

INOVIRANJE V STROJNIŠTVU - RRP

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Inoviranje v strojništvu - RRP
Course title:	Innovation in Mechanical Engineering -RRP
Članica nosilka/UL Member:	UL FS

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Strojništvo - razvojno raziskovalni program, prva stopnja, univerzitetni	Ni členitve (študijski program)	2. letnik	2. semester	izbirni

Univerzitetna koda predmeta/University course code:	0545355
Koda učne enote na članici/UL Member course code:	2025-U

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
15		15			45	3

Nosilec predmeta/Lecturer:	prof. dr. Andrej Kos, doc. dr. Mojca Volk
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Izvajalci predavanj:	
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	Splošni izbirni predmet /Elective general course
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Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
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Vsebina:	Content (Syllabus outline):
1. PREDAVANJE: - Pomen ustvarjalnosti in inovativnosti v sodobni družbi. - Metode identifikacije inovacijskih priložnosti. 2. PREDAVANJE: - Ustvarjalno razmišljanje in kreativno reševanje izzivov.	1. LECTURE: - The importance of creativity and innovation in contemporary society. - Methods for the identification of innovation opportunities. 2. LECTURE: - Creative thinking and creative problem solving.

• Razumevanje potreb trga in poslovnih priložnosti. • Ocena izvedljivost in tržni potencial novosti. 3. PREDAVANJE: • Sodobni pristopi razvoja inovativnih rešitev. • Raziskovalna in podjetniška okolja in priložnosti. • Raziskovanje poslovnih strategij. 4. in 5. PREDAVANJE • Okolja za spodbujanje procesov inoviranja. • Osnove komercializacije inovacij. • Upravljanje, zaščita in uporaba znanja in intelektualne lastnine.	• Understanding of the market and customer needs. • Feasibility assessment and understanding of the market potential. 3. LECTURE: • Modern approaches to innovative development of solutions. • Research and entrepreneurship ecosystems and opportunities. • Research of business strategies. 4. and 5. LECTURE • Innovation communities. • Basics of commercialization of innovations. • Management, protection and exploitation of know-how and intellectual property.
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Temeljna literatura in viri/Readings:

1. Likar B. in sodelavci. Management inovacijskih in RR procesov v EU. Inštitut za inovativnost in tehnologijo, Slovenija, izdaja, 2006.
https://www.researchgate.net/publication/283463376_Management_inovacijskih_in_RR_procesov_v_EU
2. Kesič, D., & Likar, B. 2018. Komercializacija novosti za neekonomiste. Založba Univerze na Primorskem.
<http://www.hippocampus.si/ISBN/978-961-7023-88-6.pdf>
3. Košmrlj Katarina, Širok Klemen, Likar Borut. 2015. Veščina obvladovanja inovacijskih problemov in priložnosti. Koper: Fakulteta za management.
https://www.researchgate.net/publication/278404371_Vescina_obvladovanja_inovacijskih_problemov_in_priloznosti
4. S. Fricker, R. Grau, A. Zwingli. 2015. Requirements Engineering: Best Practice. 10.1007/978-3-319-09798-5_2.
5. E. Ries, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business, 2011.
<https://ia800509.us.archive.org/7/items/TheLeanStartupErickRies/The%20Lean%20Startup%20-%20Erick%20Ries.pdf>

Cilji in kompetence:

Cilji:

1. Spoznati temeljne pristope in metode za razumevanje problemov in potreb uporabnikov ter kreiranje inovativnih rešitev.
2. Spoznati principe s področja identifikacije idej in kritične analize njihovega potenciala in izvedljivosti.
3. Razviti sposobnosti ustvarjalnega razmišljanja in kreativnega reševanja izzivov.
4. Spoznati metode inženirstva zahtev in sodobne pristope k uporabnikom usmerjenega načrtovanja in prototipiranja.
5. Spoznati raziskovalna in podjetniška okolja in priložnosti.
6. Spoznati principe upravljanja, zaščite in uporabe znanja in intelektualne lastnine.
7. Pridobiti izkušnje na področju sodelovalnega projektnega dela.
8. Uporabiti pridobljena znanja in veščine v praktični nalogi razvoja inovativne ideje.

Kompetence:

Objectives and competences:

Objectives:

1. Learn about the fundamental approaches and methods for understanding the customers' problems and needs, and for the design of creative solutions
2. Gain knowledge about the principles of identifying creative ideas and critical analysis of their potential and feasibility.
3. Learn about the approaches of creative thinking and creative problem solving.
4. Learn about requirements engineering and modern approaches to user-centered design and prototyping.
5. Learn about research and entrepreneurship ecosystems and opportunities.
6. Understand the principles of know-how and intellectual property management, protection and exploitation.
7. Acquire practical experience in collaborative project work.

1. Sposobnost analize in razumevanja problemov in potreb uporabnikov in kreiranje inovativnih rešitev (S1-RRP, S2-RRP, S7-RRP). 2. Uporaba tehnik kreativnega razmišljanja (S1-RRP, S2-RRP, P5-RRP). 3. Sposobnost analize potenciala in izvedljivosti idej (S5-RRP, S2-RRP, S7-RRP, S9-RRP, P3-RRP). 4. Uporaba izbranih tehnik inženirstva zahtev (S1-RRP, S2-RRP, S8-RRP). 5. Izdelava prototipov ob interakciji z uporabniki (S6-RRP, S8-RRP, P3-RRP, P5-RRP, P6-RRP). 6. Sposobnost raziskave raziskovalnih in poslovnih priložnosti (S1-RRP, S7-RRP). 7. Sposobnost konceptualnega razvoja poslovnega modela (S1-RRP, S2-RRP, S4-RRP, S6-RRP, S8-RRP, P5-RRP, P6-RRP). 8. Poznavanje temeljnih postopkov in metod za raziskavo, zaščito in uporabo intelektualne lastnine (S1-RRP, S7-RRP). 9. Povezava znanja in veščin v zaključeno projektno nalogo (S4-RRP, S7-RRP, P6-RRP).	8. Use the acquired knowledge and skills to develop an innovative idea as part of a practical assignment. Competencies: 1. Ability to analyse and understand customers' problems and needs and develop creative solutions (S1-RRP, S2-RRP, S7-RRP). 2. Use of creative thinking techniques (S1-RRP, S2-RRP, P5-RRP). 3. Ability to analyse the potential and feasibility of ideas (S5-RRP, S2-RRP, S7-RRP, S9, RRP, P3-RRP). 4. Use of selected requirements engineering techniques (S1-RRP, S2-RRP, S8-RRP). 5. Prototyping with end-user interactions (S6-RRP, S8-RRP, P3-RRP, P5-RRP, P6-RRP). 6. Ability to investigate research and business opportunities (S1-RRP, S7-RRP). 7. Ability to develop a conceptual business model (S1-RRP, S2-RRP, S4-RRP, S6-RRP, S8-RRP, P5-RRP, P6-RRP). 8. Understanding basic procedures and methods for intellectual property analysis, protection and exploitation (S1-RRP, S7-RRP). 9. Use of knowledge and skills in the practical assignment (S4-RRP, S7-RRP, P6-RRP).
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Predvideni študijski rezultati:

Znanja (Z) in spretnosti (S):

Z1. Poglobljeno strokovno teoretično in praktično poznavanje konceptov in pristopov k inoviranju.

S1.1. Raziskovanje in razumevanje potreb uporabnikov ter razvoj inovativnih rešitev.

S1.2. Analiza potenciala in izvedljivosti idej.

S1.3. Načrtovanje in izdelava prototipov ob interakciji z uporabniki

S1.4. Raziskovanje podjetniških priložnosti in iskanje možnosti komercializacije.

S1.5. Zaščita in uporaba intelektualne lastnine.

Z2. Uporaba znanja in veščin v praksi.

S2.1. Timsko delo in participacija v sodelovalnih projektnih aktivnostih.

S2.2. Razvoj inovativne ideje v praksi.

Intended learning outcomes:

Knowledge (K) and skills (S):

Z1: Thorough professional theoretical and practical knowledge of concepts and approaches in innovation.

Skills:

S1.1. Research and understanding of customer needs and innovative solution development.

S1.2. Analysis of the potential and feasibility of ideas.

S1.3. Design and prototyping with customer interaction.

S1.4. Research of business opportunities and commercialization options.

S1.5. Intellectual property protection and exploitation.

Z2. Use of knowledge and skills in practice.

S2.1. Teamwork and participation in collaborative project activities.

S2.2. Innovative idea development in practice.

Metode poučevanja in učenja:

P1. Interaktivna predavanja s primeri iz prakse in diskusijami.

P2. Interaktivna avditorna predavanja in vaje z analizami in vajami reševanja problemov na izbranih teoretičnih in praktičnih primerih.

P3. Skupinsko projektno in kolaborativno delo.

P4. Simulacije izbranih procesov inoviranja (razprave, strukturirane diskusije, predstavitve in analize po

Learning and teaching methods:

P1. Interactive lectures with practical examples and discussions.

P2. Interactive auditorial lectures and exercises with analyses and problem solving exercises of selected theoretical and practical examples.

P3. Teamwork and collaborative project work.

P4. Simulations of selected innovation processes (debates, structured discussions, presentations and

metodah inženirstva zahtev, razvoj poslovnega modela itd.). P5. Razvoj in predstavitev inovativne ideje v praksi (projektno delo). P6. Strukturirana obravnava snovi po vnaprej predloženem programu.	analyses using requirements engineering methods, business model development, etc.). P5. Innovative idea development and presentation in practice (project work). P6. Structured subject matter study based on a predefined programme.
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Načini ocenjevanja:	Delež/Weight	Assessment:
Pisni izpit.	50,00 %	Written exam.
Ocena praktičnega dela na vajah.	50,00 %	Practical assignment.

Ocenjevalna lestvica:	Grading system:
5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Andrej Kos:

1. PUSTIŠEK, Matevž, CHEN, Min, **KOS, Andrej**, KOS, Anton. Decentralized machine autonomy for manufacturing servitization. *Sensors*. Jan.-1 2022, iss. 1, 338, str. 1-22, ilustr. ISSN 1424-8220. <https://www.mdpi.com/1424-8220/22/1/338>, Repozitorij Univerze v Ljubljani – RUL, DOI: [10.3390/s22010338](https://doi.org/10.3390/s22010338). [COBISS.SI-ID [91945219](https://cobiss.si/91945219)].
2. ZAVRATNIK, Veronika, PODJED, Dan, TRILAR, Jure, HLEBEC, Nina, **KOS, Andrej**, STOJMENOVA DUH, Emilija. Sustainable and community-centred development of smart cities and villages. *Sustainability*. 2020, iss. 10, 3961, str. 1-17, ilustr. ISSN 2071-1050. <https://www.mdpi.com/2071-1050/12/10/3961>, Repozitorij Univerze v Ljubljani – RUL, DOI: [10.3390/su12103961](https://doi.org/10.3390/su12103961). [COBISS.SI-ID [15026691](https://cobiss.si/15026691)].
3. DROBNIC, Franc, STARC, Gregor, JURAK, Gregor, **KOS, Andrej**, PUSTIŠEK, Matevž. Explained learning and hyperparameter optimization of ensemble estimator on the bio-psycho-social features of children and adolescents. *Electronics*. 2023, vol. 12, iss. 19, art. 4097, str. 1-15, ilustr. ISSN 2079-9292. <https://www.mdpi.com/2079-9292/12/19/4097>, DOI: [10.3390/electronics12194097](https://doi.org/10.3390/electronics12194097). [COBISS.SI-ID [166659587](https://cobiss.si/166659587)], [JCR, SNIP, WoS, Scopus].
4. PUSTIŠEK, Matevž, TURK, Jan, **KOS, Andrej**. Secure modular smart contract platform for multi-tenant 5G applications. *IEEE access*. 10 Aug. 2020, vol. 8, str. 150626-150646, ilustr. ISSN 2169-3536. <https://ieeexplore.ieee.org/document/9163092>, DOI: [10.1109/ACCESS.2020.3013402](https://doi.org/10.1109/ACCESS.2020.3013402). [COBISS.SI-ID [26860547](https://cobiss.si/26860547)].
5. PUSTIŠEK, Matevž, ŽIVIĆ, Nataša, **KOS, Andrej**. Blockchain : technology and applications for Industry 4.0, smart energy, and smart cities. Berlin: De Gruyter, 2021, cop. 2022. XXII, 159 str., ilustr. De Gruyter STEM. ISBN 978-3-11-068112-3, ISBN 3-11-068112-9. <https://www.degruyter.com/books/9783110681123>. [COBISS.SI-ID [86443523](https://cobiss.si/86443523)].

Mojca Volk:

1. **VOLK, Mojca**, STERLE, Janez. 5G experimentation for public safety : technologies, facilities and use cases. *IEEE access*. 2021, vol. 9, str. 41184-41217, ilustr. ISSN 2169-3536. <https://ieeexplore.ieee.org/document/9371761>, DOI: [10.1109/ACCESS.2023064405](https://doi.org/10.1109/ACCESS.2023064405). [COBISS.SI-ID [55579907](https://cobiss.si/55579907)].
2. CVAR, Nina, TRILAR, Jure, KOS, Andrej, **VOLK, Mojca**, STOJMENOVA DUH, Emilija. The use of IoT technology in smart cities and smart villages : similarities, differences, and future prospects. *Sensors*. Jul.-2 2020, iss. 14, 3897, str. 1-20, ilustr. ISSN 1424-8220. <https://www.mdpi.com/1424-8220/20/14/3897>, Repozitorij Univerze v Ljubljani – RUL, DOI: [10.3390/s20143897](https://doi.org/10.3390/s20143897). [COBISS.SI-ID [22616067](https://cobiss.si/22616067)].
3. DOBRUNA, Jeta, FAZLIU, Zana L., MALOKU, Hena, **VOLK, Mojca**. A heuristic approach to energy efficient user association in ultra-dense HetNets using intermittent scheduling strategies. *IET communications*. [Print ed.]. 2024, vol. 18, iss. 17, str. 1079-1088, ilustr. ISSN 1751-8628. <https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cmu2.12816>, Repozitorij Univerze v Ljubljani – RUL, DOI: [10.1049/cmu2.12816](https://doi.org/10.1049/cmu2.12816). [COBISS.SI-ID [206870275](https://cobiss.si/206870275)].

4. SEDLAR, Urban, ŠTEFANIČ JUŽNIČ, Leon, **VOLK, Mojca**. An iteratively-improving internet-of-things honeypot experiment. V: CobCom Conference 2020 : proceedings. International Conference on Broadband Communications for Next Generation Networks and Multimedia Applications, July 7-9, 2020, Graz, Austria. Graz: [University of Technology, Institute of Microwave and Photonic Engineering], 2020. Str. 81-86, ilustr. https://www.cobcom.tugraz.at/wordpress/wp-content/uploads/2020/07/Proceedings_CoBCom_2020.pdf. [COBISS.SI-ID [26525187](#)].
5. AVDIU, Agnesë, HAJDINI, Edon, **VOLK, Mojca**. An overview of the frequency bands and channel models envisioned for 6G networks. Przegląd Elektrotechniczny. 2024, r. 100, nr. 11, str. 44-52, ilustr. ISSN 2449-9544. https://www.pe.org.pl/abstract_pl.php?nid=14703, [Repozitorij Univerze v Ljubljani – RUL](#), DOI: [10.15199/48.2024.11.09](https://doi.org/10.15199/48.2024.11.09). [COBISS.SI-ID [213595139](#)].