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| UČNI NAČRT PREDMETA / COURSE SYLLABUS |
| **Ime predmeta:** | UPRAVLJANJE Z EMBALAŽO V LOGISTIKI |
| **Course title:** | LOGISTICS PACKAGING MANAGEMENT |
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| **Študijski program in stopnja****Study programme and cycle** | **Študijska smer****Study option** | **Letnik****Year of study** | **Semester****Semester** |
| GOSPODARSKA IN TEHNIŠKA LOGISTIKA 1. stopnja |  | 3. | 5. |
| PROFESSIONAL HIGHER EDUCATION STUDY PROGRAMME ECONOMIC AND TECHNICAL LOGISTICS 1st degree |  | 3. | 5. |
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| **Vrsta predmeta (obvezni ali izbirni) /** **Course type (compulsory or elective)** | IZBIRNI |
| ELECTIVE |
|  |  |
| **Univerzitetna koda predmeta / University course code:** | VS |
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| **Predavanja****Lectures** | **Seminar****Seminar** | **Vaje****Tutorial** | **Klinične vaje****Clinical training** | **Druge oblike študija****Other forms of study** | **Samost. delo****Individual work** |  | **ECTS** |
| 21 e-P24 a-P |  |  |  |  |  |  | 90 |  | 6 |
| **a-V** | **e-V** | **LV** |  |
| 18 | 15 | 12 |  |
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| **Nosilec predmeta / Course coordinator:** | **TONE LERHER** |
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| **Jeziki /Languages:** | **Predavanja / Lectures:** | SLOVENSKI/SLOVENE |
| **Vaje / Tutorial:** | SLOVENSKI/SLOVENE |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** |  | **Prerequisites for enrolling in the course or for performing study obligations:** |
| Ni pogojev. |  | None. |
| Vsebina (kratek pregled učnega načrta):  |  | **Content (syllabus outline):** |
| * Naloge embalaže in pakiranja
* Ravni embalaže in njihova vloga v logistiki
* Embalažni materiali in tehnike embaliranja
* Ustrezna izbira embalaže
* Načrtovanje pakirnih in logističnih enot
* Označevanje embalaže in GS1 standardi
* Odpadna in vračljiva embalaža ter ravnanje z njo
* Uporaba 3D tiskanja na primeru embalaže
 |  | * Packaging and wrapping role
* Levels of packaging and their role in logistics
* Packaging materials and packaging techniques
* Appropriate packaging selection
* Planning of packaging and logistics units
* Package labelling and GS1 standards
* Waste and returnable packaging
* Use of 3D printing on the packaging case
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| **Temeljni literatura in viri / Reading materials:** |
| Ambrož, G., et al. (2019). *Razvoj embalaže v krožnem gospodarstvu: priročnik*. Celje: Fit media. ISBN - 978-961-6283-59-5Radonjič, G. (2008). *Embalaža in varstvo okolja: zahteve, smernice in podjetniške priložnosti*. Maribor: Založba Pivec, ISBN - 978-961-6494-63-2 Martini, M., Kovačič, B., Konda, Z. (2014). *Upravljanje globalnih preskrbovalnih verig: učbenik*. Ljubljana: GS1 Slovenija. ISBN - 978-961-93963-1-5Pålsson, H. (2018). *Packaging logistics: understanding and managing the economic and environmental impacts of packaging in supply chains*. London; New York; New Delhi: Kogan Page. ISBN - 978-0-7494-8170-4Yam, Kit L. et al. (2009). *The Wiley encyclopedia of packaging technology*. Hoboken: J. Wiley & Sons, cop 3rd ed. ISBN - 978-0-470-08704-6; 0-470-08704-8Coles, R. (2003). *Food packaging technology*. Oxford, Blackwell, Boca Raton, CRC Press, ISBN: 1-84127-221-3. |
| **Cilji in kompetence:** |  | **Objectives and competences:** |
| Cilji predmeta so: * opredeliti naloge in osnovne značilnosti embalaže predstaviti vlogo embalaže v logistiki,
* predstaviti tri ravni embalaže in opredeliti njihovo vlogo v logistiki,
* predstaviti različne embalažne materiale,
* predstaviti tehnike in tehnologije embaliranja in njihov vpliv na življenjski cikel artiklov,
* opredeliti, kako pakirne enote sestaviti v logistične enote,
* predstaviti označevanje embalaže, različne oznake in potrebne informacije, ki jih embalaža posameznih artiklov mora vsebovati,
* predstaviti GS1 standarde, njihovo uporabo in obveznosti pri uporabi standarda,
* predstaviti odpadno in vračljivo embalažo ter možnosti ravnanja z njo,
* predstaviti koncept razbremenilne logistike,
* predstaviti 3D modeliranje prototipa embalaže in uporabiti tiskalnike za 3D tisk.

Kompetence, ki jih študentje osvojijo:* so sposobni izbrati primerno embalažo glede na njen namen uporabe in področje logistike,
* poznajo različne vrste embalaže in znajo enote primarne embalaže ustrezno zavarovati tudi z embalažo na sekundarnem in terciarnem nivoju,
* se zavedajo vpliva različnih embalažnih materialov in vrst embalaže na okolje,
* so sposobni opremiti embalažo na vseh nivojih s potrebnimi informacijami,
* se zavedajo pomena pravilnega ravnanja z odpadki in povratne logistike,
* predstaviti uporabo 3D tiskanja na primeru prototipa embalaže.
 |  | The objectives of the course are:• define the tasks and basic characteristics of packaging, present the role of packaging in logistics,• present three levels of packaging and define their role in logistics,• present various packaging materials, • present packaging techniques and technologies and their impact on the lifecycle of products,• define how to assemble packaging units into logistics units,• present packaging labelling various labels, and necessary information that packaging of individual items must contain,• presents GS1 standards, their usage, and obligations when using the standards,• introduce waste and returnable packaging, as well as options for handling it,• present the concept of reverse logistics,• introduce 3D modelling of packaging prototypes and utilize 3D printers for 3D printing.Competences that students acquire:• are able to select the appropriate packaging for their intended use and logistics area,• are familiar with the different types of packaging and know how to adequately secure primary packaging units with secondary and tertiary packaging,• are aware of environmental impact of different packaging materials and types of packaging,• are able to provide the necessary information on packaging at all levels,• are aware of the importance of proper waste management and reverse logistics,• present the use of 3D printing on the example of a packaging prototype. |
| **Predvideni študijski rezultati:** |  | **Intended learning outcomes:** |
| Študent je ob zaključku predmeta zmožen:* izbrati ustrezno embalažo na vseh nivojih za konkretne primere artiklov glede na namen uporabe in procese v logistiki,
* našteti in opisati embalažne materiale, razume vpliv materialov na življenjsko dobo artikla,
* našteti in opisati tehnike in tehnologije embaliranja,
* ustrezno načrtovati pakirne in logistične enote,
* ustrezno opremiti embalažo z oznakami na različnih nivojih,
* prepozna in opiše pomembnejše embalažne oznake, in pozna pomen GS1 standardov in uporabiti standarde GS1 pri označevanju različnih ravni embalaže, pozna obveznosti pri uporabi sistema GS1,
* načrtovati ravnanje z odpadno in vračljivo embalažo,
* načrtovati faze razbremenilne logistike za različne ravni embalaže,
* uporabiti program za modeliranje za pripravo 3D modela prototipa embalaže,
* uporabiti 3D tiskalnik za namen ustvarjanja prototipa embalaže.
 |  | Upon completion of the course, the student is able to:• select appropriate packaging at all levels for specific items based on their intended use and logistics processes,• list and describe packaging materials, understanding the impact of materials on the lifespan of the product,• list and describe packaging techniques and technologies,• adequately plan packaging and logistics units,• properly equip packaging labels at different levels,• recognize and describe important packaging labels, understand the significance of GS1 standards, and utilize GS1 standards in labelling various levels of packaging; understand the obligations when using the GS1 system,• plan waste and returnable packaging management,• plan reverse logistics phases for different levels of packaging,• utilize modelling software to prepare a 3D model of packaging prototype, • use a 3D printer for creating a prototype of packaging. |
| **Metode poučevanja in učenja:** |  | **Learning and teaching methods:** |
| Predavanja: pri predavanjih študent spozna teoretične vsebine predmeta. Del predavanj se izvaja na klasični način v predavalnici, del pa v obliki e-predavanj (e-predavanja se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju).Vaje: pri vajah študent utrdi teoretično znanje in spozna aplikativne možnosti. Del vaj se izvaja na klasični način v predavalnici, del pa v obliki e-vaj (e-vaje se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju).Laboratorijske vaje: pri laboratorijskih vajah študentje izvedejo praktične vaje na namenski opremi v laboratoriju. |  | Lectures: students understand the theoretical frameworks of the course. Part of the lecture course is in a classroom while the rest is in the form of e-learning (e-lectures may be given via video-conferencing or with the help of specially designed e-material in a virtual electronic learning environment).Tutorials: Students enhance their theoretical knowledge and are able to apply it. Part of the seminar is in a classroom while the rest is in the form of e-learning (e-tutorials may be given via video-conference or with the help of specially designed e-material in a virtual electronic learning environment).Laboratory exercises: During laboratory sessions, students perform practical tasks using specialized equipment in the laboratory. |
| **Načini ocenjevanja:** | Delež (v %) /Share (in %) | **Assessment methods:** |
| * Sprotne naloge
* Pisni izpit
* Seminarska naloga
 | 20 %60 %20 % | * Coursework
* Written examination
* Seminar paper
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| **Reference nosilca / Course coordinator's references:**  |
| 1. HERCOG, Darko, BENCAK, Primož, VINCETIČ, Uroš, LERHER, Tone. Product assembly assistance systembased on pick-to-light and computer vision technology. *Sensors*. 2022, vol. 22, iss. 24, 24 str. ISSN 1424-8220. https://dk.um.si/IzpisGradiva.php?id=84840, DOI: 10.3390/s22249769. [COBISS.SI-ID 133762819].2. LERHER, Tone, BENCAK, Primož. Advanced technologies in logistics engineering : automated storage systems with shuttles integrated with hoisted carriage. Tehnički glasnik. 2022, vol. 16, no. 3, str. 336-342, ilustr. ISSN 1846-6168. https://hrcak.srce.hr/file/404717, DOI: 10.31803/tg-20220509104609. [COBISS.SI-ID 117014787] 3. ĐUKIĆ, Goran, OPETUK, Tihomir, GAJŠEK, Brigita, LERHER, Tone. Single-tray VLM vs dual-tray VLM : quantitative throughput comparison. Tehnički glasnik. 2021, vol. 15, no. 4, str. 498-503, ilustr. ISSN 1846-6168. https://doi.org/10.31803/tg-20210824184058, DOI: 10.31803/tg-20210824184058. [COBISS.SI-ID 84600323] 4. MAROLT, Jakob, RUPNIK, Bojan, LERHER, Tone. Stack shuffling optimization of steel bars by using genetic algorithms. V: CLAUSEN, Uwe (ur.), LANGKAU, Sven (ur.), KREUZ, Felix (ur.). Advances in production, logistics and traffic : proceedings of the 4th Interdisciplinary Conference on Production Logistics and Traffic 2019. Cham: Springer, cop. 2019. Str. 20-31, ilustr. Lecture notes in logistics, 2194-8917. ISBN 978-3-030-13534-8. [COBISS.SI-ID 512981565] 5. LERHER, Tone. Pridobljen mednarodni strokovni certifikat organizacije GS1 Ljubljana "Razume standarde GS1". Certifikat je bil pridobljen 15. junija 2021 (št. potrdila: 00266) s strani organizacije GS1 Ljubljana. |