

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 |
|---|-------------------------------|-------------------------|----------------------|
| MAG Kemija, 2. stopnja | / | 1. | 1. |
| USP Chemistry, 2 nd Cycle | / | 1 st | 1 st |

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.

Prerequisites:

The course has to be assigned to the student.

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.

Seminar: Določanje mehanizma anorganskih reakcij iz aktivacijske entropije in aktivacijske

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

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.

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

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.

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 1st 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 interdisciplinarno in na praktičnih primerih.

Refleksija
Kemija je eksperimentalna veda in osnovni cilj solidnega teoretskega znanja naj bo njegova uporaba.

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 problems that involve inorganic chemistry.

Analysis
Chemistry is experimental science and the goal of theoretical knowledge and theoretical research is its practical use.

Prenosljive spretnosti

Predmet širi znanje in nakazuje interdisciplinarnost večine raziskovalnih in razvojnih dejavnosti.

Skill-transference Ability

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 in ustni izpit: ocene od 6-10 (pozitivno) oz. 1-5 (negativno).

Delež (v %) /
Weight (in %)

Assessment:

Written and oral exam: 6-10 (pass the exam) and 1-5 (not pass the exam).

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 β -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) β -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]