UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	PRAKTIKUM IZ ORGANSKE KEMIJE
Course Title:	PRACTICAL COURSE IN ORGANIC CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
VSŠP Kemijska tehnologija, 1. stopnja	/	2.	3.
PSP Chemical Technology, 1st Cycle	/	2nd	3rd

Vrsta predmeta / Course Type: obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code: KT114

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

Nosilec predmeta / Lecturer: izr. prof. dr. Janez Cerkovnik /
Dr. Janez Cerkovnik, Associate Professor

Jeziki / Languages:

Predavanja / Lectures:	**slovenski / Slovenian**
Vaje / Tutorial:	**slovenski / Slovenian**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	Content (Syllabus outline):
Splošno. -Varnost pri delu. Osebna zaščitna oprema. Varovanje sebe, delovnega prostora in okolja. -Vodenje laboratorijskega dnevnika in pisanje poročil. -Iskanje informacij v literaturi in v bazah podatkov. **Metode in tehnike.** Vaje (eksperimenti) bodo izbrane na osnovi karakterističnih sinteznih metod. Vaje bodo zajemale pripravo reagentov in kemikalij, sintezo in izolacijo produktov, ter njihovo analitiko in karakterizacijo. Študentje bodo izvajali: -merjenje mase in prostornine -uporaba kemikalij in priprava raztopin, -topila v laboratoriju (čiščenje, regeneracija,	**General.** - Safety at work. Personal protective equipment. Personal, workspace and environmental protection. - Lab diary and reports writing. - Literature and databases information search. **Methods and techniques.** Exercise selection (experiments) will be based on the characteristic synthetic methods. Exercises will include a preparation of reagents and chemicals, synthesis and isolation of the products, followed by their analysis and characterization. Students will implement: - mass and volume measurements

brezvodna topila) -delo v inertni atmosferi, -delo s plini (jeklenke) -kristalizacija -destilacija, - sublimacija, - ekstrakcija, - kromatografske tehnike za karakterizacijo, izolacijo in separacijo spojin - karakterizacija organskih spojin s testnimi reakcijami in z derivatizacijo - določanje fizikalnih lastnosti snovi (tališče, vrelišče itd.)	- use of chemicals and preparation of solutions - solvents in the laboratory (cleaning , regeneration , anhydrous) - work at inert atmosphere - work with gases (cylinders) -crystallization - distillation - sublimation - extraction - chromatographic techniques, isolation and separation of the compounds - characterization of organic compounds with the test reactions and preparation of corresponding derivate - physical properties determination (melting point, boiling point, etc.).

Temeljna literatura in viri / Readings:

- N. Gros, J. Cerar, F. Kovač, B. Kozlevčar: Praktikum iz kemije, študijsko gradivo, UL FKKT.
- G. J. Shugar, R. A. Shugar, L. Bauman, R. Shugar Bauman: Chemical Technician's Ready Reference Handbook. McGraw-Hill, 1981.
- L. M. Harwood, C. J. Moody: Experimental Organic Chemistry. Blackwell, 1989.

Cilji in kompetence:	**Objectives and Competences:**
Cilji predmeta: Učna enota se navezuje na predmete Splošna kemija, Organska kemija . Študent z eksperimentalnim delom praktično nadgradi osnovno teoretično znanje kemije in pridobi osnovne veščine, ki so potrebne za eksperimentalno delo v kemijskem laboratoriju. **Predmetno specifične kompetence:** -varno delo v laboratoriju -priprava in izvedba preprostih in nekaterih srednje zahtevnih eksperimentov -izvajanje najpogostejših laboratorijskih meritev, temeljnih laboratorijskih operacij in postopkov -izvajanje standardnih laboratorijskih tehnik za izolacijo in čiščenje spojin -poznavanje osnov karakterizacije spojin -dostopanje in uporaba literaturnih virov in baz podatkov	**Objectives of the subject:** The course is related to the subjects of general chemistry, organic chemistry. The basic theoretical knowledge of chemistry is upgraded and the basic skills are acquired by the practical experimental work of a student, needed for the experimental work in the chemistry laboratory. **Subject-specific competencies:** -safe work in laboratory -preparation and implementation of simple and some moderately complex experiments -implementation of the most common laboratory measurements of basic laboratory operations and procedures -the application of standard laboratory techniques for the isolation and purification of compounds -knowledge of basics of compounds characterization -accessing and applying literature and databases

Predvideni študijski rezultati:	**Intended Learning Outcomes:**

Znanje in razumevanje -varno delo v laboratoriju - osnove merjenja in pravilno izvajanje temeljnih laboratorijskih operacij in meritev -priprava in izvedba pretvorb in eksperimentov - ločevanje, izolacija, čiščenje in karakterizacija spojin -pravilno načrtovanje priprave reagentov in raztopin, izbor ustreznih vrst kemikalij in pribora ter izvedba postopka -dostopanje do literaturnih virov in baz podatkov ter njihova uporaba **Razumevanje:** -osnovni in srednje zahtevni eksperimentalni postopki in pretvorbe v kemiji -teoretske osnove postopkov za izolacijo, čiščenje in karakterizacijo spojin. -osnovna pravila varnega dela v laboratoriju	Knowledge and Comprehension - laboratory safety - fundamentals of measurements, measuring techniques and basic laboratory operations in accordance with good laboratory practice - preparatory activities, transformations and experiments - separation, isolation, purification and characterisation of substances - preparation of solutions and reagents: planning, selecting chemicals of appropriate grade, choice of equipment, procedures - accessing to the information sources and data bases and their use **Understanding** - basic experimental procedures and transformations in chemistry - understanding the fundamentals of procedures of isolation, purification and characterisation of substances at the basic and intermediate level - performance in in accordance with safety precautions
Uporaba Osnovno praktično znanje kemije z razumevanjem povezav med kemijskimi področji je temeljno znanje, ki se uporablja v nadaljnjem študiju kemije in kemijske tehnologije hkrati pa je nujno potrebno vsakemu kemiku/tehnologu pri njegovem kasnejšem delu v praksi.	Application Fundamental chemical skills and understanding of the connections and relations between different chemical disciplines support study of prospect chemical and technological modules and are essential in professional practice.
Refleksija Študent bo na osnovi pridobljenega znanja sposoben izvesti preproste in srednje zahtevne meritve, eksperimente in pretvorbe v kemiji. S tem je sposoben preveriti hipoteze v praksi oziroma kritično ovrednotiti rezultate eksperimenta glede na skladnost s teoretičnimi načeli. Študent je seznanjen z dostopom do literaturnih virov in baz podatkov. Študent bo pridobil občutek za optimalno izvedbo osnovnih laboratorijskih postopkov. Študent bo pridobil kritičen odnos do priprave raztopin in se zavedal omejitev pri odmerjanju mase in prostornine ter razlik v razredih kemikalij v laboratoriju.	Analysis Student develops ability of performing measurements, experiments and transformations in chemistry at the basic and intermediate level. Student acquires skills for checking hypotheses experimentally and evaluating the conformity of the outcomes and results of experiments with theoretical expectations. Student is capable of using sources of information. Student develops sensitivity for adequate performance of laboratory operations. Student will be aware of the safety precautions for handling gasses. Student will develop critical attitude towards preparation of solutions and will be aware of the limitations in measuring mass and volume. Student will be

	aware of the distinctions between chemicals of different grades in a laboratory.
Prenosljive spretnosti - Merjenje mase in prostornine, priprava raztopin, -Pravilno izvajanje temeljnih laboratorijskih operacij -Dostopanje do literaturnih virov -Zbiranje, merjenje, analiza, razlaga in kritično vrednotenje podatkov -Identifikacija in reševanje problemov in izzivov. -Poročanje. -Kritična analiza, sinteza.	Skill-transference Ability - Measurement of mass and volume and preparation of solutions. - Performance of laboratory operations in accordance with good laboratory practice. - Ability of using information sources. - Ability of finding information, obtaining data by measurements, analysing, evaluating and interpreting data. - Ability of recognising and defining problems and challenges. - Reporting. - Critical analysis and synthesis of information.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**
Predavanja, laboratorijske vaje.	Lectures, laboratory exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Opravljene vaje so pogoj za pristop k izpitu. Pisni izpit, ki ga lahko nadomestita dva (sprotna) pregledna testa. Ocene: pozitivno 6-10.		Laboratory coursework is a prerequisite for the exam. Final written exam (or two partial written tests). Positive grades 6-10

Reference nosilca / Lecturer's references:

1. STRLE, Gregor, CERKOVNIK, Janez. A simple and efficient preparation of high-purity hydrogen trioxide (HOOOH). Angewandte Chemie, ISSN 1433-7851. [Print ed.], 2015, vol. 54, no. 34, str. 9917-9920, ilustr. http://onlinelibrary.wiley.com/doi/10.1002/anie.201504084/abstract, doi: 10.1002/anie.201504084. [COBISS.SI-ID 1536385475]
2. TUTTLE, Tell, CERKOVNIK, Janez, KOLLER, Jože, PLESNIČAR, Božo. The search for protonated dihydrogen trioxide (HOOOH) : insights from theory and experiment. The journal of physical chemistry. A, Molecules, spectroscopy, kinetics, environment, & general theory, ISSN 1089-5639, 2010, vol. 114, no. 30, str. 8003-8008, doi: 10.1021/jp103882e. [COBISS.SI-ID 34295813]
3. CERKOVNIK, Janez, PLESNIČAR, Božo. Recent advances in the chemistry of hydrogen trioxide (HOOOH). Chemical reviews, ISSN 0009-2665. [Print ed.], 2013, vol. 113, no. 10, str. 7930-7951, ilustr. http://pubs.acs.org/doi/ipdf/10.1021/cr300512s, doi: 10.1021/cr300512s. [COBISS.SI-ID 1615407]