UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	NAČRTOVANJE KEMIJSKIH PROCESOV
Course Title:	CHEMICAL PROCESS DESIGN

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
MAG Kemijsko inženirstvo, 2. stopnja	**/**	**2.**	**4.**
USP Chemical Engineering, 2nd Cycle	**/**	**2nd**	**4th**

Vrsta predmeta / Course Type: izbirni strokovni / Elective Professional

Univerzitetna koda predmeta / University Course Code: IN2I07

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
45	**15**	**15 SV**	**/**	**/**	**75**	**5**

Nosilec predmeta / Lecturer: prof. dr. Janez Levec / Dr. Janez Levec, Full 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):
Temeljna vsebinska področja predmeta so: - sinteza procesa: strategija in konceptualno načrtovanje, dekompozicijske in hevristične strategije; - pinch analiza: termodinamika, mreža toplotnih izmenjevalcev; - preliminarna analiza procesa: poenostavljene snovne in energijske bilance, prostostne stopnje, »short cut« metode, algoritmi za reševanje procesnih shem; - integracija procesa: toplotni stroji, toplotne črpalke, separatorji, reaktorji; - načrtovanje procesov z uporabo pinch tehnologije, nizanje separatorjev, sinteza toplotnih izmenjevalcev; - modeli in algoritmi za osnovne operacije;	Basic content of the course: - process synthesis: strategy and conceptual design, decomposable and heuristic strategies, - pinch analysis: thermodynamics, network of heat exchangers, - preliminary process analysis: simplified mass and heat balances, degree of freedom, short cut methods, algorithms for solving process schemes, - process integration: heat engines, heat pumps, separators, reactors, - process design by pinch technologies, series of separators, synthesis of heat exchangers, - models and algorithms for unit operations, - economic process evaluation: equipment and costs,

- ekonomska evalvacija procesa: oprema in stroški, preračuni finančnih tokov; - simulacijski koncepti načrtovanja procesov: modularni in sekvenčni pristop, analiza procesnih shem; - numerične metode za velike sisteme nelinearnih algebraičnih enačb.	- simulation concept of process design, analysis of process schemes, - numerical methods for solving large systems of nonlinear equations.

Temeljna literatura in viri / Readings:

- W. D. Seider, J. D. Seader, D. R. Lewin, Process Design Principles: Synthesis, Analysis and Evaluation, John Wiley & Sons, Inc., New York, 1998, 824 str., (40 %).
- L. T. Biegler, I. E. Grossmann, A. W. Westerberg et al., Systematic Methods of Chemical Process Design, Prentice Hall, 1997, 700 str., (20 %).

Cilji in kompetence:	**Objectives and Competences:**
Cilj predmeta je, da študentu ponudi znanja, ki so potrebna za integralno načrtovanje kemijskih procesov. Študentje pri predmetu pridobijo naslednje specifične kompetence: - sposobnost analize in sinteze procesov; - integracija procesnih aparatov v procesne sheme; - sposobnost načrtovanja enostavnejših kemijskih procesov.	Course provides knowledge that is needed in its integral approach to the chemical process design. Student gains the following specific competences: ability to analyze and synthesize processes, integrate individual apparatuses into a process scheme, ability to design a simple chemical process.

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
Znanje in razumevanje Študent zna identificirati ključne dejavnike pri sintezi in analizi kemijskih procesov, sposoben je pridobljena znanja uporabljati pri načrtovanju kemijskih obratov s stališča procesne opreme in ekonomike procesa.	Knowledge and Comprehension Student is able to identify and understand key issues in the synthesis and analysis of chemical processes and use a newly gained knowledge in the design of chemical plants from the point of process equipment and process economics.
Uporaba Pridobljena znanja je sposoben uporabiti pri načrtovanju novih in analizi obstoječih procesov.	Application Possessing sufficient knowledge student can design new and analyze existing processes.
Refleksija Na osnovi osvojenih teoretičnih znanj študentje pridobijo veščine za analizo (bio)kemijskih procesov in prenos znanja v tehnološki proces.	Analysis Theoretical knowledge gained during the course can be efficiently transferred into new technological routes of chemical processes.
Prenosljive spretnosti Razvita sposobnost integracije temeljnih kemijsko inženirskih znanj.	Skill-transference Ability Well-developed skills of integrating fundamental chemical engineering knowledge into industrial processes.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**

Predavanja, seminarji	Lectures, seminars.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni in ustni izpit. 80% Predstavitev seminarja. 20%		

Reference nosilca / Lecturer's references:

- **LEVEC, Janez**. Arrangement and process for oxidizing an aqueous medium: US Patent Number 5,928,521, Appl. no. 08/945,534, date of patent July 27, 1999.
- **LEVEC, Janez**, PINTAR, Albin. Process for treating industrial waste waters with low concentration of toxic organic pollutants: EP 0 664 771 B1: Appl. no. 93924006, München, 1997.
- PINTAR, Albin, BATISTA, Jurka, **LEVEC, Janez**. Integrated ion exchange/catalytic process for efficient removal of nitrates from drinking water. Chemical Engineering Science, 2001, vol. 56, ino. 4, pp. 1551-1559.