

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	ANORGANSKA KEMIJA
<b>Course Title:</b>	INORGANIC CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
MAG Kem. izobraževanje, 2. stopnja	/	1.	1.
USP Chemical Education, 2 <sup>nd</sup> Cycle	/	1 <sup>st</sup>	1 <sup>st</sup>

**Vrsta predmeta / Course Type:**

obvezni / Mandatory

**Univerzitetna koda predmeta / University Course Code:**

KE211

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
45	30	/	/	/	75	5

**Nosilec predmeta / Lecturer:**

prof. dr. Iztok Turel / Dr. Iztok Turel, Full Professor

**Jeziki / Languages:**

**Predavanja / Lectures:** slovenski / Slovenian

**Vaje / Tutorial:** /

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

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost. Dodatnih pogojev ni.

**Prerequisites:**

The course has to be assigned to the student. There are no additional prerequisites.

**Vsebina:**

**Predavanja:** Uvod: soodvisnost strukture in kemijske vezi anorganskih spojin s- in p-elementov, spojin d-elementov, koordinacijskih in organokovinskih spojin.

Vrste in mehanizmi anorganskih reakcij v koordinacijskih spojinah: izmenjava koordiniranih molekul topila, aktivacija molekul z interakcijo s kovinskimi ioni, homogena kataliza.

Kemija elementov s poudarkom na zahtevnejših temah, ki niso bile zajete v Anorganski kemiji na 1. stopnji študija Kemije: kemija elementov 1., 2., 13.—18. skupine in prehodnih elementov.

**Content (Syllabus outline):**

**Lectures:** Introduction: the relations between chemical bond and the structure of inorganic compounds of s- and p-elements, compounds of d-elements, coordination and organometallic compounds. Mechanisms of reactions in coordination compounds, exchange of coordinated solvent molecules, activation of molecules by the interaction with metal ions, homogenous catalysis. Chemistry of the elements at advanced level and topics not covered in Inorganic Chemistry course at Bachelor level: Chemistry of the groups 1, 2, 13-18 and transition metals.

**Seminar:** Determination of inorganic reaction mechanisms from activation entropy and

**Seminar:** Določanje mehanizma anorganskih reakcij iz aktivacijske entropije in aktivacijske prostornine, primeri študij izmenjave molekule vode kot liganda v raztopinah ionov prehodnih kovin. Metode za karakterizacijo anorganskih snovi in njihovih površin (elektronska mikroskopija, mikroskopija na atomsko silo, vrstična tunelska mikroskopija, rentgenska spektroskopija, elektronska spektroskopija, termična analiza). Koordinacijske spojine: primeri sinteze in karakterizacije. Možne so tudi predstavitve nekaterih drugih aktualnih tem s področja anorganske kemije.

activation volume, examples of studies of exchange of water molecule ligands in solutions of transition-metal ions. Methods of characterization of inorganic substances and their surfaces (electron-, atom force-, scanning tunnelling microscopy, X-ray spectroscopy, thermal analysis). Coordination compounds: examples of syntheses and characterization. Presentations of certain other interesting topics from the field of inorganic chemistry are also possible.

### Temeljna literatura in viri / Readings:

- C. E. Housecroft, A. G. Sharpe, *Inorganic Chemistry, Second Edition*, Pearson Education Limited, Harlow, England, 2005, 949 strani, poglavja 4, 6, 8, 18, 21-23, 25, 26 (skupaj 258 strani, 25%), knjiga dostopna v knjižnici FKKT.

#### *Priporočena dodatna literatura:*

- M. L Tobe, J. Burgess, *Inorganic Reaction Mechanisms*, Longman, Harlow, 1999, 674 strani.  
- M. Weller, T. Overton, J. Rourke, and Fraser Armstrong, *Inorganic Chemistry, Sixth Edition*, Oxford University Press, Oxford, UK, 2014, 912 strani.

### Cilji in kompetence:

*Cilj* predmeta je nadgraditi znanje iz predmetov Splošna kemija in Anorganska kemija s teoretsko poglobljenim predmetom, ki podaja sintezo, reaktivnost, lastnosti in uporabo anorganskih snovi.  
*Kompetence:* razumevanje in načrtovanje zatevnejših anorganskih reakcij.

### Objectives and Competences:

**Objectives:** to gain the in-deep understanding of principles of synthesis, reactivity, properties and application of inorganic compounds that are first covered by General and Inorganic Chemistry courses in 1<sup>st</sup> Cycle.  
**Competences:** understanding and planning of advanced inorganic reactions.

### Predvideni študijski rezultati:

Znanje in razumevanje  
Predmet predstavlja nadaljevanje predmetov Splošna in anorganska kemija I in II. Študent mora uporabiti znanja, ki jih je dobil pri osnovnih predmetih v prvih treh letnikih, da lahko osvoji vsebino (točka 14) tega predmeta.

Uporaba  
Študent dobi poglobljeno teoretsko znanje, ki mu pomaga pri načrtovanju sintez spojin in predvidevanju njihovih lastnosti. Sposoben naj bi bil uporabljati svoje znanje

### Intended Learning Outcomes:

Knowledge and Comprehension  
Understanding of advanced principles of the properties and reactivity of inorganic compounds. Ability to understand and plan the syntheses of inorganic compound.

Application  
The students get the theoretical knowledge that help them to plan the synthesis of compounds and predict their properties. The students should be able to solve interdisciplinary

interdisciplinarno in na praktičnih primerih.	problems that involve inorganic chemistry.
<u>Refleksija</u> Kemija je eksperimentalna veda in osnovni cilj solidnega teoretskega znanja naj bo njegova uporaba.	<u>Analysis</u> Chemistry is experimental science and the goal of theoretical knowledge and theoretical research is its practical use.
<u>Prenosljive spretnosti</u> Predmet širi znanje in nakazuje interdisciplinarnost večine raziskovalnih in razvojnih dejavnosti.	<u>Skill-transference Ability</u> The course broadens the knowledge and shows the interdisciplinary nature of most research projects.

#### Metode poučevanja in učenja:

Predmet se izvaja v obliki predavanj in seminarjev, pri katerih se snov poglobi in se obravnavajo aktualne teme s področja predmeta. Pri predavanjih se občasno uporabljajo tudi nekatere sodobnejše tehnike (študij primerov, uporaba računalniških in video predstavitev, ipd.).

#### Learning and Teaching Methods:

Lectures and seminars. The seminars covers some experimental methods in inorganic chemistry: the background of the methods is described, the students observe the measurement and evaluate raw experimental data.

#### Načini ocenjevanja:

Pisni izpit: ocene od 6-10 (pozitivno) oz. 5 (negativno).

Delež (v %) /  
Weight (in %)

**100 %**

#### Assessment:

Written exam: 6-10 (pass) and 5 (fail).

#### Reference nosilca / Lecturer's references:

- SERŠEN, Sara, KLJUN, Jakob, KRYEZIU, Kushtrim, PANCHUK, Rostyslav, ALTE, Beatrix, KÖRNER, Wilfried, HEFFETER, Petra, BERGER, Walter, **TUREL, Iztok**. Structure-related mode-of-action differences of anticancer organoruthenium complexes with  $\beta$ -diketonates. Journal of medicinal chemistry, ISSN 0022-2623, 2015, vol. 58, iss. 9, str. 3984-3996, ilustr.  
<http://pubs.acs.org/doi/abs/10.1021/acs.jmedchem.5b00288>, doi: 10.1021/acs.jmedchem.5b00288. [COBISS.SI-ID 1536265667]

- KLJUN, Jakob, BRATSOS, Ioannis, ALESSIO, Enzo, PSOMAS, George, REPNIK, Urška, BUTINAR, Miha, TURK, Boris, **TUREL, Iztok**. New uses for old drugs : attempts to convert quinolone antibacterials into potential anticancer agents containing ruthenium. Inorganic chemistry, ISSN 0020-1669, 2013, vol. 52, no. 15, str. 9039-9052, ilustr.  
<http://pubs.acs.org/doi/pdf/10.1021/ic401220x>, doi: 10.1021/ic401220x. [COBISS.SI-ID 1610287]

- SERŠEN, Sara, KLJUN, Jakob, POŽGAN, Franc, ŠTEFANE, Bogdan, **TUREL, Iztok**. Novel organoruthenium(II)  $\beta$ -diketonates as catalysts for ortho arylation via C-H activation. Organometallics, ISSN 0276-7333, 2013, vol. 32, issue 2, str. 609-616.  
<http://pubs.acs.org/doi/pdf/10.1021/om3011189>, doi: 10.1021/om3011189. [COBISS.SI-ID 36426757]