Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Kemijsko računanje II**
Course title:	**Chemical calculation II**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	**/**	**2.**	**Poletni Spring**
Five-year master's degree program Subject Teacher	**/**		

Vrsta predmeta / Course type	Izbirni / Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
20			**10**		**60**	**3**

Nosilec predmeta / Lecturer:	doc. dr. Majda Krajnc/Assistant professor

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Anorganska kemija, matematika,	Anorganic chemistry, mathematics,

računalništvo v kemiji.	computer in chemistry.

Vsebina:

Predavanja:

- vrste kemijskih procesov (šaržni kontinuirni),
- pretvarjanje enot veličin,
- različni načini reševanja masnih bilanc posameznih procesnih enot (brez in z kemijsko reakcijo),
- sekvenčni in modularni način reševanja masnih bilanc sistemov procesnih enot,
- značilni tokovi v kemijskem procesu (obtok, mimotok, odtok),
- linearna interpolacija in regresija,
- numerično reševanje algebrskih enačb.

Računalniške vaje:

Na osnovi osvojene teorije študentje uporabljajo različne načine in orodja pri reševanju masnih bilanc procesnih enot in sistemov procesnih enot.

Pri reševanju matematičnih in kemijskih problemov uporabljajo različne numerične metode in programe in sicer Aspen Plus, Polymath in Excel.

Content (Syllabus outline):

Lectures:

- chemical processes (batch, continuous),
- conversion of units,
- different approaches of solving material balances for single process units (without and with chemical reaction),
- sequential and modular approaches of solving material balances for chemical processes,
- different streams in chemical processes (recycle, bypass, purge),
- linear interpolation and regression,
- solving algebraic equations with numerical methods.

Computational work:

On the basis of the learned theory students use different approaches and tools for solving material balances of process units and systems of process units.

They also use different numerical methods and programs (Aspen Plus, Polymath and Excel) for solving mathematical and chemical problems.

Temeljni literatura in viri / Readings:

1. R. M. Felder, R. W. Rousseau, Elementary Principles of Chemical Processes, John Wiley & Sons, Inc., New York, 2000.
2. M. Krajnc, S. Oreški, F. Purkeljc, Procesne bilance, Fakulteta za kemijo in kemijsko tehnologijo, Maribor, 2012 (elektronska verzija).
3. M. Krajnc, Procesne bilance, zbirka rešenih nalog, zbrano gradivo, FKKT Maribor, 2011 (elektronska verzija).

4. S. Oreški, Procesne bilance – računalniške vaje, 2. del, Numerične metode, snovne bilance sistemov brez in s kemijsko reakcijo, FKKT, Maribor, 2007.

Cilji in kompetence:

Sistematično reševanje masnih bilanc v kemijskih procesih, samostojna uporaba programskih paketov Aspen Plus, Polymath in Excel.

Objectives and competences:

Systhematic solving of material balances in chemical processes, the use of programs Aspen Plus, Polymath and Excel.

Predvideni študijski rezultati:

Znanje in razumevanje:

Do rezultatov vodi sistematično reševanje masnih bilanc.

Prenesljive/ključne spretnosti in drugi atributi:

Uporaba komercialnih programov (Aspen Plus, Polymath in Excel) pri podobnih predmetih.

Intended learning outcomes:

Knowledge and Understanding:

Systhematic work leads to the material balances results.

Transferable/Key Skills and other attributes:

The use of comercial programs (Aspen Plus, Polymath and Excel) with similar courses.

Metode poučevanja in učenja:

Aktivno poučevanje in učenje, skupinsko (sodelovalno) delo, e-izobraževanje.

Learning and teaching methods:

Active teaching and learning, cooperative learning, e-learning.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: - pisni izpit ali 2 pisna testa, - ustno izpraševanje ali 2 e-testa, - domača naloga, - računalniške vaje.	**30** **20** **20** **30**	Student passes the examination if s(he) successfully passed all the following obligations: - written test or 2 written tests, - oral examination or 2 e-tests, - homework, - computational work.

Reference nosilca / Lecturer's references:

1. LUKMAN, Rebeka, KRAJNC, Majda. Exploring non-traditional learning methods in virtual and real-world environments. *Educ. technol. soc.*, 2012, vol. 15, no. 1, str. 237-247. http://www.ifets.info/journals/15_1/21.pdf.

2. PETEK, Aljana, KRAJNC, Majda. The enthalpy and entropy of activation for ethyl acetate saponification. *Int. j. chem. kinet.*, 2012, vol. 44, issue 10, str. 692-698, doi: 10.1002/kin.20712.

3. LUKMAN, Rebeka, LOZANO, Rodrigo, VAMBERGER, Tamara, KRAJNC, Majda. Addressing the attitudinal gap towards improving the environment : a case study from a primary school in Slovenia. *J. clean. prod.*. [Print ed.], Available online 12 August 2011, doi: 10.1016/j.jclepro.2011.08.005.

4. KRAJNC, Majda. E-learning environment integration in the chemical engineering educational process. *Int. j. eng. educ.*, 2009, vol. 25, no. 2, str. 349-357. http://www.ijee.ie/latestissues/Vol25-2/s18_ijee2119.pdf.

5. KRAJNC, Majda, KOVAČ KRALJ, Anita, GLAVIČ, Peter. Heat integration in a speciality product process. *Appl. therm. eng.*. [Print ed.], June 2006, vol. 26, iss 8/9, str. 881-891. http://dx.doi.org/10.1016/j.applthermaleng.2005.09.018.