur.). *Slovenski kemijski dnevi 2014, Maribor, 11. - 12. september 2014*. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, 2014, str. 1-5, ilustr. [COBISS.SI-ID 18082326].

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Nanokemija in materiali
Course title:	Nanochemistry and materials

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja Chemistry/1. level		2	Poletni Spring

Vrsta predmeta / Course type	Obvezni/Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			30		90	4

Nosilec predmeta / Lecturer:	Mihael Drofenik

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovene
	Vaje / Tutorial:	Slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Zanje slovenskega jezika Končana srednja šola in opravljena matura	Knowledge of the Slovene language Accomplished secondary school with leaving examination

Vsebina:	**Content (Syllabus outline):**
Fizikalno-kemijske lastnosti nanodelcev in tankih plasti. Sodobni postopki, ki omogočajo kontrolirano sintezo nanodelcev in tankih plasti: soobarjanje v mikroemulzijah, sono-kemijski postopek , mehano - kemijski postopek, hidrotermalna sinteza in drugi manj pomembni postopki.	Physical and chemical properties of nanoparticles and thin layers The contemporary methods which enable controlled synthesis of nanopaticles and thin layers: co-precipitation in micro emulsions, sono-chemical synthesis, mechano-chemical syntheses, hydrothermal synthesis and other less important processes.

Stabilizacija suspenzij, nanodelcev v nosilnih tekočinah in tankih plasteh Funkcionalizacija površin nanodelcev z anorganskimi prevlekami ali vezavo organskih molekul na njihovo površino Zgoščevanje nanomaterialov; nanokompozitov in tankih plasti. Sinteza nanokompozitov: z mehanskimi, magnetnimi in električnim lastnostmi. Potencialna uporaba nanokompozitov v tehniki in medicini	The stabilization of nanoparticles in caring liquids and thin layers. Functionalization of nanoparticles surfaces using inorganic coatings and bonding of organic molecules on their surface. Synthesis and properties of nanocomposites, i.e., exhibiting mechanical, magnetic and electric properties The application of nanocomposites in technique and medicine

Temeljni literatura in viri / Readings:

- Claudia Altavilla, Enrico Ciliberto, Inorganic Nanopaticles-Synthesis, Applications and Perspectives CRC press, Taylor and Francis Group, (2011)
- G. Schmid, "Nanoparticles - From Theory to Application" Wiley-VCH, 2004.
- Magnetic Fluids and applications Handbook, Ed. B. Berkovsky, V Bashatvoy, Series of Learning Materials (1996)
- Nanomaterials: synthesis, properties and applications, Ed. A.S. Edelstain, R.C. Cammarata, Institute of Physics Publishing Bristol and Phyladelphia (2002)
- Chris Binns, Introduction to Nanoscience and Nanotecnology, John Willey and Sons (2010)

Cilji in kompetence:	**Objectives and competences:**
Namen predmeta je, da pridobi kandidat osnovno znanje pri razvoju in raziskavah sodobnih nano-materialov za medicino in tehniko. Slušatelji se seznanijo s specifiko v fizikalno-kemijskih lastnostih nanodelcev. Seznanijo se z najpomembnejšimi metodami, ki omogočajo kontrolirano sintezo nanodelcev ter s pomenom nanodelcev pri načrtovanju novih sodobnih materialov. Posebna pozornost je posvečena funkcionaliziciji površin nanodelcev ter procesom, ki omogočajo stabilnost koloidnih suspenzij nanodelcev	The objectives of the subject is to acquire the knowledge which can be used during the development and investigation of contemporary nano-materials for the technique and medicine. Students are introduced to specifics of physical-chemical properties of nanoparticles They learn the most important methods of controlled nanoparticles synthesis and the significance of nanoparticles for advanced material planning. Special attention is given to functionalization of the nanoparticle and to the processes, which enable stability of their colloidal suspensions

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: 1. Razumevanje posebnosti v fizikalno-kemijskih lastnostih nano-materialov . 2. Razumevanje mehanizmov, ki omogočajo kontrolo kemičnih in fizikalnih lastnosti nanodelcev med njihovo sintezo. 3. Poznavanje nekaterih najpogosteje uporabljenih metod za kontrolirano sintezo nanodelcev.	Knowledge and understanding: 1. The student will acquire details of physical-chemical properties of nanoparticles 2. The student will recognize mechanisms which can be used during the synthesis of nanoparticles 3. The student will learn some of the most used methods for the controlled synthesis of the nanoparticles.

4. Poznavanje načinov uravnavanja površinskih lastnosti nanodelcev s funkcionalizacijo njihovih površin. 5. Razumevanje procesov, ki omogočajo pripravo stabilnih suspenzij nanodelcev.	4. The student will learn basic methods used for engineering of the nanoparticles surface functionalization. 5. The student will understand the processes involved during preparation of stable nanoparticles suspensions.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijsko delo	• Lectures • Laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • Vaje (kolokvij) • ustni izpit	 50 50	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: • Lab. Course (written test) • oral exam

Reference nosilca / Lecturer's references:

1. FERK, Gregor, DROFENIK, Mihael, LISJAK, Darja, HAMLER, Anton, JAGLIČIĆ, Zvonko. Synthesis and characterisation of Mg[sub](1+x)Fe[sub](2-2x)Ti[sub]xO[sub]4 nanoparticles with an adjustable Curie point. *Journal of Magnetism and Magnetic Materials*,. 2014, vol. 350, str. 124-128,

2. FERK, Gregor, STERGAR, Janja, DROFENIK, Mihael, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, BAN, Irena. The synthesis and characterization of copper-nickel alloy nanoparticles with a narrow size distribution using sol-gel synthesis. *Materials letters*, 2014, vol. 124, str. 39-42,

3. STERGAR, Janja, FERK, Gregor, BAN, Irena, DROFENIK, Mihael, HAMLER, Anton, JAGODIČ, Marko, MAKOVEC, Darko. The synthesis and characterization of copper-nickel alloy nanoparticles with a therapeutic Curie point using the microemulsion method. *Journal of alloys and compounds*,. 2013, vol. 576, str. 220-226,

4. MERTELJ, Alenka, LISJAK, Darja, DROFENIK, Mihael, ČOPIČ, Martin. Ferromagnetism in suspensions of magnetic platelets in liquid crystal. *Nature*, 2013, vol. 504, no. 7479, str. 237-241

5. DRMOTA, Ana, DROFENIK, Mihael, ŽNIDARŠIČ, Andrej. Synthesis and characterization of nano-crystalline strontium hexaferrite using the co-precipitation and microemulsion methods with nitrate precursors. *Ceramics international*, 2012, vol. 38, issue 2, str. 973-979,

6. LISJAK, Darja, DROFENIK, Mihael. Chemical substitution - an alternative strategy for controlling the particle size of barium ferrite. *Crystal growth & design* 2012, vol. 12, no. 11, str. 5174-5179,

7. LISJAK, Darja, JENUŠ, Petra, DROFENIK, Mihael. Formation of columnar structures by the magnetically directed assembly of cobalt ferrite nanoparticles. *IEEE transactions on magnetics*, 2012, vol. 48, no. 11, str.

3303-3306,
8. MAKOVEC, Darko, PRIMC, Darinka, ŠTURM, Sašo, KODRE, Alojz, HANŽEL, Darko, DROFENIK, Mihael. Structural properties of ultrafine Ba-hexaferrite nanoparticles. *Journal of solid state chemistry*, 2012, vol. 196, str. 63-71.

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Instrumentalna analiza
Course title:	Instrumental analysis

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		2	zimski Autumn
Chemistry/1. Level			

Vrsta predmeta / Course type izbirni predmet / elective course

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			**15**		**120**	**5**

Nosilec predmeta / Lecturer: Mitja Kolar

Jeziki / Languages:
Predavanja / Lectures: slovenski / Slovene
Vaje / Tutorial: slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Potrebno je predhodno osnovno znanje analizne kemije, osnove instrumentalnih metod, fizike in matematike.

Prerequisits:

Basic knowledge of analytical chemistry, basic instrumental methods, physics and mathematics is needed.

Vsebina:

- Principi delovanja osnovnih sklopov v sodobnih instrumentalnih analiznih tehnikah.
- Osnovni principi instrumentalnih metod na področju separacije/detekcije zvrsti in pregled sklopljenih analiznih sistemov.
- Priprava vzorcev-predkoncentracija za določanje sledov.
- Kromatografski sistemi: HPLC-MS, GC-MS, HPLC-ICP-MS, LA-ICP-MS.
- Organokovinski kompleksi – njihov izvor in analitika.
- Separacija in kvantifikacija ostankov zdravil v odpadnih, površinskih in pitnih vodah z izbranimi primeri.
- Kontrola kvalitete in zagotavljanje pravilnosti določitev na področju uporabe instrumentalnih analiznih sistemov.
- Pri laboratorijskih vajah bodo študentje vzorčili, pripravili vzorce in opravili analize na sklopljenem analiznem sistemu.

Content (Syllabus outline):

- Basic operation principles of subsistems used in modern instrumental analytical approaches.
- The concepts of instrumental methods in analytical chemistry and speciation analysis with overview of hyphenated analytical systems.
- Sample preparation-preconcentration for trace analysis.
- Chromatographic systems: HPLC-MS, GC-MS, HPLC-ICP-MS, LA-ICP-MS.
- Organometalloids - occurence and the analysis.
- Separation and quantification of drug resiues in wastewaters, surface waters and tap waters with selected case-studies.
- Quality Control and assuarance in instrumental analytical systems.
- At lab course students will learn about sampling and sample preparation. Details of selected hyphenated analytical system will be presented and analysis performed.

Temeljni literatura in viri / Readings:

Principles of Instrumental Analysis, Skoog, Holler Nieman, Saunders College Publishing, 2012.
Sample preparation for hyphenated analytical techniques, J.M. Rosenfeld (Editor), Blackwell Publishing, Oxford, UK, CRC Press, Boca Raton, FL, USA, 2004.
Hyphenated Techniques in Speciation Analysis, Joanna Szpunar and Ryszard Lobinski, Series editor Roger M. Smith, RSC Series Chromatography Monographs, Springer Berlin / Heidelberg, 2005.

Cilji in kompetence:

Cilj predmeta je seznaniti študente s:
- teoretskimi osnovami in principi sodobnih instrumentalnih analiznih sistemov,
- področji, na katerih je uporaba sklopljenih analiznih sistemov nenadomestljiva (metalomika, identifikacija razgradnih produktov..),
- problematiko kvantifikacije analiznih sistemov (referenčni materiali, certificirani referenčni materiali..),
- vzočenjem ter konzerviranjem vzorcev glede na kočno določitev z različnimi analiznimi sistemi.

Objectives and competences:

<u>Knowledge and Understanding:</u>
- understanding of basic principles of of modern hyphenated analytical systems and their advatages regarding the classical ones,

- interfaces, their operational principles, examples,

- better understanding of the impact of element species on the environment, human health, food safety etc. and their reliable separation-determination.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:	Knowledge and understanding:
Predmet se dopolnjuje s predmeti, ki vsebujejo analitske vsebine (instrumentalne metode, meroslovje, analizni aspekti celostnega razvoja (okolje, hrana, vode), (bio)sinteza spojin in materialov, itd.).	The subject is related to subjects that include analtical chemistry (instrumental methods, metrology, analytical aspects of sustainable development (environment, food, water), (bio)synthesis of molecules and materials etc.).

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja v učilnici, ki je opremljena z osnovnimi avdio-vizualnimi pripomočki. Individualna priprava seminarskih nalog s predstavitvijo in diskusijo. Praktično delo na izbranem analiznem sistemu.	Lectures in lecture room, equipped with basic audio-visual equipment Individual preparation of seminars and their presentation with discussion. Practical work using selected analytical system.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: - laboratorijsko delo in poročilo - pisni izpit:	 25 75	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: - laboratory work and report - writen examination:

Reference nosilca / Lecturer's references:

1. BRGLEZ, Polonca, HOLOBAR, Andrej, PIVEC, Aleksandra, KOLAR, Mitja. Spin-coating for optical-oxigen-sensor preparation = Uporaba spinskega nanosa pri izdelavi optičnih senzorjev za kisik. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], 2014, letn. 48, št. 2, str. 181-188. [COBISS.SI-ID 17746454]

2. JERENEC, Simona, ŠIMIĆ, Mario, SAVNIK, Aleš, PODGORNIK, Aleš, KOLAR, Mitja, TURNŠEK, Marko, KRAJNC, Peter. Glycidyl methacrylate and ethylhexyl acrylate based polyhipe monoliths : morphological, mechanical and chromatographic properties. *Reactive & functional polymers*, ISSN 1381-5148. [Print ed.], 2014, vol. 78, str. 32-37, doi: 10.1016/j.reactfunctpolym.2014.02.011. [COBISS.SI-ID 17661718]

3. BRGLEZ, Polonca, HOLOBAR, Andrej, PIVEC, Aleksandra, BELŠAK, Nataša, KOLAR, Mitja. Determination of oxygen by means of a biogas and gas - interference study using an optical tris (4,7-diphenyl-1,10-phenanthroline) ruthenium(II) dichloride complex sensor. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2012, vol. 59, no. 1, str. 50-58, ilustr. http://acta.chem-soc.si/59/59-1-50.pdf. [COBISS.SI-ID 15889686]

4. ZAJŠEK, Katja, KOLAR, Mitja, GORŠEK, Andreja. Characterisation of the exopolysaccharide kefiran produced by lactic acid bacteria entrapped within natural kefir grains. *International journal of dairy technology*, ISSN 1364-727X, 2011, vol. 64, issue 4, str. 544-548, doi: 10.1111/j.1471-0307.2011.00704.x. [COBISS.SI-ID 15278870]

5. KOLAR, Mitja, DOLIŠKA, Aleš, ŠVEGL, Franc, KALCHER, Kurt. Tungsten - tungsten trioxide electrodes for

the long-term monitoring of corrosion processes in highly alkaline media and concrete-based materials. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2010, vol. 57, no. 4, str. 813-820, graf. prikazi. http://acta.chem-soc.si/57/57-4-813.pdf. [COBISS.SI-ID 14701078]

Univerza v Mariboru

Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Prenos toplote
Course title:	Heat transfer

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija / 1. stopnja UN Chemistry / 1. Level UN		**2.**	Zimski Autumn

Vrsta predmeta / Course type Izbirni/ Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15			15		120	**5**

Nosilec predmeta / Lecturer: Darko Goričanec

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Osnovno znanje kemije, matematike in fizike.

Prerequisits:

Basic knowledge of chemistry, mathematics and physics.

Vsebina:

- Osnovni zakonitosti prenosa toplote
- Termofizikalne lastnosti
- Enodimenzionalni stacionarni prevod
- Naravna konvekcija
- Prisilna konvekcija, notranji in zunanji tok v kanalih
- Uparjanje in kondenzacija
- Sevanje toplote
- Kombinacija uporov prenosa toplote
- Prenosniki toplote
- Enodimenzionalni nestacinarni prenos toplote, vsi upori na površini, oba upora pomembna,

Content (Syllabus outline):

- Basic concepts of heat transfer
- Thermophysical properties
- One – dimensional steady – state conduction
- Natural convection
- Forced convection, internal flow in ducts, external flow
- Boiling and condensation
- Heat radiation
- Combination of heat transfer resistance
- Heat exchangers
- One dimensional unsteady – state heating : all resistance in film, both resistance important, all

vsi upori v telesu • Nestacionarni prenos toplote polneskončnega telesa • Nestacionarni prenos toplote telesa končne velikosti	resistance in conduction through the solid • Un – steady heat transfer of the body with half endless largeness • Un – steady heat transfer of the body with final largeness

Temeljni literatura in viri / Readings:

- J. Krope, L. Lipuš Črepinšek: Prenos toplote, Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, april 2008
- J. Krope, G. Radonjič: Prenos toplote : zbirka problemov z rešitvami. Maribor: Tehniška fakulteta, 1991.
- G. Sam Samdami: Heat Transfer Technologies and Practices, Chemical eng. Staff, 1996
- J. R. Welty, C. E. Wicks, R. E. Wilson, G. L. Rorrer,: Fundamentals of Momentum, Heat and Mass Transfer, 4th edition, John Wiley & Sons, 2000
- D. Pitts: Heat Transfer, 2nd edition, Schaum's Outlines Series, McGraw – Hill, 1998

Cilji in kompetence:	**Objectives and competences:**
• Razumevanje dogajanj v prenosu toplote, zlasti z vidika kemijskega inženirstva. • Razviti sposobnost samostojnega in kreativnega reševanja inženirskih problemov.	• Understanding of phenomena arising in heat transfer from the viewpoint of chemical engineering. • To further develop student's capabilities of independent thinking and creative solutions of engineering problems.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Razumevanje soodvisnosti različnih znanj in postopkov ter pomena uporabe strokovne literature za učinkovito reševanje inženirskih problemov povezanih s prenosom toplote. Prenesljive/ključne spretnosti in drugi atributi: • Z mentorskim reševanjem konkretnih primerov se oblikuje študentova kreativnost, logično razmišljanje. • Avtonomnost v strokovnem in raziskovalnem delu.	Knowledge and Understanding: • Understanding of relationship between different skills and procedures and importance of professional literature for efficient solutions of engineering problems related to heat transfer. Transferable/Key Skills and other attributes: • Solving examples under supervision and hence developing the student's creativity, logical thinking. • Autonomy in professional and research work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• predavanja • laboratorijske vaje • obravnava študijskih primerov	• lectures • laboratory work • coursework

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**

Teoretični in računski del tvorita celoto in se preverjata hkrati. Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • toeretični del • računski del • laboratorijsko in samostojno delo	 30 50 20	The theoretical and the calculus part of exam are performed simultaneously. Student passes the examination if s(he) successfully passed all the following obligations: • Theoretical part • Calculation part • Laboratory and individual work

Reference nosilca / Lecturer's references:

DOBERŠEK, Danijela, GORIČANEC, Darko, KROPE, Jurij. Calibration of pipe networks for district heating using the nonlinear optimisation method. *Int. j. of nonlinear sci. & numer. simul.*, 2006, vol. 7, no. 2, str. 225-228. [COBISS.SI-ID 10350102]
GORIČANEC, Darko, POZEB, Viljem, TOMŠIČ, Ladislav, TROP, Peter. Exploitation of the waste-heat from hydro power plants. Energy, ISSN 0360-5442. [Print ed.], Available online 22 July 2014, str. 1-6,

SORŠAK, Marko, ŽEGARAC LESKOVAR, Vesna, PREMROV, Miroslav, GORIČANEC, Darko, PŠUNDER, Igor. Economical optimization of energy-efficient timber buildings: Case study for single family timber house in Slovenia. Energy, ISSN 0360-5442. [Print ed.], Article in Press 2014, str. 1-9

KROPE, Jurij, GORIČANEC, Darko*. Izdelava računskega modela za kvalitativno določanje izdatnosti ležišč v geotermalnih vrtinah na osnovi temperature karotaže : končno poročilo*. Maribor: Fakulteta za strojništvo, 2005. 29 f., graf. prikazi. [COBISS.SI-ID 9938198]

TORHAČ, Evgen, GORIČANEC, Darko, KROPE, Jurij, TROP, Peter, SALJNIKOV, Aleksandar. *Geothermal gravity heat pipe for exploitation of geothermal energy from unproductive wells : končno poročilo = Geotermalna gravitacijska toplotna cev za izkoriščanje geotermalne energije neproduktivnih vrtin : final report*. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, 2012. 213 str., ilustr. [COBISS.SI-ID 16626966]

Univerza v Mariboru

Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Prenos snovi *(izbirni predmet)*
Course title:	Mass transfer (*elective course)*

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		2.,3.	poletni
Chemistry/1. Level			Spring

Vrsta predmeta / Course type	Izbirni / Elective
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			15		120	**5**

Nosilec predmeta / Lecturer:	Mojca Škerget
Jeziki / Languages: **Predavanja / Lectures:**	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ni	Ni

Vsebina:	**Content (Syllabus outline):**
• Molekularni prenos snovi. Fickov zakon. Metode za izračun difuzivnosti v plinih in kapljevinah. Tipi difuzije v trdnih telesih. • Bilanca mase. Diferencialna masna bilanca za binarni sistem. Posebne oblike diferencialne masne bilance. Podobnosti med dif. enačbami za prenos toplote in snovi. • Stacionarna difuzija. Difuzija skozi mirujočo komponento. Pseudostacionarna difuzija. Binarna ekvimolarna protidifuzija. Difuzija povezana s heterogeno in homogeno reakcijo. Difuzija v padajoči laminarni film tekočine. • Nestacionarna difuzija. Nestacionarna difuzija v polneskončni medij in v končni medij. Analitične rešitve. Uporaba Gurney-Lurijevih diagramov.	• Introduction of flux relationships (Fick's law) • molecular diffusion in gases, liquids, solids • formulation of diffusional mass transfer problems by the differential shell balance method • simple steady-state diffusion models (one and two dimensional), steady-state diffusion with • homogeneous and heterogeneous reaction • unsteady diffusion and application of graphical solutions • convective mass transfer (discussion of the film theory and penetration theory, interfacial • mass transfer and the use of overall mass transfer coefficients, methods for predicting • convective mass transfer coefficients for various

• Prenos snovi s konvekcijo. Snovna prestopnost in snovna prehodnost. • Modeli snovne prestopnosti. Filmska in penetracijska teorija snovne prestopnosti. • Korelacije za snovno prestopnost. Analogija med transportnimi pojavi. Dimenzijska analiza snovnega prenosa. Kriterijska števila. Pomembnejše korelacije za snovno prestopnost. • Dimenzioniranje naprav za snovni prenos. Šaržni in kontinuirni snovni prenos v posodah in v bazenih. Volumetrični koeficient snovne prestopnosti. Snovni prenos v kolonah s polnili. Višina prestopne enote in število prestopnih enot. Analitični in grafični izračun števila prestopnih enot. Vaje: iz izbranih vsebin predmeta	geometries). • the analogies between heat, momentum and mass transfer are discussed Laboratory work: in selected areas of subject.

Temeljni literatura in viri / Readings:

T. Koloini, Heat and Mass Transfer, FKKT Ljubljana, SI, 1999 (in Slovenian).
L. Hines, R. N. Maddox, Mass Transfer, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1985.
J. Geankopolis, Transport Processes and Unit Operations, Allyn and Bacon, Inc., Boston, USA, 1983.
R. S. Brodkey, H. C. Hershey, Transport Phenomena. A unified Approach, McGraw-Hill Book Company, New York, USA, 1988.

Cilji in kompetence:	**Objectives and competences:**
Uvesti študenta v razumevanje prenosa snovi ter ga seznaniti z metodami izračuna naprav za prenos snovi. Predmet je osnova termodifuzijskim operacijam in deloma reaktorskemu inženirstvu. Ob tem si študent razvija predvsem sposobnost analize in matematične formulacije konkretnega problema.	Basic knowledge of the mass transfer enables students to understand transport phenomena in macroscopic separation processes.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Zmožnost reševanja konkretnih problemov povezanih z napravami za prenos snovi. Prenesljive/ključne spretnosti in drugi atributi: Vsebina predmeta je povezana z ostalimi predmeti na smeri Kemijske in biokemijske tehnike in podaja znanja potrebna za razumevanje vsebin , ki so zajeta npr. pri predmetu Termodifuzijska tehnika.	Knowledge and Understanding: Ability to solve concrete problems connected to the mass transfer apparatus. Transferable/Key Skills and other attributes: The subject is connected to other subjects on the direction Chemical and biochemical engineering and gives the knowledge which is necessarry for understanding other subjects such as Thermodiffusional technology.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar, laboratorijske vaje.	Lectures, seminar, laboratory work.

Delež (v %) /

Načini ocenjevanja:	Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: Pisni izpit (ali 2 sprotna testa) Ustni izpit Laboratorijske vaje	 **40** **40** **20**	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: Written exam (or 2 tests) oral examination laboratory work

Reference nosilca / Lecturer's references:

1. ŠKERGET, Mojca, MANDŽUKA, Zoran, AIONICESEI, Elena, KNEZ, Željko, JEŠE, Robi, ZNOJ, Bogdan, VENTURINI, Peter. Solubility and diffusivity of CO2 in carboxylated polyesters. J. supercrit. fluids. [Print ed.], Jan. 2010, vol. 51, iss. 3, str. 306-311. [COBISS.SI-ID 13799446]
2. PERKO, Tina, AIONICESEI, Elena, KNEZ, Željko, ŠKERGET, Mojca. Solubility and diffusivity of CO2 in natural methyl cellulose and sodium carboxymethyl cellulose. J. chem. eng. data, 2011, vol. 56, no. 11, str. 4040-4044. [COBISS.SI-ID 15441430]
3. AIONICESEI, Elena, ŠKERGET, Mojca, KNEZ, Željko. Solubility and diffusivity of CO2 in poly(l-lactide)-hydroxyapatite and poly(d, l-lactide-co-glycolide)-hydroxyapatite composite biomaterials. J. supercrit. fluids. Jan. 2011, vol. 55, iss. 3, str. 1046-1051. [COBISS.SI-ID 14677526]
4. ŠKERGET, Mojca. Formuliranje prašnih lakov z visokotlačnim postopkom : zaključno poročilo o rezultatih raziskovalnega projekta. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, 2011. loč. pag. [COBISS.SI-ID 14953238] (Projekt ARRS)
5. KNEZ, Željko, NOVAK, Zoran, HABULIN, Maja, ŠKERGET, Mojca, SINKOVIČ, Andreja, BRODNJAK-VONČINA, Darinka, VONČINA, Ernest, RIŽNER HRAŠ, Andreja, BERGLEZ, Tone. Superkritični fluidi : zaključno poročilo o rezultatih raziskovalnega centra odličnosti v programskem obdobju 2004-2006. Maribor: Univerza, Fakulteta za kemijo in kemijsko tehnologijo, 2008. 26 f. [COBISS.SI-ID 13084950].
6. KNEZ, Željko, HABULIN, Maja, ŠKERGET, Mojca, NOVAK, Zoran, PRIMOŽIČ, Mateja. Green/clean processing of bioactive materials = Sub Clean Probiomat : EST final acivity report : Marie Curie Actions, (European Commission resarch DG Human Resources and Mobility). Maribor: University of Maribor, 2009. 16 f., graf. prikazi. [COBISS.SI-ID 13475862] (EU projekt)

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Pojavi na površinah
Course title:	Processes at Surfaces

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja Chemistry/1. Level		2., 3.	poletni Spring

Vrsta predmeta / Course type *(izbirni predmet) /(elective course)*

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15			15		120	5

Nosilec predmeta / Lecturer: Regina Fuchs-Godec

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje matematike, fizike in fizikalne kemije	Knowledge of mathematics, physics and physical chemistry

Vsebina:	**Content (Syllabus outline):**
• Splošne lastnosti površin: medfazne meje tekoče-plin, tekoče- tekoče, trdno-tekoče • Termodinamika površin: površinska napetost in površinska prosta energija • Metode za proučevanje trdnih površin • Interakcije trdno-plin, adsorpcija • Kemijska adsorpcija, fizikalna adsorpcija, adsorpcijske izoterme • Filmi na površinah: spontano in kontrolirano nastali filmi na površini • Površine kovin, oksidov, medfazna površina trdno-trdno in trdno-tekoče	• General properties of surfaces: interphases liquid-gas, liquid-liquid, solid-liquid • Thermodynamics of surfaces: surface tension and surface free energy • Methods of studying solid surfaces • Solid-gas interactions, adsorption • Chemical adsorption, physical adsorption, adsorption isotherms • Surface films: spontaneously generated films and films formed under controlled conditions • Surfaces of metals, oxides, solid-solid and solid liquid interfaces

• Dinamika prenosov elektronov • Laboratorijske vaje: Praktični primeri iz posameznih pojavov na površinah.	• Dynamics of electron transfer • Lab work: Practical examples of some specific topics in surface phenomena.

Temeljni literatura in viri / Readings:

- P. W. Atkins, J. de Paula : *Physical Chemistry, 8th Ed*., Oxford University Press, 2006.
- P. W. Atkins, J. de Paula: *Physical Chemistry, 7th Ed*., Oxford University Press, 2002.
- W. Andeson, A. Gast: *Physical Chemistry of Surfaces*, Willey, New York, 1997.
- J.O. Bockris, S.U.M. Khan: *Surface Electrochemistry, A Molecular Level Approach*, Plenum Press, New York and London, 1993.

Cilji in kompetence:	**Objectives and competences:**
Seznaniti z osnovnimi zakonitostmi kemijskega obnašanja površin, s poudarkom na strukturi površin, vezeh, termokemiji in dinamiki obnašanja.	Introduces the student to the basic principles of the chemical behavior of surfaces with emphasis on the fundamental aspects, including surface structure, bonding, thermochemistry and dinamical behavior.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Pojavi na površinah so ključnega pomena v mnogih tehnoloških in naravnih procesih in razumevanje le teh je odločilno npr. za: katalizo, korozijo, transport polutantov v zemlji. Prenesljive/ključne spretnosti in drugi atributi: Študenti bodo razvili spretnost pisnega komuniciranja, reševanja problemov in uporabljanja znanja pri različnih procesih.	Knowledge and Understanding: Surface phenomena are at the heart of many technological and natural processes and understanding of surface event is cruical to: catalysis, corrosion and wear, pollutant transport in soils. Transferable/Key Skills and other attributes: Students will develop written communication skills, problem solving and knowledge application in different processes.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, reševanje problemov, seminarska naloga, laboratorijske vaje.	Lectures, problem sessions, seminar work, lab work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • Ustni izpit	 60 40	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations:

• Seminarska naloga		• Oral examination • Seminar work

Reference nosilca / Lecturer's references:

1. FUCHS-GODEC, Regina, PAVLOVIĆ, Miomir, TOMIĆ, Milorad V. The inhibitive effect of vitamin-C on the corrosive performance of steel in HCl solutions. *International Journal of Electrochemical Science*, ISSN 1452-3981, 2013, vol. 8, str. 1551-1519. http://www.electrochemsci.org/papers/vol8/80101511.pdf. [COBISS.SI-ID 16562966], [JCR, SNIP, WoS do 24. 3. 2014: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 27. 2. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]

2. FUCHS-GODEC, Regina, PAVLOVIĆ, Miomir. Synergistic effect between non-ionic surfactant and halide ions in the forms of inorganic or organic salts for the corrosion inhibition of stainless-steel X4Cr13 in sulphuric acid. *Corrosion science*, ISSN 0010-938X. [Print ed.], May 2012, vol. 58, str. 192-201, doi: 10.1016/j.corsci.2012.01.027. [COBISS.SI-ID 15809558], [JCR, SNIP, WoS do 6. 8. 2014: št. citatov (TC): 13, čistih citatov (CI): 13, normirano št. čistih citatov (NC): 16, Scopus do 17. 9. 2014: št. citatov (TC): 13, čistih citatov (CI): 13, normirano št. čistih citatov (NC): 16]

3. FUCHS-GODEC, Regina. The erosion-corrosion inhibition of AISI 431 martensitic stainless steel in 2.0 M H2SO4 solution using N-alkyl quaternary ammonium salts as inhibitors. *Industrial & engineering chemistry research*, ISSN 0888-5885. [Print ed.], 2010, vol. 49, no. 14, str. 6407-6415, doi: 10.1021/ie100275a. [COBISS.SI-ID 14191894], [JCR,

4. FUCHS-GODEC, Regina, DOLEČEK, Valter. Determination of the critical pitting temperature and the critical ion (Cl-) concentration inducing pitting of AISI 304L stainless steel in 0.5 M H2SO4. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2004, 51, 3, str. 495-506. [COBISS.SI-ID 9011734], [JCR, SNIP, WoS do 12. 7. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2, Scopus do 3. 5. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Termodinamika
Course title:	Thermodynamics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		3	zimski
Chemistry/1. Level		3	Autumn

Vrsta predmeta / Course type: Obvezni/Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer: Mojca Škerget

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Osnovno znanje matematike, fizike in fizikalne kemije

Prerequisits:

Basic knowledge of mathematics, physics and physical chemistry

Vsebina:

Predavanja

- Prvi zakon termodinamike in drugi osnovni koncepti
- Volumetrične lastnosti čistih fluidov
- Toplotni efekti
- Drugi zakon termodinamike
- Termodinamske lastnosti fluidov
- Uporaba termodinamike v pretočnih procesih
- Ravno težje para/tekoče: Uvod
- Termodinamika raztopin: Teorija
- Termodinamika raztopin: Uporaba
- Kemijsko reakcijsko ravnotežje
- Obravnava primerov iz faznih ravnoteži

Laboratorijske vaje

Content (Syllabus outline):

Lectures

- First law of thermodynamics and other basic concepts
- Volumetric properties of pure fluids
- Heat effects
- The second law of thermodynamics
- Thermodynamic properties of fluids
- Application of thermodynamics to flow processes
- Vapor/liquid equilibrium: Introduction
- Solution thermodynamics: Theory
- Solution thermodynamics: Application
- Chemical-reaction equilibria
- Topics in phase equilibria

Laboratory work

• Ravnotežje para/tekoče • Ravnotežje tekoče/tekoče • Kalorimetrija • Parcialne molske količine	• Vapor/liquid equilibrium • Liquid/liquid equilibrium • Calorimetry • Partial molar quantities

Temeljni literatura in viri / Readings:

- J. M. Smith, H. C. Van Ness, M. M. Abbott: *Introduction to Chemical Engineering Thermodynamics*, McGraw-Hill Companies, 7th ed., 2005, 6th ed., 2001, 5th ed., 1996.
- J. M. Smith, H. C. Van Ness: *Introduction to Chemical Engineering Thermodynamics*, McGraw-Hill Book Companny, 4th ed., 1987.
- A. Petek: *Laboratorijske vaje iz termodinamike*, (skripta), Maribor, 2007

Cilji in kompetence:	**Objectives and competences:**
Uporaba termodinamskih izračunov za industrijske procese, s poudarkom na pretočnih sistemih in faznem ravnotežju. Splošne metode, enačbe stanja, aktivnostni modeli in drugi termodinamski modeli, potrebni za kvantitativno obravnavo praktičnih fiziko-kemijskih sistemov.	Application of thermodynamic calculation to industrial processes, with emphasis on flow systems and phase equilibria. Generalized methods, equations of state, activity models and other thermodynamic models, needed for quantitative treatment practical chemical-physical processes.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben • razumeti osnove kemijske termodinamike: osnovnih zakonov, lastnosti realnih fluidov; • spoznati enačbe stanja za čiste in več snovne sisteme, modele za mešanice, ugotavljanje fugativnostnih in aktivnostnih koeficientov; • spoznati večkomponentna fazna ravnotežja in kemijska ravnotežja; • obvladal v veliki meri termodinamske izračune za kemijske sisteme. Prenesljive/ključne spretnosti in drugi atributi: Spretnosti komuniciranja, predvsem sposobnost zbiranja potrebnih informacij za termodinamske izračune. Reševanje termodinamskih problemov, od enostavnejših do bolj zapletenih.	Knowledge and Understanding: On completion of this course the student will be able to • understand the basic of chemical thermo-dynamics: basic laws, properties of real fluids; • recognize equations of state for pure and multicomponent systems, recognize models for mixtures, determinate fugacity and activity coefficients; • recognize multicomponent phase equilibria and chemical equilibria; • govern in a great extent thermodynamic calculations for chemical systems. Transferable/Key Skills and other attributes: Communication skills, preferable the capability of collecting needed information's for thermodynamic calculations. Solution of thermodynamical problems, simple and more sophisticated.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Reševanje računskih nalog • Laboratorijske vaje	• Lectures • Problems solving • Lab work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Student passes the examination if s(he) successfully passed all the following obligations:
<u>Ocenjevanje predmeta</u> • Računske naloge • Pisni izpit (ali 2 sprotna testa) • Laboratorijske vaje	15 60 25	<u>Assesment of the subject</u> • Solving problems • Written exam (or two tests) • Lab work

Reference nosilca / Lecturer's references:

1. ŠKERGET, Mojca, ČUČEK, Denis, KNEZ, Željko. Phase equilibria of the propylene glycol/CO2 and propylene glycol/ethanol/CO2 systems. The Journal of supercritical fluids, ISSN 0896-8446. [Print ed.], Nov. 2014, vol. 95, str. 129-136, [COBISS.SI-ID 18135574].
2. KNEZ HRNČIČ, Maša, MARKOČIČ, Elena, TRUPEJ, Nina, ŠKERGET, Mojca, KNEZ, Željko. Investigation of thermodynamic properties of the binary system polyethylene glycol/CO2 using new methods. The Journal of supercritical fluids, ISSN 0896-8446. [Print ed.], Mar. 2014, vol. 87, str. 50-58, [COBISS.SI-ID 17563414].
3. ČUČEK, Denis, KNEZ, Željko, ŠKERGET, Mojca. Determination of vapor-liquid equilibria of the binary system of sub- and supercritical CO2 and diethyl fumarate. Journal of chemical and engineering data, ISSN 0021-9568, 2014, vol. 59, no. 5, str. 1528-1532, [COBISS.SI-ID 17747222].
4. ŠKERGET, Mojca, KNEZ, Željko, KNEZ HRNČIČ, Maša. Solubility of solids in sub- and supercritical fluids : a review. Journal of chemical and engineering data, ISSN 0021-9568, 2011, vol. 56, no. 4, str. 694-719, [COBISS.SI-ID 14935830].
5. MARKOČIČ, Elena, ŠKERGET, Mojca, KNEZ, Željko. Mathematical modelling of the solubility of supercritical CO2 in poly(l-lactide) and poly(d, l-lactide-co-glycolide). The Journal of supercritical fluids, ISSN 0896-8446. [Print ed.], okt. 2009, vol. 50, iss. 3, str. 320-326, [COBISS.SI-ID 13560342].

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Organska sinteza
Course title:	Organic synthesis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		3.	zimski
Chemistry/1. Level		3.	Autumn

Vrsta predmeta / Course type	Obvezni / obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		**15**	**15**		**105**	**6**

Nosilec predmeta / Lecturer:	Jernej Iskra

Jeziki / Languages:	**Predavanja / Lectures:**	**slovenski / Slovene**
	Vaje / Tutorial:	**slovenski / Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje iz splošne in organske kemije; obvladovanje osnovnih eksperimentalnih postopkov.	Knowledge of general and organic chemistry; proficiency with basic experimental procedures.

Vsebina:	**Content (Syllabus outline):**
Načrtovanje organskih sintez s termičnimi metodami. Retrosintetska analiza, sintoni. Primeri najpogostejših sinteznih metod v organski kemiji. Laboratorijske vaje: Sintezne metode, delo pod inertno atmosfero.	Planning of organic synthesis via thermal methods. Retrosynthetic analysis, sintons. Cases of most used synthetic methods in organic chemistry. Experimental course: Synthetic methods, work under inert atmosphere.

Temeljni literatura in viri / Readings:

Warren S., Organic Synthesis: The Disconnection Approach, Wiley 1984.
Warren S., Wyatt P., Organic Synthesis: Strategy and Control, Wiley , 2007.
M. B. Smith, J. March, March's Advanced Organic Chemistry, Wiley, 2007.

Cilji in kompetence:	**Objectives and competences:**
Spoznati metodo retrosintetske analize. Biti sposoben načrtovati sintezo organskih molekul iz preprostejših prekurzorjev.	To know: The method of retrosynthetic approach to organic synthesis. To be abble to plan the synthesis of organic molecules from less complex molecules.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent zna uporabljati metodo retrosintetske analize v namene načrtovanja organskih sintez. Študent se spozna z naprednejšimi metodami sinteze v laboratoriju. Prenesljive/ključne spretnosti in drugi atributi: Načrtovanje organskih sintez.	Knowledge and understanding: Student can use the method of retrosynthetic analysis (disconnection approach) for the planning of organic molecule synthesis. Student becomes familiar with advanced synthesis techniques in the laboratory. Transferable/Key Skills and other attributes: Planing of organic synthesis.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske vaje, laboratorijske vaje	Lectures, seminar tutorial, laboratory experiments

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: Pisni izpit Lab. vaje	 80 20	Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: Written exam Exp. course

Reference nosilca / Lecturer's references:

Leon Bedrač, **Jernej Iskra**, *Iodine(I) reagents in hydrochloric acid-catalyzed oxidative iodination of aromatic compounds by hydrogen peroxide and iodine*, ***Adv. Synth. Catal.***, **2013**, *355*, 1243-1248.

Ajda Podgoršek, Marko Zupan, Jernej Iskra, *Oxidative halogenation with "green" oxidants : oxygen and*

hydrogen peroxide, ***Angew. Chem. Int. Ed***., **2009**, *48*, 8424-8450.

Ajda Podgoršek, Marco Eissen, Jens Fleckenstein, Stojan Stavber, Marko Zupan, **Jernej Iskra**, *Selective aerobic oxidative dibromination of alkenes with aqueous HBr and sodium nitrite as a catalyst*, ***Green Chem***., **2009**, *11*, 120-126.

Katja Žmitek, Stojan Stavber, Marko Zupan, **Jernej Iskra**. *The effect of iodine on the peroxidation of carbonyl compounds*, ***J. Org. Chem***., **2007**, *72*, 6534-6540.

Katja Žmitek, Stojan Stavber, Marko Zupan, Daniele Bonnet-Delpon, Sebastien Charneau, Phillipe Grellier, **Jernej Iskra**, *Synthesis and antimalarial activities of novel 3,3,6,6-tetraalkyl-1,2,4,5-tetraoxanes,* ***Bioorg. Med. Chem***., **2006**, 14, 7790-7795.

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Biokemija in uvod v vede o življenju
Course title:	Biochemistry and introduction to life sciences

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		**3**	zimski
Chemistry/1. Level		**3**	Autmn

Vrsta predmeta / Course type Obvezni / Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			**30**		**75**	**5**

Nosilec predmeta / Lecturer: Uroš Potočnik

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Ni.

Prerequisits:

None.

Vsebina:

- Zgradba celice: razlike med prokarionti in evkarionti Osnove kemične zgradbe in termodinamika bioloških molekul, biološke molekule v vodi
- Pomen sekvenciranja humanega genoma in genomov ostalih organizmov
- Proteini: aminokisline, peptidi, tridimenzionalna zgradba, biološka vloga,Encimi
- Ogljikovi hidrati: zgradba in biološka vloga
- Lipidi: zgradba in biološka vloga, biološke membrane, transport
- Temelji celičnega metabolizma in bioenergetika,
- Osnove mikrobiologije

Content (Syllabus outline):

- Cell structure: difference between prokaryotes and eukaryotes
- Impact of sequencing of human genome and other genomes
- Biochemistry: From Atoms to Molecules to Cells, Biomolecules in Water
- Proteins: Amino Acids, Peptides, and Proteins, : Protein Architecture and Biological Function,Enzymes
- Carbohydrates: Structure and Biological Function
- Lipids: Structure and Biological Function, Biological Membranes and Cellular Transport
- Basic Concepts of Cellular Metabolism and Bioenergetics,

- DNA struktura in lastnosti, replikacija (prokarionti, eukarionti), rekombinacija DNA, DNA popravljalni mehanizmi, DNA mutacije, struktura kromosomov
- RNA struktura in lastnosti, vrste RNA molekul in funkcije, transkripcija (prokarionti, eukarionti), postranskripcijske modifikacije
- Struktura proteinov, sinteza proteinov, posttranslacijske modifikacije proteinov, zvijanje proteinov, transport proteinov, Regulacija proteinske sinteze:
- Osnove dedovanja in molekularne genetike

Laboratorijsko delo:

- Kvalitativno določanje ogljikovih hidratov
- Kolorimetrične reakcije za določanje prisotnosti sladkorjev, Molisheva reakcija, Antronska reakcija, Benedictova reakcija. Inverzija saharoze.
- Ekstrakcija lipidov in dokaz prisotnosti holesterola
- Homogenizacija, ekstrakcija, Lieberman Buchardova reakcija za določanje prisotnosti holesterola.Ločevanje proteinov z gelsko filtracijo
- Afinitetna kromatografija
- Osnovne mikrobiološke tehnike: priprava gojišč, barvanje po gramu

- Basics of microbiology
- DNA structure and characteristics, replication (prokaryotes, eukaryotes), recombination, repair and mutations,, structure and function of genes and chromosomes,
- RNA structure characteristics: role of different types of RNA, transcription (prokaryotes, eukaryotes), post transcription modification
- Protein structures, synthesis of proteins, translation, posttranslational modifications, protein folding, protein trafficking,Regulation of protein synthesis
- Basics of heredity and molecular genetics

Laboratory work:

- Determination of carbohydrates.
- Colorimetric reactions for determination of carbohydrate. Molisch, Anthrone, Benedict's. Sucrose Invesrion.
- Lipid extraction and determination of cholesterol.
- Homogenisation, extraction. Lienerman Buchard reaction for cholesterol determination
- Gel filtration for protein separation
- Affinity chromatography

Basic microbiology techniques: grow medium preparation, bacterial staining according to Gram

Temeljni literatura in viri / Readings:

1. Boyer, Rodney F.: Concepts in biochemistry, 3rd ed., J. Wiley & Sons, Hoboken , 2006
2. D.E. Nelson, M.M. Cox, Lehninger Principles of Biochemistry, 6th Ed. W.H. Freeman & Co., New York, 2013.
3. B. ALBERTS et al.: Molecular biology of the cell., 5th Ed., Gerland Publish, Inc., New York, 2007
4. LODISH H., Baltimore D., Berk A., Zipursky S.L., Matsudaira P., Darnell J.: Molecular Cell Biology, 7th Ed., Scientific American Books, Freeman and Co., New York, 2012

Cilji in kompetence:

Predmet bo nudil študentom osnovno razumevanje in celostni pristop k osnovnim molekularnim procesom v celici, tkivih, organih in celotnem organizmu. Povdarek bo na prenosu DNA informacije za sintezo proteinov.

Objectives and competences:

Students will understand basic molecular mechanisms in the cell, how cells are organized in tissues, organs and whole organisms. The focus will be on transfer of genomic information to synthesis of proteins.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:	Knowledge and understanding:
• osnovne biokemijske in molekularne procese v celici	• basic biochemical and molecular processes in the cell

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje	• Lectures • Laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če sta pozitivno opravljeni naslednji obveznosti:		Type (examination, oral, coursework, project): Student has to pass successfully the following obligations:
pisni izpit	60	writen exemination
ustni izpit	30	oral exemination
laboratorijske vaje	10	laboratory work

Reference nosilca / Lecturer's references:

1. JOSTINS, Luke, MITROVIČ, Mitja, POTOČNIK, Uroš. Host-microbe interactions have shaped the genetic architecture of inflammatorybowel disease. Nature (Lond.), 2012, vol. 491, no. 7422, str. 119-124, doi: 10.1038/nature11582. [COBISS.SI-ID 512230968],
2.PERIN, Petra, POTOČNIK, Uroš. Polymorphisms in recent GWA identified asthma genes CA10, SGK493, and CTNNA3 are associated with disease severity and treatment response in childhood asthma. Immunogenetics, ISSN 0093-7711, 2014, vol. 66, issue 3, str. 143-151, doi: 10.1007/s00251-013-0755-0. [COBISS.SI-ID 17472790
3. RIVAS, Manuel A, MITROVIČ, Mitja, POTOČNIK, Uroš. Deep resequencing of GWAS loci identifies independent rare variants associated with inflammatory bowel disease. Nat Genet, 2011, vol. 43, no. 11, str. 1066-1073, doi: 10.1038/ng.952. [COBISS.SI-ID 15421974],
4.BERCE, Vojko, PINTO KOZMUS, Carina, POTOČNIK, Uroš. Association among ORMDL3 gene expression, 17q21 polymorphism and response to treatment with inhaled corticosteroids in children with asthma. Pharmacogenomics j. (Print), Dec. 2013, vol. 13, iss. 6.
http://www.nature.com/tpj/journal/vaop/ncurrent/full/tpj201236a.html, doi: 10.1038/tpj.2012.36. [COBISS.SI-ID 4406079].
5. REPNIK, Katja, POTOČNIK, Uroš. Haplotype in the IBD5 region is associated with refractory Crohn's disease in Slovenian patients and modulates expression of the SLC22A5 gene. J Gastroenterol, 2011, vol. 46, no. 9, str. 1081-1091, doi: 10.1007/s00535-011-0426-6. [COBISS.SI-ID 15110422].

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Separacijska tehnika
Course title:	Separation Processes

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja Chemistry/1. Level		3.	zimski Autumn

Vrsta predmeta / Course type	Obvezni/Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
30			30		90	5

Nosilec predmeta / Lecturer:	Željko Knez

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Predmet je povezan s fiziko in zahteva predznanje matematike.	The subject is connected with physics and knowledge of mathematics is needed

Vsebina:	**Content (Syllabus outline):**
• Mehanske operacije: - drobljenje in mletje, lasiranje, sortiranje: - sejanje, - magnetno, - po gostoti, - v električnem polju, - flotacija, - filtracija, - membranske operacije, - mešanje. • Termične in difuzijske operacije: uparjanje, kristalizacija, destilacija-rektifikacija, osnove	• Unit operations: - size reduction of solids - magnetic separation - sieving, - flotation, - filtration, - membrane separation, - centrifugation, - emulsifying, - mixing, • Thermal separation processes: evaporation, crystallization, distillation, extraction processes,

ekstrakcijskih procesov, sušenje. Laboratorijske vaje: Mletje s krogličnim mlinom in določitev porazdelitve mas s sejalnimi metodami (Sejalna analiza), filtriranje s poizkusno filterno ploščo, mešanje, ultrafiltracija, ekstrakcija, kristalizacija, sušenje, destilacija z vodno paro, diferencialna destilacija, dializa poizkusno filterno ploščo, mešanje, ultrafiltracija, ekstrakcija, kristalizacija, sušenje, destilacija z vodno paro, diferencialna destilacija, dializa	drying, Laboratory work: Grinding with ball-bearing mill and mass distribution determination with sowing methods, Filtration with filter plate, mixing, Ultrafiltration, Extraction, Crystallization, Drying, Distillation with water steam, Differential distillation, Dialysis Grinding with ball-bearing mill and mass distribution determination with sowing methods, Filtration with filter plate, mixing, Ultrafiltration, Extraction, Crystallization, Drying, Distillation with water steam, Differential distillation, Dialysis

Temeljni literatura in viri / Readings:

1. Christie J. Geankoplis, Transport Processes and Separation Process Principles: Includes Unit Operations, Prentice Hall, New Jersey, 2003.
2. Richard G. Griskey, Transport Phenomena and Unit Operations: A Combined Approach, Wiley, New York, 2002.
3. Warren L. McCabe, Julian Smith, Peter Harriott, Unit Operations of Chemical Engineering, McGraw Hill, 2005.
4. V. Ozim, Ž. Knez: Mehanska procesna tehnika, FKKT (1995).
5. Ž. Knez, M. Škerget, Termodifuzijska tehnika, FKKT UM (1999).
6. Ž. Knez, M. Habulin, V. Ozim, Navodila za vaje iz analize procesov in mehanske tehnike (zbrano gradivo), FKKT, UM, 1997.

Cilji in kompetence:	**Objectives and competences:**
Predmet obravnava uvod v kemijsko tehniko, industrijsko stehiometrijo ter materialne in energetske bilance kemijskih sistemov	Basic knowledge of the more important unit operations (mainly physical in nature) as well as thermal separation processes used in chemical and process industries enables students to understand industrial technological processes

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Zmožnost načrtovanja ekstrakcijskega ali drugega sistema. Uporaba ustreznih mehanskih, termičnih in difuzijskih operacij v povezavi z analizo določenega procesa.	Knowledge and Understanding: Design of extraction or other systems. Application of mechanical, thermal or diffusional operation for a defined process analysis.

Prenesljive/ključne spretnosti in drugi atributi:	Transferable/Key Skills and other attributes:
Vsebina predmeta je povezana z ostalimi predmeti na smeri Kemijske tehnike.	The subject is connected to other subjects on the direction Chemical engineering.

Metode poučevanja in učenja:	**Learning and teaching methods:**
– Predavanja – Laboratorijske vaje	– Lectures – Lab work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Student passes the examination if s(he) successfully passed all the following obligations:
Ustni izpit		
Pisni izpit	30	Oral examination
Laboratorijske vaje	60	Written examination
	10	Laboratory work

Reference nosilca / Lecturer's references:

KRAMBERGER, Boris, MARKOČIČ, Elena, KNEZ, Željko. Phase equilibria of binary mixture of carbon monoxide and water at elevated temperatures and pressures. *Chemical Engineering Science*, ISSN 0009-2509. [Print ed.], Aug. 2013, vol. 99, str. 77-80, doi: 10.1016/j.ces.2013.05.048.

KNEZ HRNČIČ, Maša, VENDERBOSCH, Robbie H., ŠKERGET, Mojca, KNEZ, Željko. Observation of phase behavior for bio-oil + diesel + carbon dioxide and bio-oil + tail water + carbon dioxide system. *Journal of chemical and engineering data*, ISSN 0021-9568, 2013, vol. 58, no. 3, str. 648-652, doi: 10.1021/je301146g.

KNEZ, Željko, ILIĆ, Ljiljana, ŠKERGET, Mojca, KOTNIK, Petra. High-pressure solubility data for palm oil-SF6 and coconut oil-SF6 systems. *Journal of chemical and engineering data*, ISSN 0021-9568, 2010, vol. 55, no. 12, str. 5829-5833, doi: 10.1021/je100782c.

KNEZ, Željko, ŠKERGET, Mojca, MANDŽUKA, Zoran. Determination of S-L phase transitions under gas pressure. *The Journal of supercritical fluids*, ISSN 0896-8446. [Print ed.], Dec. 2010, vol. 55, iss. 2, str. 648-652, doi: 10.1016/j.supflu.2010.09.016.

KNEZ, Željko, MARKOČIČ, Elena, NOVAK, Zoran, KNEZ HRNČIČ, Maša. Processing polymeric biomaterials using supercritical CO[sub]2. *Chemie Ingenieur Technik*, ISSN 0009-286X, 2011, vol. 83, no. 9, str. 1371-1380.

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Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Kemijska reakcijska tehnika I
Course title:	Chemical reaction engineering I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		3.	Zimski
Chemistry/1. Level		3.	Autumn

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer:	Goršek Andreja

Jeziki / Languages:	**Predavanja / Lectures:**	**Slovenski/Slovene**
	Vaje / Tutorial:	**Slovenski/Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Potrebna so znanja iz matematike, fizikalne kemije in prenosa snovi.	Knowledge about mathematics, physical chemistry and mass transfer is required.

Vsebina:	**Content (Syllabus outline):**
Predavanja: **Homogene reakcije.** Kinetika homogenih reakcij. Uvod v načrtovanje reaktorjev. Idealni reaktorji za enostavne reakcije: šaržni, cevni, mešalni, obtočni, kaskadni. Reaktorji za sestavljene reakcije: vzporedne, zaporedne, obojesmerne, kombinirane. Vpliv temperature in tlaka. Izbira pravega reaktorja. Neidealnost toka, multiparametrični modeli. Mešanje fluidov.	**Lectures:** **Homogeneous Reactions**. Kinetics of homogeneous reactions. Introduction to reactor design. Ideal reactors for single reactions: batch, plug-flow, mixed-flow, recycle reactors, mixed-reactors in series. Reactors for multiple reactions: parallel, in series, reversible, series-parallel. Temperature and pressure effects Choice of the right kind of reactor Non-ideal flow, compartment models. Mixing of fluids.

Vaje: Značilnosti idealnih reaktorjev (kinetika, vrsta toka). Določanje porazdelitve bivalnih časov in presnove.	Laboratory: Characteristics of ideal reactors (kinetics, flow patterns). Determination of retention time distribution and conversion.

Temeljni literatura in viri / Readings:

- P. Glavič, Kemijska reakcijska tehnika, zbirka nalog z navodili in rešitvami, UM FKKT, Maribor, 2007.
- M. Krajnc, Reakcijska tehnika, Laboratorijske vaje : navodila za delo, UM FKKT, 2005.
- O. Levenspiel, Chemical Reaction Engineering, 3rd Ed., John Wiley and Sons, New York, 1999.
- H. Scott Fogler, Elements of Chemical Reaction Engineering, Prentice-Hall, London, 2005.
- A. Pintar, Kemijsko reakcijsko inženirstvo, Zbirka rešenih nalog, Ljubljana, Kemijski inštitut, 2012

Cilji in kompetence:	**Objectives and competences:**
Pri predmetu študent spozna osnove kemijske tehniške kinetike in na teh temeljih osvoji tehnike načrtovanja idealnih reaktorjev in v nadaljevanju še reaktorjev za sestavljene reakcije. Seznani se z neidealnim tokom in metodami za njegovo določanje. Na osnovi pridobljenega znanja študent zna izbrati pravi reaktor.	The course is concerned with the fundamentals of chemical engineering kinetics together with the ideal and multiple reactions design. Basics of non-ideal flow and methods for its determination are also included. Based on the first part of the course the student is able to choose the right reactor.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent spozna osnovni pristop k problemu: kateri so potrebni podatki za njegovo rešitev, kako jih pridobiti, kako med več možnostmi izbrati realen načrt. **Prenesljive/ključne spretnosti in drugi atributi:** Načrtovanje in primerjava osnovnih tipov reaktorjev z namenom industrijskega načrtovanja in optimiranja. Ugotavljanje neidealnosti.	**Knowledge and understanding:** Student learns how to face with the problem: what data are needed to attack the problem, how to obtain them and how to select a reasonable design from the many alternatives. **Transferable/key skills and other attributes:** Design and comparison of the major reactor types with the aim of industrial design and optimization. Determination of non-idealities.

Metode poučevanja in učenja:	**Learning and teaching methods:**

Aktivno poučevanje in učenje. Domače naloge iz načrtovanja reaktorjev. Pisno testiranje sposobnosti reševanja nalog. Skupinsko laboratorijsko delo. Pisanje in oddaja poročila. Laboratorijsko preučevanje reakcij, reaktorjev in neidelanega toka.	Active teaching and learning. Homework: problem solving and design. Written test on problem solving skills. Team work in laboratory Writing a report. Hands-on work in reaction kinetics, reactor operation and nonideal flow in laboratory.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
- laboratorijske vaje - pisni izpit (reševanje problemov) - sprotno delo in ustni izpit	**20** **40** **40**	- laboratory - writen exam (problem solving) - every day work and oral exam

Reference nosilca / Lecturer's references:

1. PEČAR, Darja, GORŠEK, Andreja. Oxidation of menthol : reaction-rate determination based on thermodynamic profiles. *Chemical engineering communications*, ISSN 0098-6445, 2014, vol. 201, iss. 11, str. 1548-1554. http://www.tandfonline.com/doi/full/10.1080/00986445.2013.819353#.U6E-jU-KDq4. [COBISS.SI-ID 17918998]

2. VNUČEC, Doroteja, GORŠEK, Andreja, KUTNAR, Andreja, MIKULJAN, Marica. A new method of physical modification of soy proteins for wood adhesives. V: *International conference on wood adhesives : 9-11 october, 2013, Toronto, Ontario, Canada*. [Madison]: Forest Products Society, 2014, str. 570-576, ilustr. [COBISS.SI-ID 1536529092]

3. LEŠER, Tadej, GORŠEK, Andreja. Study of enamel frit melting kinetics. *Glass technology*, ISSN 0017-1050, Oct. 2013, vol. 54, no. 5, str. 199-203. [COBISS.SI-ID 17385238]

4. PEČAR, Darja, KOLAR, Mitja, GORŠEK, Andreja. Kinetično modeliranje nastajanja CO2 med fermentacijo kefirja. V: KRAVANJA, Zdravko (ur.), BRODNJAK-VONČINA, Darinka (ur.), BOGATAJ, Miloš (ur.). *Slovenski kemijski dnevi 2013, Maribor, 10.-12. september 2013*. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, 2013, str. 1-8. [COBISS.SI-ID 17148950]

5. ZAJŠEK, Katja, GORŠEK, Andreja, KOLAR, Mitja. Cultivating conditions effects on kefiran production by the mixed culture of lactic acid bacteria imbedded within kefir grains. *Food chemistry*, ISSN 0308-8146. [Print ed.], Jan. 2013, vol. 139, iss. 1-4, str. 970-977, doi: 10.1016/j.foodchem.2012.11.142. [COBISS.SI-ID 16645142]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Organska analiza
Course title:	Organic analysis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		3.	poletni
Chemistry/1. Level		3.	Spring

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15		15			90	4

Nosilec predmeta / Lecturer:	Jernej Iskra

Jeziki / Languages:	**Predavanja / Lectures:**	**slovenski / Slovene**
	Vaje / Tutorial:	**slovenski / Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne in organske kemije. Znanje osnovne analizne kemije.	Knowledge of general, organic chemistry. Basics of analytical chemistry.

Vsebina:	**Content (Syllabus outline):**
Kemijske metode določanja organskih spojin. Uvod v tehniko nuklearne magnetne resonance. Protonska NMR tehnika. Metode reševanja spektrov. Infrardeča spektroskopija- teoretske osnove. Masna spektroskopija organskih spojin- teorija Masna spektroskopija organskih spojin- fragmentacije. Kombinacije NMR, IR in MS metod za določitev strukture organske spojine.	Chemical methods of organic compounds structure determination. Introduction into nuclear magnetic resonance. Proton NMR technique. Methods for spectra representation. Infrared spectroscopy- theory behind it. Mass spectroscopy of organic compounds- theory. Mass spectroscopy of organic compounds- fragmentations. Combinations of NMR, IR and MS methods for the determination of structure of organic compounds.

Temeljni literatura in viri / Readings:

R. M. Silverstein, F. X. Webster, D. Kiemle, Spectrometric Identification of Organic Compounds, 7th Ed., Wiley, 2005.
L. D. Field, S. Sternhell, J. R. Kalman, Organic Structures from Spectra, 5th Ed., Wiley, 2013.

Cilji in kompetence:	**Objectives and competences:**
Spoznati klasične kemijske metode za določanje strukture organskih spojin. Spoznati metodo protonske NMR spektroskopije; znati rešiti preproste spektre organskih spojin. Razumeti pojem kemijske ekvivalence, kemijskega premika in sklopitve. Poznati princip infrardeče spektroskopije. Znati interpretirati infrardeči spekter organske spojine s pomočjo tabel za energijske absorpcije. Poznati metodo masne spektroskopije in osnovne fragmentacije organskih spojin.	To know: clasical chemical methods for organic compounds structure determination. The method of proton NMR spectroscopy. The principle of infrared spectroscopy. The method of mass spectroscopy of organic compounds. To understand: how to interpret simple H NMR spectra. The meaning of chemical equivalency, chemical shift and coupling. To interpret infrared spectra of organic compounds with the aid of energy absorption tables.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent pozna klasične in spektroskopske metode za določanje strukture organskih spojin: NMR, IR, MS. Zna razlagati NMR, IR in MS spektre organskih spojin in na osnovi teh spektrov določiti strukturo spojine. Prenesljive/ključne spretnosti in drugi atributi: Poznavanje metod NMR, IR, MS za določanje strukture organskih spojin	Knowledge and Understanding: Student knows the classical and spectroscopic methods for the determination of the structure of organic compounds: NMR, IR, MS. Student is able to interpret these spectra and is able to conclude the compound structure. Transferable/Key Skills and other attributes: Knowledge of the methods NMR, IR, MS for the determination of structure of organic compounds.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske vaje	Lectures, seminar tutorial

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following

Pisni izpit	100	obligations: Written exam

Reference nosilca / Lecturer's references:

Leon Bedrač, **Jernej Iskra**, Iodine(I) reagents in hydrochloric acid-catalyzed oxidative iodination of aromatic compounds by hydrogen peroxide and iodine, **Adv. Synth. Catal.**, **2013**, 355, 1243-1248.

Ajda Podgoršek, Marko Zupan, Jernej Iskra, Oxidative halogenation with "green" oxidants : oxygen and hydrogen peroxide, **Angew. Chem. Int. Ed**., **2009**, 48, 8424-8450.

Ajda Podgoršek, Marco Eissen, Jens Fleckenstein, Stojan Stavber, Marko Zupan, **Jernej Iskra**, Selective aerobic oxidative dibromination of alkenes with aqueous HBr and sodium nitrite as a catalyst, **Green Chem**., **2009**, 11, 120-126.

Katja Žmitek, Stojan Stavber, Marko Zupan, **Jernej Iskra**. The effect of iodine on the peroxidation of carbonyl compounds, **J. Org. Chem**., **2007**, 72, 6534-6540.

Katja Žmitek, Stojan Stavber, Marko Zupan, Daniele Bonnet-Delpon, Sebastien Charneau, Phillipe Grellier, **Jernej Iskra**, Synthesis and antimalarial activities of novel 3,3,6,6-tetraalkyl-1,2,4,5-tetraoxanes, **Bioorg. Med. Chem**., **2006**, 14, 7790-7795.

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Kemija okolja
Course title:	Environmental Chemistry

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		**3.**	poletni
Chemistry/1. Level		**3.**	Spring

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
45			**30**		**75**	**5**

Nosilec predmeta / Lecturer:	Mitja Kolar

Jeziki / **Languages:**	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Potrebno je predhodno osnovno znanje iz kemije, instrumentalnih metod, biokemije in fizike.	Basic knowledge in chemistry, instrumental methods, biochemistry and physics is needed.

Vsebina:

- Osnovni pojmi o okolju: ponovitev in poglobitev razumevanja lastnosti elementov in spojin v okolju ter reakcij, procesov in biogeokemijskih ciklov v različnih medijih v okolju.
- Analizna kemija v okolju: vrste in značilnosti metod, uporabnost pridobljenih informacij.
- Monitoring okolja: osnovni pojmi, postopki za vzpostavitev monitoringa, kemijski. monitoring, biomonitoring, vrste monitoringa s konkretnimi primeri.
- Paleookoljske metode: uporabnost, interpretacija meritev in faktorji, ki zabrišejo informacije, časovna komponenta, konkretni primeri metod.
- Sredstva za oceno stanja okolja: emisijski faktorji.
- Terenske vaje vzorčenja in laboratorijske vaje – analize zraka, prsti in sedimenta.

Content (Syllabus outline):

- Basic characteristics of the environment: repetition and deepening understanding of characteristics of elements and substances in the environment and reactions, processes and biogeochemical cycles in different media of the environment.
- Environmental analytical chemistry: types and characteristics of methods, applicability of gathered information.
- Environmental monitoring: basic characteristics, procedures for the development of monitoring, chemical monitoring, biomonitoring, types of monitoring with real examples.
- Paleoenvironemntal methods: applicability, interpretation of measurements and factors that blur information, temporal component, examples of methods.
- Means for estimation of the condition of the environment: emission factors.
- Field work sampling and laboratory analysis of air, soil and sediment.

Temeljni literatura in viri / Readings:

J.F. Artiola, I.L. Pepper, M. Brusseau, Environmental monitoring and characterization, Elsevier, 2004.
G.B. Wiersma, Environmental Monitoring, CRC Press, 2004.
E.K. Berner, R.A. Berner, Global environment: water, air and geochemical cycles. Prentice Hall, 1995.
M.H. Engel, S.A. Macko, Organic geochemistry, principles and applications, Plenum Press, 1993.

Cilji in kompetence:

Cilj predmeta je seznaniti študente z osnovnimi pristopi in postopki za

- aplikacijo kemije na področju okolja
- analizo trenutnega stanja okolja
- oceno stanja okolja v primeru neobstoječih ali pomanjkljivih podatkov
- rekonstrukcijo stanja okolja v bližnji oziroma daljnji preteklosti

Objectives and competences:

The aim of the subject is to familiarize students with basic concepts and procedures for

- application of chemistry in the environment
- analysis of the current condition of the environment
- estimation of the condition of the environment in the case of missing or incomplete data
- reconstruction of the condition of the environment in the near and far history

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje: • razumevanje osnovnih pojavov in biogeokemijskih ciklov v okolju • pomen in uporabnost monitoringa okolja • uporabnost paleookoljskih metod za poglobljene študije o stanju okolja Prenesljive/ključne spretnosti in drugi atributi: Predmet se navezuje in dopolnjuje z ostalimi segmenti v okolju, kot so onesnaževanje okolja, postopki za prikazovanje procesov v okolju, ocenjevanje vplivov na okolje.	Knowledge and Understanding: • understanding of basic phenomena and biogeochemical cycles in the environment • importance and applicability of environmental monitoring • applicability of paleoenvironmental methods for detailed studies of the condition of the environment Transferable/Key Skills and other attributes: The subject is related and complemented with other segments in the environment, such as pollution of the environment, procedures for modelling of environmental processes, environmental impact assessments.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• predavanja • priprava in predstavitev seminarskih nalog z diskusijo • učilnica, opremljena z osnovnimi avdio-vizualnimi pripomočki	• lectures • preparation and presentation of seminars with discussion • lecture room, equipped with basic audio-visual equipment

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations:
• pisni izpit • seminarska naloga	50 50	• written exam • seminar

Reference nosilca / Lecturer's references:

1. PULKO, Irena, KOLAR, Mitja, KRAJNC, Peter. Atrazine removal by covalent bonding to piperazine functionalized PolyHIPEs. *Science of the total environment*, ISSN 0048-9697, Nov. 2007, vol. 386, iss. 1/3, str. 114-123. http://dx.doi.org/10.1016/j.scitotenv.2007.06.032. [COBISS.SI-ID 11508246]

2. BRGLEZ, Polonca, HOLOBAR, Andrej, PIVEC, Aleksandra, BELŠAK, Nataša, KOLAR, Mitja. Determination of oxygen by means of a biogas and gas - interference study using an optical tris (4,7-diphenyl-1,10-phenanthroline) ruthenium(II) dichloride complex sensor. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2012, vol. 59, no. 1, str. 50-58, ilustr. http://acta.chem-soc.si/59/59-1-50.pdf. [COBISS.SI-ID 15889686]

3. KRAJNC, Bojana, KOLAR, Mitja. Chemical analysis and the river Mura water quality. *Sanitarno inženirstvo*, ISSN 1854-0678, feb. 2010, vol. 4, no. 2, str. 4-17. [COBISS.SI-ID 15255574]

4. PETRINIĆ, Irena, ANDERSEN, Niels Peder Raj, KEIDING, Kristian, KOLAR, Mitja, ŠOSTAR-TURK, Sonja. A study of treating textile wastewater after reactive dye printing by using nanofitration, *Tekstil*, ISSN 0492-5882, 2006, vol. 55, br. 2, str. 57-62 (eng); 63-69 (scr). [COBISS.SI-ID 10389782]

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Polimerna kemija
Course title:	Polymer chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Kemija/1. Stopnja		**3.**	zimski
Chemistry/1. Level		**3.**	Autumn

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			**30**		**90**	**5**

Nosilec predmeta / Lecturer:	Peter Krajnc

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne kemije in znanje organske kemije.	Knowledge of general and organic chemistry.

Vsebina:	**Content (Syllabus outline):**
Uvod: razdelitev polimerov po kemijski sestavi in načinu priprave, nomenklatura polimerov. Načini polimerizacije (kemizem): radikalska (prosta in kontrolirana), kondenzacija. Načini polimerizacije (medij): v topilu, v masi, heterogeni mediji. Vplivi polimerizacijskih pogojev na strukturo. Strukturna organiziranost polimerov, strukturni nivoji: molekulska, nadmolekulska in mikrostruktura polimerov. Naravni polimeri: pridobivanje in uporaba. Sintetični polimeri: sodobni polimerni materiali. Analizne metode za identifikacijo kemizma in strukturne organiziranosti polimerov.	Introduction: systematics and nomenclature of polymers. Polymerisations (chemistry): radical (free and controlled), condensation. Polymerisations (medium): solvent, bulk, heterogenuous. Influence of polymerisation conditions on the structure. Structural levels of polymers: molecular, supramolecular, micro. Natural polymers: preparation and applications. Synthetic polymers: advanced polymeric materials. Analytical methods for identification of chemistry and structure of polymers.

Vaje iz predmeta vključujejo radikalsko polimerizacijo (v masi in s heterogenim medijem), kondenzacijo (poliamidi, poliuretani).	Experimantal course includes radical polymerisation (bulk, heterogenuous media), condensation (polyamides, polyurethanes).

Temeljni literatura in viri / Readings:

C.E.Carraher: Introduction to Polymer Chemistry
D. Braun, H.Cherdron, H. Ritter: Polymer Synthesis: Theory and Practice, Springer, Berlin, 2001.
B. J. Hunt, M.I. James (Eds.): Polymer Characterisation, Chapman and Hall, Glasgow, 1993

Cilji in kompetence:	**Objectives and competences:**
Spoznati osnovne načine priprave sintetičnih polimerov. Poznati lastnosti naravnih in sintetičnih polimerov in njihova področja uporabe. Obvladati mehanizme kemizma sinteze polimerov Spoznavanje principov oblikovanja strukture polimernih materialov ter sprememb strukture zaradi modifikacije polimerov. Poznati analitske metode, ki se uporabljajo za karakterizacijo polimerov.	To know: basic ways of polymer preparation, characteristics of natural and synthetic polymers and their fields of preparation, principles of structure relations, analytical methods for polymer characterisations. To understand the mechanisms of polymer synthesis.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent pozna sintezne načine polimerov. Razume mehanizme kemijskih reakcij priprave. Pozna analitske metode za karakterizacijo kemizma in strukture polimerov. Prenesljive/ključne spretnosti in drugi atributi:	Knowledge and Understanding: Student knows synthetic pathways for various polymers. Understands the mechanisms of synthetic reactions. Knows the analytical methods for the characterisations of chemistry and structure of polymers. Transferable/Key Skills and other attributes:

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarsko delo, laboratorijske vaje	Lectures, seminar work, laboratory experiments

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti:		Type (examination, oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations:
Pisni izpit	60	Written exam
Seminarska naloga	20	Seminar
Laboratorijske vaje	20	Experimental course

Reference nosilca / Lecturer's references:

KOVAČIČ, Sebastijan, KRAJNC, Peter, SLUGOVC, Christian. Inherently reactive polyHIPE material from dicyclopentadiene. *Chem. commun. (Lond., 1996)*, 2010, vol. 46, issue 40, str. 7504-7506, doi: 10.1039/C0CC02610G.

PULKO, Irena, WALL, Jennifer, KRAJNC, Peter, CAMERON, Neil R. Ultra-high surface area functional porous polymers by emulsion templating and hypercrosslinking : efficient nucleophilic catalyst supports. *Chemistry (Weinh., Print)*. [Print ed.], Feb. 2010, vol. 16, iss. 8, str. 2350-2354, doi: 10.1002/chem.200903043.

PULKO, Irena, SANDHOLZER, Martina, KOLAR, Mitja, SLUGOVC, Christian, KRAJNC, Peter. Removal of an olefin metathesis catalyst using 4-nitrophenyl acrylate based polymer supports. *Tetrahedron lett.*. [Print ed.], 2010, vol. 51, issue 44, str. 5827-5829, doi: 10.1016/j.tetlet.2010.08.114.

MAJER, Janja, KRAJNC, Peter. Cross-linked porous poly(acrylic acid-co-acrylamide) from high internal phase emulsions: preparation and functionalisation. *Acta chim. slov.*. [Tiskana izd.], 2009, vol. 56, št. 3, str. 629-634, ilustr.

PULKO, Irena, KRAJNC, Peter. Open cellular reactive porous membranes from high internal phase emulsions. *Chem. commun. (Lond., 1996)*, 2008, iss. 37, str. 4481-4483. http://dx.doi.org/10.1039/b807095d, doi: 10.1039/b807095d.

TURNŠEK, Marko, KRAJNC, Peter. PolyHIPEs from divinyl adipate : preparation and degradability. *Macromol. chem. phys.*, Article first published online: 16 AUG 2013, doi: 10.1002/macp.201300390.

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Fakulteta za kemijo
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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Tehnologija keramike (*izbirni predmet)*
Course title:	Ceramic Technology (*elective course)*

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		3.	poletni
Chemistry/1. Level			Spring

Vrsta predmeta / Course type	Izbirni / elective course
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			15		120	5

Nosilec predmeta / Lecturer:	Mihael Drofenik
Jeziki / Languages: **Predavanja / Lectures:**	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne kemije, znanje anorganske kemije in poznavanje materialov.	Knowledge of general and inorganic chemistry and materials.

Vsebina:	**Content (Syllabus outline):**
Predmet zajema osnove keramične tehnologije tradicionalne in tehnične keramiko Keramične surovine Osnove sintranja in razvoja mikrostrukture v keramičnih materialih Tradicionalna keramika (silikatna) Oksidna in neoksidna keramika Elektronska in inženirska keramika Elektronska in tehnična keramika Biokeramika (zobje, sklepi, …) Cement (beton) in steklo	*The subject comprehends elements of ceramic technology for the traditional and technical ceramic* Ceramic raw materials Introduction of sintering and microstructure development in ceramic materials Traditional ceramics Oxide and nonoxide ceramics Electronic and Engineering ceramics Bioceramics (dental and joints) Cement (concrete) and Glass

Temeljni literatura in viri / Readings:

D. Kolar, Keramika I in II, Mladinska Knjiga (1989)
A. Žnidaršič,. *Tehnologija keramike*. Maribor: Fakulteta za kemijo in kemijsko tehnologijo, 2009
W. D. Kingery , »Introduction to Ceramics«, John Wilay & Sons, Inc, New York (1963)
J. S. Reed, »Introduction to the Principles of Ceramics Processing«, John Wilay & Sons, Inc, New York (1988)

Cilji in kompetence:	**Objectives and competences:**
Kandidat bo seznanjen z osnovami keramične tehnologije. Znanje mu bo pomagalo pri razvoju in proizvodnji tradicionalne keramike, elektronske keramike, tehnične keramike in proizvodnji stekla ter cementa. Kandidat se bo lahko vključil v tehnološki proces izdelave keramičnih materialov.	The candidate will be acquainted with elements of ceramic technology. The skills obtained will assist him during the development and production of traditional ceramics, electronic ceramic, cement and glass product. The candidate will be able to join the development and fabrication process of ceramic and glass production.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Samostojno načrtovanje osnovnih tehnoloških procesov povezanih s keramično tehnologijo Prenesljive / ključne spretnosti in druge sposobnosti: Pridobitev tehnoloških znanj potrebnih za razumevanje predmetov povezanih z anorganskimi materiali. Pridobitev splošnega tehnološkega znanja za sodelovanje pri ostalih tehnoloških predmetih.	Knowledge and Understanding: Self-sufficient planning of basic technological processing of ceramic Transferable/Key Skills and other abilities: Gaining of technological knowledge needed for attendance of other courses associated with inorganic materials. Achievement of general technological knowledge required for teamwork with other technological subjects.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminarji • Laboratorijsko delo (izjemoma)	• Lectures • Seminar work • Laboratory work (exceptionally)

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način preverjanja znanja (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • seminar • ustni izpit	 50 50	Type of examination (oral, coursework, project): Student passes the examination if s(he) successfully passed all the following obligations: • seminar • oral exam

Reference nosilca / Lecturer's references:

1. ZAJC, Igor, DROFENIK, Mihael. PTCR anomaly in barium-titanate-based composites. *Ceramics international*, 2014, vol. 40, no. 6, str. 8033-8036,
2. JENUŠ, Petra, LISJAK, Darja, KUŠČER, Danjela, MAKOVEC, Darko, DROFENIK, Mihael. The low-temperature cosintering of cobalt ferrite and lead zirconate titanate ceramic composites. *Journal of the American Ceramic Society*, , 2014, vol. 97, no. 1, str. 74-80,
3. MUŠIČ, Branka, DROFENIK, Mihael, VENTURINI, Peter, ŽNIDARŠIČ, Andrej. Electromagnetic wave absorption by an organic resin solution based on ferrite particles with a spinel crystal structure. *Ceramics international*, 2012, vol. 34, issue 4, str. 2693-2699,
4. DRMOTA, Ana, DROFENIK, Mihael, ŽNIDARŠIČ, Andrej. Synthesis and characterization of nano-crystalline strontium hexaferrite using the co-precipitation and microemulsion methods with nitrate precursors. *Ceramics international*, 2012, vol. 38, issue 2, str. 973-979,
5. OVTAR, Simona, LISJAK, Darja, DROFENIK, Mihael. Preparation of oriented barium hexaferrite films by electrophoretic deposition. *Journal of the American Ceramic Society*, 2011, vol. 94, no. 10, str. 3373-3379,
6. LISJAK, Darja, DROFENIK, Mihael, et al. Magnetic phase formation in coti-substituted ba hexaferrite coatings prepared with atmospheric plasma spraying. *Journal of the American Ceramic Society*, , 2010, vol. 93, no. 9, str. 2579-2584,

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Bioinformatika in genomika *(izbirni predmet)*
Course title:	Bioinformatics and genomics (*elective course)*

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		**3**	poletni
Chemistry/1. Level		**3**	Spring

Vrsta predmeta / Course type Obvezni / Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			15		120	5

Nosilec predmeta / Lecturer: Uroš Potočnik

Jeziki / **Languages:**		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ni.	None.

Vsebina:	**Content (Syllabus outline):**
Podatkovne zbirke v molekularni biologiji in genomiki: - indeksiranje in iskalni profili -Bibliografske podatkovne zbirke (PubMed), -tekstovne podatkovne zbirke (OMIM) - faktografske podatkovne zbirke (DNA sekvence (Genbank), genomov, proteinske sekvence (SwissProt), proteinske structure, ekspresijke, metabolne poti -Integrirani sistemi za dostop do podatkovnih zbirk: Entrez (NCBI), ExPASy , Ensembl Sekvenčne poravnave in konsktrukcija filogenetskih dreves: merila sekvenčne podobnosti, poravnava dveh zaporedij, poravnava večih zaporedij, iskanje	Databases in molecular biology and genomics: -database indexing and search profiles -bibliographic databases (PubMed) -text databases (OMIM) -surveys of molecular biology databases and servers: nucleotide acid sequence databases (GenBank), genome databases, protein sequence databases (Swiss Prot), databases of structures, expression databases, databases of metabolic pathways Integrated systems for data retrieving: ENTREZ (NCBI), ExPASy, Ensembl Sequence alignments and phylogenetic trees: measures of similarity, computing the alignment of two sequences, multiple sequence alignments

podobnih zaporedij v podatkovnih zbirkah (skriti modeli Markov, PSI-Blast, profile), filogenetska drevesa (metoda klastrov, klad, problem različnih stopenj evolucije) Proteinske strukture in odkrivanje novih zdravil: zvijanje in stabilnost proteinske strukture, superpozicija struktur in strukturne poravnave, klasifikacija proteinskih struktur, predikcija strukture in modeliranje, povezava proteinske strukture z genomom, predikcija funkcije proteinov (ortologi, paralogi), računalniško načrtovanje novih zdravil Laboratorijske vaje: Izdelava in evalvacija testov za gensko tipizacijo DNA polimorfizmov: prenos tarčnih sekvenc iz podatkovnih zbirk v orodja za analizo DNA sekvenc, načrtovanje oligonukeotidov za PCR, RFLP test	(profiles, PSI-BLAST, Hidden Markov Models), phylogenetic trees (clustering methods, cladistic method, the problem of varying rates of evolution) Protein structure and drug discovery: protein stability and folding, superposition of structures and structural alignments, evolution of protein structures, classification of protein structures, protein prediction and modeling, assignment of protein structures to genomes, drug discovery and development, computer-assisted drug design Laboratory work: • Design and evaluation of assays for genotyping of DNA polymorphisms: transfer of target DNA sequences from databases into DNA sequence analysis tools, PCR primer deisgn, RFLP test

Temeljni literatura in viri / Readings:

1. Lesk A: (2005) Introduction to Bioinformatics. 2nd Ed, Oxford University Press, Oxford, UK
2. Barnes MR, Gray IC: Bioinformatics for geneticist. John Wiley&Sons, R.J.M , West Sussex, 2003.
3. Attwood TK, Parry-Smith DJ (1999) Introduction to Bioinformatics. Prentice Hall, Harlow, England.
4. Baxevanis AD, Francis Ouellette BF (1998) Bioinformatics A Practical Guide to the Analysis of Genes and Proteins. Wiley-Interscience, A John Wiley & Sons Inc., Publication, New York, USA.
5. Higgins D, Taylor W (2000) Bioinformatics. Sequence, Structure and Databanks. Oxford University Press, Oxford, UK.
6. Kanehisa M (2002) Post-genome Informatics. Oxford University Press, Oxford, United Kingdom

Cilji in kompetence:	**Objectives and competences:**
Študent bo znal uporabljati glavne podatkovne zbirke in programska orodja s področja biokemije, molekularne biologije in genomike	Students will be able to use relevant databases and bioinformatic tools in the fields of biochemistry, molecular biology and genomics.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: vrste in struktura podatkovnih zbirk pomen in interpretacija molekularno bioloških in genomskih podatkov Prenesljive/ključne spretnosti in drugi atributi: študenti bodo znali uporabljati programska orodja za dostop do relevantnih podatkov iz podatkovnih zbirk s področja molekularne biologije in genomike	Knowledge and Understanding: type and structure of databases meaning and interpretation of molecular biology and genomic data Transferable/Key Skills and other attributes: students will be able to acsess and retrieve most relevant data from available databases in the field of molecular biology and genomics

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje	• Lectures • Laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt) Izpit je opravljen, če sta pozitivno opravljeni naslednji obveznosti:		Type (examination, oral, coursework, project): Student has to pass successfully the following obligations:
pisni izpit	60	writen exemination
seminar	30	seminar
laboratorijske vaje	10	laboratory work

Reference nosilca / Lecturer's references:

1. JOSTINS, Luke, MITROVIČ, Mitja, POTOČNIK, Uroš. Host-microbe interactions have shaped the genetic architecture of inflammatorybowel disease. Nature (Lond.), 2012, vol. 491, no. 7422, str. 119-124, doi: 10.1038/nature11582. [COBISS.SI-ID 512230968],
2.PERIN, Petra, POTOČNIK, Uroš. Polymorphisms in recent GWA identified asthma genes CA10, SGK493, and CTNNA3 are associated with disease severity and treatment response in childhood asthma. Immunogenetics, ISSN 0093-7711, 2014, vol. 66, issue 3, str. 143-151, doi: 10.1007/s00251-013-0755-0. [COBISS.SI-ID 17472790
3. RIVAS, Manuel A, MITROVIČ, Mitja, POTOČNIK, Uroš. Deep resequencing of GWAS loci identifies independent rare variants associated with inflammatory bowel disease. Nat Genet, 2011, vol. 43, no. 11, str. 1066-1073, doi: 10.1038/ng.952. [COBISS.SI-ID 15421974],
4. ALMOUZNI, Geneviève, GRGUREVIČ, Neža, MAJDIČ, Gregor, POTOČNIK, Uroš, ILAŠ, Janez, et al. Relationship between genome and epigenome - challenges and requirements for future research. BMC genomics, ISSN 1471-2164, 2014, vol. 15, no. 487, str. 1-7. http://www.biomedcentral.com/1471-2164/15/487, doi: 10.1186/1471-2164-15-487. [COBISS.SI-ID 512412216
5. REPNIK, Katja, POTOČNIK, Uroš. Haplotype in the IBD5 region is associated with refractory Crohn's disease in Slovenian patients and modulates expression of the SLC22A5 gene. J Gastroenterol, 2011, vol. 46, no. 9, str. 1081-1091, doi: 10.1007/s00535-011-0426-6. [COBISS.SI-ID 15110422].

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Praktično usposabljanje *(izbirni predmet)*
Course title:	Practical work (*elective course)*

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		3.	poletni
Chemistry/1. Level			Spring

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
					150	5

Nosilec predmeta / Lecturer:

Jeziki / Languages:	
Predavanja / Lectures:	
Vaje / Tutorial:	

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni.	None.

Vsebina:	**Content (Syllabus outline):**
Študent izvaja praktično usposabljanje s polnim ali deljenim delovnim časom v podjetju s področja kemije, kemijske ali biokemijske tehnike ali drugih sorodnih panog. Izjemoma lahko študent izvaja praktično usposabljanje tudi na fakulteti ali inštitutu, če je zaradi narave dela to mogoče. Študentu sta dodeljena mentor v organizaciji in na Fakulteti za kemijo in kemijsko tehnologijo. V času izvajanja praktičnega usposabljanja se študent seznani z naravo dela kot tudi z organiziranostjo, obratovanjem in poslovanjem organizacije, kjer izvaja praktično usposabljanje. Študent o aktivnostih, izvajanju in rezultatih praktičnega usposabljanja napiše poročilo.	Student works full or part time in an organization in the field of chemistry, chemical or biochemical engineering or other related industries. The practical work could be exceptionally carried out at the Faculty or Institute if this is required by the nature of the work. Two mentors are appointed to student: one in the organization, and the other one at the Faculty of Chemistry and Chemical Engineering. Student becomes acquainted with the practical work in chemistry and also with structure, production and management in the organization. Student prepares a written report about the execution and results of the practical work.

Temeljni literatura in viri / Readings:

Specifično literaturo bodo študentom posredovali mentorji.

Cilji in kompetence:

Namen praktičnega usposabljanja je, da študent:

- določen čas dela v organizaciji s področja kemije, kemijske ali biokemijske tehnike ali druge sorodne industrijske panoge
- spozna organiziranost, obratovanje in poslovanje neakademske organizacije
- uporabi teoretično znanje, pridobljeno med študijem, za reševanje konkretnega problema v praksi
- pridobi specifične spretnosti, ki jih ne more pridobiti na fakulteti

Objectives and competences:

The aim of the practical work is to:

- work for the specified time period in an industrial chemical, biochemical or other related organization
- become familiar with the structure as well as with production and management processes in non-academic organization
- apply knowledge gained during the study for solving practical problem
- acquire skills different from the ones taught at the Faculty

Predvideni študijski rezultati:

Znanje in razumevanje:

- poznavanje organiziranosti, obratovanja in poslovanja neakademskih organizacij
- boljše poznavanje zaposlitvenih možnosti po zaključku študija
- boljše poznavanje in razumevanje nalog in odgovornosti v poklicnem okolju

Prenesljive/ključne spretnosti in drugi atributi:

- prilagajanje obnašanja in ravnanja v različnih poklicnih okoljih
- širši pogled na položaj organizacije v določeni panogi in globalnem gospodarstvu (konkurenčnost)
- pridobljene nove spretnosti, ki so potrebne za uspešno izvajanje in zaključek praktičnega projekta

Intended learning outcomes:

Knowledge and Understanding:

- to understand the structure, production and management process in non-academic organization
- to increase understanding of employment options after graduation
- to get a better perception of tasks and responsibilities within a professional environment

Transferable/Key Skills and other attributes:

- to learn a different way of behavior, suitable for different professional environments
- to obtain a better view of the position of a company compared to other companies and global economy (competition)
- to obtain new skills that are necessary to successfully accomplish practical project

Metode poučevanja in učenja:

- samostojno delo
- konzultacije z mentorjem v organizaciji
- priprava pisnega poročila

Learning and teaching methods:

- independent work
- consultations between student and mentor in the organization
- preparation of written report

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Industrijski projekt je zaključen, če so pozitivno opravljene naslednje obveznosti: • pisno poročilo	100	Student has to pass successfully the following obligations: • written report

Reference nosilca / Lecturer's references:

Se nanašajo na mentorja.

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Diplomsko delo
Course title:	Bachelor's Thesis

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Kemija/1. Stopnja		3.	poletni
Chemistry/1. Level		3.	Spring

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
		10			290	10

Nosilec predmeta / Lecturer:

Jeziki / **Languages:**		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni.	None.

Vsebina:	**Content (Syllabus outline):**
Priprava diplomskega dela poteka kot samostojno delo študenta na raziskovalnem projektu s področja kemije. Diplomsko delo je lahko tudi skupni raziskovalni projekt več študentov. Teme projektov za diplomska dela razpišejo mentorji v okviru raziskovalnih laboratorijev Fakultete za kemijo in kemijsko tehnologijo ali pa jih predlagajo študentje sami. Študent pridobi soglasje predvidenega mentorja, ki ga usmerja in svetuje pri izvedbi diplomskega dela. Formalni postopek priprave in zagovora diplomskega dela poteka v skladu z veljavnim pravilnikom o postopku priprave in zagovora diplomskega dela na študijskem programu 1.	The student has to work independently on a research project concerning problems in chemistry. Bachelor's Thesis can be a common research project of several students. The research topics are issued by the mentors in the research laboratories of the Faculty of Chemistry and Chemical Engineering or could be initiated by students. Consent of mentor is required. Mentor guides the student through the research work of Bachelor's Thesis. The formal procedure for Bachelor's Thesis preparation and defence is regulated by the "pravilnik o postopku priprave in zagovora diplomskega dela na študijskem programu 1. stopnje" of the University of Maribor.

stopnje, Univerze v Mariboru. Predvidene aktivnosti študenta pri pripravi in zagovoru diplomskega dela so naslednje: • formulacija problema • pregled in analiza dosedanjih raziskav in relevantne literature • postavitev raziskovalnih hipotez • definiranje metod dela • časovni načrt izvedbe projekta • praktično delo v enem od raziskovalnih laboratorijev fakultete • interpretacija in kritična presoja rezultatov • priprava pisnega izdelka • ustna predstavitev.	The preparation and defence of Bachelor's Thesis usually include the following activities of student: • problem formulation • state-of-the-art in the proposed field of research and survey of the relevant literature • definition of research hypotheses • definition of research methods • time plan of project • practical work in one of the Faculty research laboratories • interpretation and evaluation of the results • written presentation of the work • oral presentation of the work.

Temeljni literatura in viri / Readings:

- Kravanja Zdravko, Navodila za kvalitetno izvajanje diplomskega dela. Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 2014.
  http://www.fkkt.uni-mb.si/sites/default/files/Navodila%20za%20kakovostno%20izvajanje%20diplomskega%20dela.pdf

- Novak Pintarič Zorka, Kravanja Zdravko, Predloga z navodili za pisanje diplomskega dela. Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 2014. (za UNI KE)
  http://www.fkkt.uni-mb.si/sites/default/files/Predloga_diplome_UNI_KE-2014.docx

- Peter Glavič: *Navodila za izdelavo diplomskega dela.* Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 2008.
- Veljavni pravilnik o postopku priprave in zagovora diplomskega dela za univerzitetni na študijskem programu 1. stopnje, Univerze v Mariboru.
- Specifično literaturo bodo študentom posredovali mentorji.

Cilji in kompetence:	**Objectives and competences:**
Študent je sposoben: • izbrati ter uporabiti domačo in tujo strokovno literaturo za potrebe rešitve izbranega problema. • reševanja kemijskih problemov z uporabo teoretičnih znanj in v praksi pridobljenih izkušenj. • predstavitve rezultatov dela strokovni javnosti v obliki pisnega poročila, predavanja, diskusije	The student would be able to: • to choose and use national and international professional literature in order to solve the chosen problem. • to solve problems in chemistry by using theoretical knowledge and practical experiences. • present the results to a professional audience by means of a written report, oral presentation and discussion.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • obvladanje znanj širšega strokovnega področja, v katerega sodi diplomska naloga in ožje znanje ter razumevanje izrazoslovja, ki ga zajema tema diplomskega dela. Poudarek je na praktičnih znanjih in enostavnejših metodologijah	Knowledge and Understanding: • present the knowledge of the broader professional field to which belongs the thesis and special knowledge of the glossary concerned by the degree's work theme. The emphasis is on the practical skills and relatively more simple

zajemanja, obdelovanja in prikazovanja podatkov. • poznavanje sistematike, metod in pristopov raziskovalnega dela • sposobnost reševanja problemov s področja kemije Prenesljive/ključne spretnosti in drugi atributi: • sposobnost reševanja strokovnih problemov, kritičnega razmišljanja in razumevanja strokovne literature • sposobnost učinkovite komunikacije o strokovni problematiki • sposobnost učinkovite predstavitve in interpretacije rezultatov dela	methodologies of collecting, processing and presenting data. • knowledge of systematics, methods and approaches of research work, • ability of solution of problems in the field of chemistry Transferable/Key Skills and other attributes: • ability to solve the professional problems, understand the literature and to think critically • ability to efficiently communicate about problematic, • ability to efficiently present and interpret the results of work

Metode poučevanja in učenja:	**Learning and teaching methods:**
Mentor na konzultacijah preverja: • vsebinski in strukturni vidik naloge. • pripravo pisnega izdelka in ustne predstavitve	• Consultations between student and mentor about: • The content and the structural aspect of the work • preparation of written report and oral presentation

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Diplomsko delo je zaključeno, če so pozitivno opravljene naslednje obveznosti:		Student has to pass successfully the following obligations:
• diplomsko delo	50	• Bachelor's Thesis work
• ustni zagovor	50	• oral presentation

Reference nosilca / Lecturer's references:

Se nanašajo na izbranega mentorja.