

NAČRTOVANJE TRAJNOSTNIH KEMIJSKIH PRODUKTOV

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Načrtovanje trajnostnih kemijskih produktov
Course title:	Design of Sustainable Chemical Products
Članica nosilka/UL	UL FKKT
Member:	

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Kemijska tehnologija, prva stopnja, visokošolski strokovni	Ni členitve (študijski program)	2. letnik, 3. letnik	2. semester	izbirni

Univerzitetna koda predmeta/University course code: 0643415

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
20	55				75	5

Nosilec predmeta/Lecturer: doc. dr. Blaž Zupan, prof. dr. Urška Šebenik

Vrsta predmeta/Course type: izbirni strokovni/Elective Professional

Jeziki/Languages:

Predavanja/Lectures:	Slovenščina
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:

- Definicija načrtovanja kemijskih produktov.
- Koncept zelenega prehoda in trajnostni pristopi pri načrtovanju produktov.
- Piramida kemijskega produkta. Vplivi na funkcionalnost produkta (materiali in sestava, proces izdelave, struktura, pogoji uporabe, kazalci učinkovitosti in faktorji kakovosti). Funkcije lastnosti, procesa in uporabe.
- Osnovni koraki pri načrtovanju produktov in procesov, ki vključujejo definicijo problema in potencialne tehnične rešitve ob upoštevanju trajnostnih dejavnikov. Potrebe, ideje, izbor ideje, izdelava in ekonomika.
- Okoljski projektni management, funkcije managementa, deležniki organizacije, družbena inovacija, organizacija in vodenje, pregled organizacijskih struktur, kultura organizacije, navade

Content (Syllabus outline):

- Definition of chemical product design.
- Green transition concept and sustainable approaches in product design.
- The chemical product pyramid. Effects on chemical product performance (materials and composition, use, process, structure and performance indices and quality factors). Property, process, and usage functions.
- Basic steps in product and process design with problem definition and possible technical solutions considering sustainability issues.
- Needs, ideas, idea selection, manufacturing and economics.
- Environmental project management, functions of management, organizational stakeholders, social innovation, organization and leadership, overview of organizational structures, organizational culture,

<p>in rutine, trajnostno vodenje</p> <ul style="list-style-type: none"> - Poslovno načrtovanje, izdelava poslovnega modela, ekonomika poslovanja, upravljanje z denarnimi tokovi in poslovnimi tveganji - Primeri načrtovanja trajnostnih kemijskih produktov. Študentje v skupinah rešujejo realen problem in razvijajo trajnosten/zelen/družbeno odgovoren produkt. 	<p>habits and routines, sustainable leadership</p> <ul style="list-style-type: none"> - Business planning, business model development, economics, cash flow management and business risk management - Examples of sustainable chemical product design. Students solve a real-world problem in groups and design a sustainable/green/socially responsible product.
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Temeljna literatura in viri/Readings:

<ul style="list-style-type: none"> • E. L. Cussler in G. D. Moggridge, Chemical Product Design, Cambridge University Press, Cambridge, 2. izdaja, 2011. • J. A. Wesselingh, S. Kuil, M. E. Viglid, Design and Development of Biological, Chemical, Food and Pharmaceutical Products, John Wiley & Sons, Chichester, 2007. • R. Costa, G. D. Moggridge in P. M. Saraiva, Chemical Product Engineering: An Emerging Paradigm Within Chemical Engineering, AIChE, 52 (6) 2016, 1976 - 1986. • M. Marc, N. Ponikvar, M. Tekavčič, Ekonomika projektov, Ljubljana, 2020. • A. Stare, Projektni management: teorija in praksa, Ljubljana: Agencija POTI, 2011. • Maurya, Ash. Delaj vitko: od načrta A do načrta, ki deluje. Pasadena, 2014. • Antončič in ostali: Podjetništvo – glavi dejavnik razvoja, 2022. Dostopno na: http://maks2.ef.uni-lj.si/zaloznistvoslike/499/Podjetni%C5%A1tvo.pdf • Dodatna znanstvena in strokovna literatura za opravljanje seminarske naloge in izdelavo pisnega poročila o seminarski nalogi.
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Cilji in kompetence:

<p>Študent osvoji metodološki pristop za razvoj novih produktov, ki vključuje identifikacijo in analizo potreb, s poudarkom na trajnostnih pristopih in zelenem prehodu. Osvoji različne stopnje razvoja kemijskih produktov in splošni pristop k definiranju potencialnih tehničnih rešitev ob upoštevanju ekonomskih, varstvenih in okoljskih dejavnikov. Študent je sposoben uporabiti kemijsko inženirska znanja za opis in reševanje realnega problema. Osvoji osnove poslovnega načrta, projektne managementa in vodenja projektne skupine.</p>	<h3>Objectives and competences:</h3> <p>The student acquires a methodological approach to new product development that includes identification and analysis of needs, with emphasis on sustainable approaches and a green transition. The student understands the different stages of chemical product development and the general approach to define possible technical solutions by considering economic, safety and environmental factors. Ability to apply chemical engineering knowledge to describe and solve a real-world problem. Understanding the basic of business planning, project management and project team management.</p>
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Predvideni študijski rezultati:

<p>Znanje in razumevanje</p> <p>Študent zna identificirati ključne dejavnike pri razvoju trajnostnih kemijskih produktov in možnosti za zeleni prehod. Razume povezavo med osnovnimi kemijsko inženirskimi znanji in specifičnimi znanji za načrtovanje lastnosti določenega kemijskega produkta. Pozna osnovno metodologijo razvoja produkta in procesa za zadovoljitev potreb trga. Zna upoštevati spoznanja s področja (projektne) managementa, ekonomske in okoljske dejavnike pri načrtovanju procesa za kemijski produkt. Razume pomen zelenega prehoda. Razume pomen interdisciplinarnega sodelovanja pri reševanju kompleksnih izzivov, ki se pojavijo pri razvoju trajnostnih kemijskih produktov.</p> <p>Uporaba</p> <p>Študent je pridobljena znanja sposoben uporabiti pri</p>	<h3>Intended learning outcomes:</h3> <p>Knowledge and Comprehension</p> <p>Ability to identify key factors in the development of sustainable chemical products and opportunities for a green transition. Understanding of the relationship between basic chemical engineering skills and specific skills to design the properties of a given chemical product. Knowledge of basic product and process development methodology to meet market needs. Knowledge of how to consider insights from (project) management, economic and environmental factors when developing a process for a chemical product. Understanding of the importance of the green transition. Understanding of the importance of interdisciplinary collaboration in solving the complex challenges that arise in the development of sustainable chemical products.</p>
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razvojnem in raziskovalnem delu na področjih razvoja in optimizacije procesov in produktov.

Refleksija

Študent je sposoben sintetizirati pridobljena kemijsko inženirska znanja in jih uporabiti pri reševanju realnih problemov. Študent je sposoben identificirati potrebo po specifičnih tehničnih in naravoslovnih znanjih ter osnovnih ekonomsko/poslovnih znanjih za reševanje realnega problema. Pridobljeno znanje mu omogoča aktivno komuniciranje in sodelovanje na interdisciplinarnih področjih.

Prenosljive spretnosti

- razumevanje koncepta zelenega prehoda,
- sposobnost ustvarjalnega razmišljanja in delovanja,
- sposobnost iskanja, interpretacije, kritične analize in povezovanja relevantnih informacij,
- sposobnost analize, sinteze in razumevanja vpliva tehniških rešitev na okoljske in socialne odnose,
- sposobnost komunikacije (razprava s poudarkom na argumentaciji), tudi v angleščini, in uporabe modernih komunikacijskih orodij,
- sposobnost komunikacije s strokovnjaki ekonomsko/poslovnih ved
- sposobnost delovanja in organizacije dela v skupini,
- sposobnost razumevanja poklicne in etične odgovornosti,
- sposobnost samostojnega učenja,
- digitalna pismenost.

Application

The student can apply the acquired knowledge in development and research work in the areas of process and product development and optimization.

Analysis

The student is able to integrate and apply the acquired chemical engineering knowledge in solving problems in practise. The ability to identify the need for specific technical and natural science knowledge as well as fundamental economic/business skills to solve a real-world problem. The knowledge acquired will enable the student to actively communicate and cooperate in interdisciplinary fields.

Skill-transference Ability

- the understanding of the concept of green transition,
- the ability to think and act creatively,
- the ability to find, interpret, critically analyse, and link relevant information,
- the ability to analyse, synthesize and understand the impact of technical solutions on environmental and social conditions,
- the ability to communicate (discussion with emphasis on argumentation), and to use modern communication tools,
- the ability to communicate with experts in the field of economics and business,
- the ability to work in a group and to organize work,
- the ability to understand professional and ethical responsibilities,
- the ability to learn independently,
- digital literacy.

Metode poučevanja in učenja:

Predavanja, seminarji – projektno delo v manjših skupinah
Poleg predavanja v živo v predavalnici se največ do 15 ur pedagoško delo izvede z elektronskimi oblikami dela.

Learning and teaching methods:

Lectures, seminars – project work in small groups
In addition to the live lectures in the lecture hall, a maximum of 15 hours of pedagogical work will be conducted using electronic forms of work.

Načini ocenjevanja:

Pogoj za pristop k pisnem izpitu je izdelana seminarska naloga (izvedba, pisno poročilo in predstavitev).

Delež/Weight

40,00 %

Assessment:

The prerequisite for participation in the written examination is a prepared seminar paper (implementation, written report, and presentation).

Pisni izpit

60,00 %

Written exam

Reference nosilca/Lecturer's references:

- RUČIGAJ, Aleš, ŠTIRN, Žiga, ŠEBENIK, Urška, KRAJNC, Matjaž. Main-chain benzoxazine oligomers: effects of molecular weight on the thermal, mechanical, and viscoelastic properties. Journal of applied polymer science. 2018, 135(35),1-11.
- KAJTNA, Jernej, ŠEBENIK, Urška. Novel acrylic/nanocellulose microsphere with improved adhesive properties. International journal of adhesion and adhesives. 2017, 74, 100-106.
- LAPASIN, Romano, GRASSI, Mario, ABRAMI, Michela, ŠEBENIK, Urška. Structural evolution of salt-free aqueous Laponite dispersions : a study based on low-field NMR relaxometry and rheological investigations. Colloids and surfaces. A, Physicochemical and Engineering Aspects. 2020, 602, 1-11.

- PUSTOVRH, Aleš, JAKLIČ, Marko, BOLE, Domen, **ZUPAN, Blaž**. How to create a successful regional startup ecosystem : a policy-making analysis. Lex localis : revija za lokalno samoupravo. [Tiskana izd.]. Jul. 2019, vol. 17, iss. 3, str. 749-770.

- **ZUPAN, Blaž**, CANKAR, Franc, SETNIKAR-CANKAR, Stanka. The development of an entrepreneurial mindset in primary education. European journal of education. [Print ed.]. Sep.2018, vol. 53, iss. 3, str. 427-439.

- LIKAR, Borut, CANKAR, Franc, **ZUPAN, Blaž**. Educational model for promoting creativity and innovation in primary schools. Systems research and behavioral science : the official journal of the International Federation for Systems Research. Mar./Apr. 2015, vol. 32, iss. 2, str. 205-213.

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