UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	OSNOVNE OPERACIJE V KEMIJSKEM INŽENIRSTVU
Course Title:	UNIT OPERATIONS IN CHEMICAL ENGINEERING

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
VSŠP Kemijska tehnologija, 1. stopnja	**/**	**2.**	**4.**
PSP Chemical Technology, 1st Cycle	**/**	**2nd**	**4th**

Vrsta predmeta / Course Type:	obvezni / Mandatory
Univerzitetna koda predmeta / University Course Code:	KT119

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

Nosilec predmeta / Lecturer:	Izr. prof. dr. Aleš Podgornik / Dr. Aleksander Pavko, Associate Professor

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

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):**
Uvod: Pomen kemijskega inženirstva v svetu tehnike, znanosti in gospodarstva. Domena in smeri razvoja kemijskega inženirstva. Področja aktivnosti kemijskega inženirja. **Proces in procesna shema**. Osnovne procesne spremenljivke. Osnovne faze kemijskega procesa: priprava, kemijska pretvorba, izolacija in čiščenje produkta. **Osnovne operacije**. Koncept in temeljni principi osnovnih operacij. **Mehanske in hidrodinamske operacije**: drobljenje in mletje, sejanje, mešanje, posedanje, centrufugiranje, filtracija. Osnovni principi in naprave. **Termodifuzijske operacije**: destilacija, ekstrakcija, absorpcija, adsorpcija, uparjanje, kristalizacija, sušenje. Osnovni principi in naprave. Primeri sinteze posameznih osnovnih operacij v	**Introduction.** The role of chemical engineering in the field of science and technology as well as economy. Directions of development of chemical engineering. Activity fields of a chemical engineer. **Process diagram.** Basic process variables. Phases in a chemical process: upstream, reaction and downstream. **Unit operations.** Concept and basic principles. **Mechanical and hydrodynamical unit operations:** grinding, screening, mixing, settling, centrifugation, filtration. Basic principles and equipment. **Thermodiffusional unit operations.** Distillation, extraction, absorption, adsorption, crystallization, evaporation, drying. Basic principles and

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tehnološki proces.	equipment. Selected examples of integration of unit operations into whole technological process.

Temeljna literatura in viri / Readings:

- E.Ignatowitz, Kemijska tehnika (prevedel Leon Čelik), Jutro, Ljubljana, 1996, 456 str. (50%)
- J.H.Harker, J.R.Backhurst, J.F.Richardson, Chemical Engineering, Volume 2, Elsevier, 2002.

Cilji in kompetence:	**Objectives and Competences:**
Cilj predmeta je študente seznaniti z značilnostmi in koncepti kemijsko inženirske stroke. Predmetno specifične kompetence: - študent spozna osnovno in splošno vlogo ter pomen osnovnih operacij v kemijsko tehnološkem procesu, razume in zna pripraviti procesno shemo iz osnovnih operacij oziroma aparatov za določen tehnološki proces.	The objective is to acquaint the student with characteristics and concepts of chemical engineering profession. Specific competences are: - student recognizes basic and general role and significance of unit operations in a chemical process technology, student understands and is able to prepare a process scheme containing unit operations and equipment for a particular process technology.

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
<u>Znanje in razumevanje</u> Študent je po osvojitvi pojmov, zakonitosti, teorij in pojavov, ki jih podaja ta predmet, sposoben razumeti specifičnosti kemijsko inženirske stroke ter pomena osnovnih operacij v tehnološkem procesu.	<u>Knowledge and Comprehension</u> After mastering notions, laws, theories and phenomenon presented by those course, student is able to understand the specifics of chemical engineering profession and the role of unit operations in the chemical process technology.
<u>Uporaba</u> Pridobljena znanja je sposoben uporabiti pri reševanju posameznih praktičnih primerov in problemov v industrijskih kemijsko tehnoloških procesih .	<u>Application</u> Student is able to use the acquired knowledge in solving particular practical cases and problems from chemical process technology on industrial scale.
<u>Refleksija</u> Uporaba splošnih znanj in osnovnih principov kemijskega inženirstva, analiza in kritično ovrednotenje tehnološkega procesa oziroma posameznega postopka in naprave.	<u>Analysis</u> Use of general knowledge and basic principles of chemical engineering as well as analysis and critical evaluation of chemical process technology and particular operation and equipment.
<u>Prenosljive spretnosti</u> Razvita sposobnost identifikacije in reševanja problemov, kritičnega razmišljanja in logičnega sklepanja. Sposobnost uporabe literature, zbiranja in interpretacije podatkov in njihove kritične evalvacije.	<u>Skill-transference Ability</u> Developed skill to identify and solve problem, critical thinking and making logical conclusions. Ability of literature data using, data collection and interpretation as well as their critical evaluation.

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni in ustni izpit	**40 %**	Written and oral exam
Pisna seminarska naloga (pogoj za pristop k izpitu)	**20 %**	Written seminar (mandatory before exam)
Ocene: 6-10 (pozitivno), 1-5 (negativno).	**40 %**	Marks: 6-10 (positive), 1-5 (negative).

Reference nosilca / Lecturer's references:

ANDREJČIČ, Miha, PODGORNIK, Aleš. Effect of pressure drop model implemented for description of pressure drop on chromatographic monolith on estimated adsorbed layer thickness. Chemical Engineering Science, ISSN 0009-2509. [Print ed.], Apr. 2017, vol. 161, str. 370-381, doi: 10.1016/j.ces.2016.12.011.

GAŠPERŠIČ, Jernej, PODGORNIK, Aleš, KRAMBERGER, Petra, JARC, Marko, JANČAR, Janez, ŽORŽ, Mirjan, LENDERO KRAJNC, Nika. Separation of pegylated recombinant proteins and isoforms on CIM ion exchangers. Journal of chromatography. B, Analytical technologies in the biomedical and life sciences, ISSN 1570-0232, Oct. 2016, vol. 1033/1034, str. 91-96, doi: 10.1016/j.jchromb.2016.07.020.

ISAKARI, Yu, KISHI, Yuhi, YOSHIMOTO, Noriko, YAMAMOTO, Shuichi, PODGORNIK, Aleš. Reaction-mediated desorption of macromolecules : novel phenomenon enabling simultaneous reaction and separation. Biotechnology journal, ISSN 1860-6768, 2018, vol. 13, iss. 7, str. 1-9, ilustr. doi: 10.1002/biot.201700738.

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