|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | | | | |
| **Ime predmeta:** | | UPORABA OPTIMIZACIJSKIH METOD V LOGISTIKI | | | | | | | | | | | | | | | | | | |
| **Course title:** | | APPLICATION OF OPTIMIZATION TECHNIQUES IN LOGISTICS | | | | | | | | | | | | | | | | | | |
|  | | | | | |  | | | | | | | | | |  | |  | | |
| **Študijski program in stopnja**  **Study programme and cycle** | | | | | | **Študijska smer**  **Study option** | | | | | | | | | | **Letnik**  **Year of study** | | **Semester**  **Semester** | | |
| GOSPODARSKA IN TEHNIŠKA LOGISTIKA 1. stopnja | | | | | |  | | | | | | | | | | 2. | | 4. | | |
| PROFESSIONAL HIGHER EDUCATION STUDY PROGRAMME ECONOMIC AND TECHNICAL LOGISTICS 1st degree | | | | | |  | | | | | | | | | | 2. | | 4. | | |
|  | | | | | | | | | | | | | | | | | | | | |
| **Vrsta predmeta (obvezni ali izbirni) /**  **Course type (compulsory or elective)** | | | | | | | | | | | | | | | OBVEZNI | | | | | |
| COMPULSORY | | | | | |
|  | | | | | | | | | | | | | | |  | | | | | |
| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | | | | VS | | | | | |
|  | | | | | | | | | | | | | | | | | | | | |
| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | | | **Klinične vaje**  **Clinical training** | | | | | **Druge oblike študija**  **Other forms of study** | | | **Samost. delo**  **Individual work** | |  | **ECTS** |
| 30 e-P  30 a-P |  | | |  |  | |  | |  | | | | |  | | | 90 | |  | 6 |
| **a-V** | **e-V** | | **LV** | |  |
| 6 | 12 | | 12 | |  |
|  | | | | | | | | | | | | | | | | | | | | |
| **Nosilec predmeta / Course coordinator:** | | | | | | TOMAŽ KRAMBERGER | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | |
| **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):** | | | | | | | | |
| * Ponovitev osnov matričnega in procentnega računa, razmerja, razdelilni račun, zmesi račun.   Osnove obrestnega računa, navadni obrestni račun,obrestno obrestni račun,vloge in dvigi,  posojila.   * Sistemi linearnih enačb in neenačb pri reševanju optimizacijskih problemov. * Konveksne množice pri reševanju optimizacijskih problemov. * Optimizacijski modeli. * Linearno programiranje (formulacija problema,   reševanje na grafični način,reševanje s programskim paketom LINGO in Microsoft Excel).   * Osnove DEA (Data Envelopment Analysis) analize (analitični in grafični način reševanja). | | | | | | | | | |  | | * Revision of basics of matrix and interest calculations, ratios, distribution calculation, mixture calculation. Basics of interest calculation, ordinary interest calculation, interest rate calculation deposits and withdrawals, loans. * Systems of linear equations and inequalities in solving optimization problems. * Convex masses in solving optimization problems. * Optimization models. * Linear programming (problem formulation,solving problems using graphs,solving problems using LINGO and Microsoft Excel software). * Basics of DEA (Data Envelopment Analysis) (using analitical and graphical methods). | | | | | | | | |
| **Temeljni literatura in viri / Reading materials:** | | | | | | | | | | | | | | | | | | | | |
| 1. Jensen, P. A., & Bard, J. F. (2003). Operations research: models and methods (str. XII, 675 , 5 pril.). John Wiley & Sons. 2. KRAMBERGER, Tomaž, ŠINKO, Simona. (2022). Optimizacijske metode v logistiki : osnovni problemi linearnega programiranja. 1. izd. Celje: Fakulteta za logistiko Univerze v Mariboru. 3. KRAMBERGER, Tomaž, ŠINKO, Simona. et al. (2022). Optimizacijske metode v logistiki : upravljanje s pretoki in odločanje. 1. izd. Celje: Fakulteta za logistiko Univerze v Mariboru. | | | | | | | | | | | | | | | | | | | | |
| **Cilji in kompetence:** | | | | | | | | | |  | | **Objectives and competences:** | | | | | | | | |
| Cilji predmeta so:   * seznaniti študente z matričnim in procentnim račun, razmerji, razdelilnim računom, zmesnim računom, obrestnim računom, vlogami, dvigi in posojili. * seznaniti študente s sistemi linearnih enačb in neenačb z nami reševanja optimizacijskih problemov, * seznaniti študente s konveksnimi množicami in njihovo uporabo pri reševanju optimizacijskih problemov, * seznaniti študente z optimizacijskimi modeli, * seznaniti študente z linearnim programiranjem, * seznaniti študente z osnovami DEA analize.   Kompetence, ki jih študentje osvojijo:   * sposobnost uporabe matričnega in procentnega računa, razmerij, razdelilnega računa, zmesnega računa, obrestnega računa, vlog, dvigov in posojil za namene logističnih operacij, * sposobnost uporabe sistemov linearnih enačb in neenačb z namenom reševanja optimizacijskih problemov, * sposobnost uporabe konveksnih množic z namenom reševanja optimizacijskih problemov, * sposobnost zapisati realen problem z linearnim programom, grafično rešiti preprost primer linearnega programa, uporabiti programski paket LINGO in Microsoft Excel za reševanje linearnih programov, * sposobnost uporabe DEA analize za določanje učinkovitosti. | | | | | | | | | |  | | The objectives of the course are:  • to acquaint students with matrix and percentage calculations, ratios, distribution calculations, joint calculations, interest calculations, deposits, withdrawals and loans.  • to acquaint students with systems of linear equations and inequalities with us for solving optimization problems,  • to acquaint students with convex sets and their use in solving optimization problems,  • to acquaint students with optimization models,  • to acquaint students with linear programming,  • to acquaint students with the basics of DEA analysis.  Competences that students acquire:  • ability to use matrix and percentage calculations, ratios, distribution calculations, joint calculations, interest calculations, deposits, withdrawals and loans,  • ability to use systems of linear equations and inequalities in order to solve optimization problems,  • ability to use convex sets in order to solve optimization problems,  • ability to write a real problem with a linear program, graphically solve a simple example of a linear program, use the software package LINGO and Microsoft Exccel to solve linear programs,  • ability to use DEA analysis to determine performance. | | | | | | | | |
| **Predvideni študijski rezultati:** | | | | | | | | | | |  | **Intended learning outcomes:** | | | | | | | | |
| Študent ob zaključku predmeta:   * uporabi matrični in procentni račun, razmerja, razdelilni račun, zmesni račun, obrestni račun, vloge, dvige in posojila na realnih problemih, * razume kaj je optimizacijski model in pozna korake izvedbe optimizacije, * zapiše linearni program na osnovi podanega problema, * reši linearni program na grafični način in za reševanje uporabiti programski paket LINGO in Microsoft Excel * izvede preprosto DEA analizo za določanje učinkovitosti | | | | | | | | | | |  | Student at the end of the course:  • knows how to use matrix and percentage calculations, ratios, distribution calculations, joint calculations, interest calculations, deposits, withdrawals and loans,  • understands what an optimization model is and knows the steps of performing optimization,  • can write a linear program based on a given problem,  • can solve a linear program in a graphical way and use the LINGO and Microsoft Excel software package for solving it  • Performs a simple DEA analysis to determine performance | | | | | | | | |
| Prenesljive/ključne spretnosti in drugi atributi:  Študenti se usposobijo za uporabo teoretičnega znanja v praktičnih primerih, predvsem pri procesih, ki so jih spoznali pri predmetih Osnove logistike, Osnove logističnih procesov in trajnostnih oskrbovalnih verig, Osnove ekonomike v logistiki v prvem letniku. | | | | | | | | | | |  | Transferable/Key Skills and other attributes:  Students learn to apply theoretical knowledge to practical situations, especially processes from the following subjects: Basics of logistics, Basics of logistics processes and sustainable supply chains, Fundamentals of Economics in logistics from year 1. | | | | | | | | |
| **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 v okviru laboratorijskih vaj, 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). | | | | | | | | | | |  | 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-conferencing or with the help of specially designed e-material in a virtual electronic learning environment). | | | | | | | | |
| **Načini ocenjevanja:** | | | | | | | | Delež (v %) /  Share (in %) | | | | | **Assessment methods:** | | | | | | | |
| **Predavanja:**  Pisni izpit.  **Vaje:**  Ocena e-vaj. | | | | | | | | 80%  20% | | | | | **Lectures:**  Written examination.  **Tutorials:**  Grade from e-tutorials. | | | | | | | |

|  |
| --- |
| **Reference nosilca / Course coordinator's references:** |
| 1. KRAMBERGER, Tomaž, MONIOS, Jason, ŠTRUBELJ, Gregor, RUPNIK, Bojan. Using dry ports for port co-opetition : the case of Adriatic ports. *International journal of shipping and transport logistics*, ISSN 1756-6525. [Online ed.], 2018, vol. 10, iss. 1, str. 18-44, ilustr. <http://www.inderscience.com/info/inarticle.php?artid=88319>, doi: [10.1504/IJSTL.2018.10008533](https://doi.org/10.1504/IJSTL.2018.10008533). [COBISS.SI-ID [512889661](https://plus.si.cobiss.net/opac7/bib/512889661?lang=sl)]. 2. BUTTON, Kenneth John, KRAMBERGER, Tomaž, GROBIN, Klemen, ROSI, Bojan. A note on the effects of the number of low-cost airlines on small tourist airports' efficiencies. *Journal of Air Transport Management*, ISSN 1873-2089. [Online ed.], 2018, vol. 72, str. 92-97. <https://www.sciencedirect.com/science/article/pii/S096969971730114X>, doi: [10.1016/j.jairtraman.2017.12.003](https://doi.org/10.1016/j.jairtraman.2017.12.003). [COBISS.SI-ID [512892733](https://plus.si.cobiss.net/opac7/bib/512892733?lang=sl)]. 3. BUTTON, Kenneth John, KRAMBERGER, Tomaž, VIZINGER, Tea, INTIHAR, Marko. Economic implications for Adriatic seaport regions of further opening of the Northern Sea Route. *Maritime economics & logistics*, ISSN 1479-294X. [Spletna izd.], Mar. 2017, vol. 19, iss. 1, str. 52-67, ilustr. <http://www.palgrave-journals.com/mel/journal/vaop/ncurrent/abs/mel201525a.html>, doi: [10.1057/mel.2015.25](https://doi.org/10.1057/mel.2015.25). [COBISS.SI-ID [512702781](https://plus.si.cobiss.net/opac7/bib/512702781?lang=sl)]. 4. INTIHAR, Marko, KRAMBERGER, Tomaž, DRAGAN, Dejan. Container throughput forecasting using dynamic factor analysis and ARIMAX model. *Promet*, ISSN 0353-5320. [Print ed.], 2017, vol. 29, no. 5, str. 529-542, ilustr. [COBISS.SI-ID [512879421](https://plus.si.cobiss.net/opac7/bib/512879421?lang=sl)]. 5. KRAMBERGER, Tomaž, RUPNIK, Bojan, ŠTRUBELJ, Gregor, PRAH, Klemen. Port hinterland modelling based on port choice. *Promet*, ISSN 0353-5320. [Print ed.], 2015, vol. 27, no. 3, str. 195-203, ilustr. <http://www.fpz.unizg.hr/traffic/index.php/PROMTT/article/view/1611>, doi: [10.7307/ptt.v27i3.1611](https://doi.org/10.7307/ptt.v27i3.1611). [COBISS.SI-ID [512689725](https://plus.si.cobiss.net/opac7/bib/512689725?lang=sl)]. |