

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	ORGANSKA KEMIJA
Course Title:	ORGANIC CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UŠP Kemijsko inženirstvo, 1. stopnja	/	2.	3.
USP Chemical Engineering, 1 st Cycle	/	2 nd	3 rd

Vrsta predmeta / Course Type:

obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code:

IN113

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
60	15	/	/	/	75	5

Nosilec predmeta / Lecturer:

prof. dr. Bogdan Štefane / Dr. Bogdan Štefane, Associate 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:

a) Struktura in reaktivnost organskih spojin
 - Pregled, fizikalne lastnosti in nomenklatura organskih spojin
 - Kemijske vezi ter premiki elektronov
 - Konformacije in stereokemija
 - Tok elektronov, odcep protona, intermediati
 - Stereoelektronski vplivi substituent na pretvorbe organskih molekul
 - Pregled osnovnih tipov transformacij organskih spojin
b) Pretvorbe organskih spojin
 - Kemija alkanov: nukleofilne, elektrofilne in radikalske substitucije;
 eliminacijske reakcije
 - Kemija alkenov: elektrofilne, nukleofilne in

Content (Syllabus outline):

Structure and reactivity of organic compounds – survey, physical properties, and nomenclature of organic compounds

- Chemical bonds
- Conformations and stereochemistry
- Electron flow, deprotonation, intermediates
- Stereoelectronic effects of substituents
- Basic types of organic transformations.

Transformations of organic compounds

- Chemistry of alkanes: nucleophilic, electrophilic, and radical substitutions; elimination reactions
- Chemistry of alkenes: electrophilic, nucleophilic, and radical substitutions

radikalske adicije

- Kemija aromатов: elektrofilne, nukleofilne in radikalske substitucije
- Kemija karbonilov: nukleofilne, elektrofilne in radikalske adicije, adicije-substitucije ter adicije-eliminacije
- Oksidacije in redukcije

- Chemistry of aromatics: electrophilic, nucleophilic, and radical substitutions
- Chemistry of carbonyls: nucleophilic, electrophilic, and radical additions, addition-substitution, addition-elimination
- Oxidations and reductions.

Temeljna literatura in viri / Readings:

- J. McMurry: Fundamentals of Organic Chemistry, Brooks/Cole Cengage Learning, 7th Edition, Pacific Grove 2011, 598 pages (70%).
- J. McMurry: Organic Chemistry, Brooks/Cole Brooks/Cole Cengage Learning, 8th Edition, Pacific Grove 2012, 1262 pages (30%).

Cilji in kompetence:

Učna enota prispeva predvsem k razvoju naslednjih splošnih in specifičnih kompetenc:

- osnovno znanje organske kemije
- poznavanje nomenklature organskih spojin
- poznavanje strukturnih značilnosti organskih spojin, funkcionalnih skupin in njihovih pretvorb
- poznavanje reaktivnosti organskih spojin in tipičnih organskih reakcij
- poznavanje osnov organske stereokemije
- poznavanje reakcijskih mehanizmov in intermediatov
- poznavanje osnovnih principov organske sinteze
- poznavanje dostopanja do literaturnih virov in njihove uporabe

Objectives and Competences:

Basic knowledge of organic chemistry: nomenclature, structural features, functional groups, reactivity, and typical transformations of organic compounds. Basic knowledge of organic stereochemistry, reaction mechanisms and intermediates. Knowledge of the basic principles of organic chemistry and accessing literature sources.

Competences:

Basic knowledge of organic chemistry: nomenclature, structure, reactivity and transformations of organic compounds. Ability to understand structure-reactivity relationship, i.e. to predict chemical properties of a given organic compound from its structure and vice versa.

Predvideni študijski rezultati:

Znanje in razumevanje

Študent pozna in razume:

- organske spojine glede na strukturo osnovnega skeleta in tipične funkcionalne skupine
- izomerijo in nomenklaturu organskih spojin
- osnovne pretvorbe organskih spojin
- značilne reagente, ki se uporabljajo pri osnovnih organskih reakcijah.

Intended Learning Outcomes:

Knowledge and Comprehension

Student understands and is familiar with:

- Structure of organic compounds and functional groups
- Isomerisation and nomenclature of organic compounds
- Basic transformations of organic compounds

Typical reagents used for performing basic organic reactions.

<p>Uporaba</p> <p>Znanje organske kemije je temeljno znanje, ki je osnova za študij kemijskega inženirstva in se hkrati navezuje na veliko ostalih predmetov študija. Poleg tega je osnovno teoretično in praktično znanje organske kemije nujno potrebno vsakemu kemijskemu inženirju pri njegovem kasnejšem delu v praksi.</p>	<p>Application</p> <p>Mastered knowledge of organic chemistry is basic knowledge needed for studying chemical engineering. The knowledge is interconnected with majority of other subjects concerning the program. Course is also fundamental for understanding biochemistry subjects and courses concerning organic materials and ecology.</p>
<p>Refleksija</p> <p>Znanje organske kemije sodi med temeljna kemijska znanja in je pogoj za uspešno delo na vseh ostalih področjih kemijskega inženirstva. Predmet je tudi osnova za razumevanje biokemijskih predmetov ter predmetov povezanih z organskimi materiali in ekologijo.</p>	<p>Analysis</p> <p>The topics of other courses and laboratory trainings are connected to the topics of lectures. Therefore, the student learns critical assessment (evaluation) of practical results with respect to the theory.</p>
<p>Prenosljive spretnosti</p> <ul style="list-style-type: none"> -Poznavanje organske kemije kot temeljnega znanja za specifična področja kemijskega inženirstva -Poznavanje strukture in reaktivnosti organskih spojin -Uporaba organskih sinteznih principov na ostalih področjih kemijskega inženirstva in materialov 	<p>Skill-transference Ability</p> <p>The student acquires skills that are required for a laboratory work and for handling with chemicals. The knowledge on organic chemistry enables better understanding of the basic principles of other subjects and courses within the study of Chemical engineering.</p>

Metode poučevanja in učenja:

Predavanja, seminarji.

Learning and Teaching Methods:

Lectures, seminar work, theoretical training by analytical solving of strategic problems.

Načini ocenjevanja:

Pisni izpit.

Delež (v %) /

Weight (in %) **Assessment:**

Written exam.

Reference nosilca / Lecturer's references:

- ŠTEFANE, Bogdan. Selective addition of organolithium reagents to BF₂-chelates of [beta]-ketoesters. *Organic letters*, ISSN 1523-7060, 2010, vol. 12, no. 13, str. 2900-2903, doi: [10.1021/ol100620j](https://doi.org/10.1021/ol100620j). [COBISS.SI-ID [34162181](https://www.cobiss.si/id/34162181)]

- WANG, Jingxin, ŠTEFANE, Bogdan, JABER, Deana, SMITH, Jacqueline A. I., VICKERY, Christopher, DIOP, Mouhamed, SINTIM, Herman O. Remote C-H functionalization : using the N-O moiety as a atom-economical tether to obtain 1,5- and the rare 1,7-C-H insertions. *Angewandte Chemie*, ISSN 1433-7851. [Print ed.], 2010, vol. 49, no. 23, str. 3964-3968, doi: [10.1002/anie.201000160](https://doi.org/10.1002/anie.201000160). [COBISS.SI-ID [34061573](https://www.cobiss.si/id/34061573)]

- NAKAYAMA, Shizuka, KELSEY, Ilana, WANG, Jingxin, ROELOFS, Kevin, ŠTEFANE, Bogdan, LUO, Yiling, LEE, Vincent T., SINTIM, Herman O. Thiazole orange-induced c-di-GMP quadruplex

formation facilitates a simple fluorescent detection of this ubiquitous biofilm regulating molecule. *Journal of the American Chemical Society*, ISSN 0002-7863, 2011, vol. 133, no. 13, str. 4856-4864, doi: [10.1021/ja1091062](https://doi.org/10.1021/ja1091062). [COBISS.SI-ID [34845957](https://www.cobiss.si/id/34845957)]

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