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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Modul J: Internetna omrežja 2 | | | | | | | | | | | | | | |
| **Course title:** | | | Module J: Internet Networks 2 | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Podiplomski magistrski študijski program druge stopnje Elektrotehnika | | | | | Informacijsko komunikacijske tehnologije | | | | | | | | 2 | | 1 | | |
| 2nd cycle masters study programme in Electrical Engineering | | | | | Information and communication technologies | | | | | | | | 2 | | 1 | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Izbirni-strokovni /elective professional | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64302S | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **Work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| 45 |  | | | 30 | | |  | | | |  | | | 75 | |  | 6 |
|  | | | | | | | | | | | | | | | | | |
| **Nosilec predmeta / Lecturer:** | | | | | Andrej Kos, Janez Bešter | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | slovenski / Slovenian  angleški (mentorsko) / English (consultations) | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | slovenski / Slovenian  angleški (mentorsko) / English (consultations) | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v letnik predmeta | | | | | | | | |  | Enrolment in the year of the course | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Zagotavljanje povezavnosti v paketnih omrežjih (mehanizmi in signalizacije). Klasifikacija naprednih omrežnih storitev. Osnove MPLS in MetroEthernet. Storitve MPLS. Navidezna zasebna omrežja. Mehanizmi in metode zagotavljanja kakovosti storitev, sinhronizacije in redundance. Mobilnost in omrežna fiksno-mobilna konvergenca. Osnove paketnih kabelskih sistemov. Operaterski omrežni modeli in programirljiva omrežja. Virtualizacija omrežij in računalniških sistemov. | | | | | | | |  | | Mechanisms and signalling to provide connection oriented communications in packet networks. Classification of advanced network services. Fundamentals of MPLS and MetroEthernet. MPLS services. Virtual private networks. Mechanisms and methods for quality of service, synchronization, and redundancy. Mobility and fixed-mobile convergence. Fundamentals of packet cable systems. Network operator network models and software defined networking. Network and system virtualization. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. Tannenbaum, A.S.: Computer networks, 5th ed., international ed., ISBN 978-0-13-255317-9, 2011, Pearson. 2. Medhi, D., Ramasamy, K.: Network Routing: Algorithms, Protocols, and Architectures, ISBN 978-0-120-88588-6, 2007, Elsevier : M. Kaufmann Publishers. 3. Stallings, W.: Data and computer communications, 10th ed., ISBN 978-0-13-350648-8, 2013, Pearson. 4. Fall, K. R., Stevens, W. R.: TCP/IP illustrated. Vol. 1, The protocols, 2nd ed., ISBN 978-0-321-33631-6, 2012, Addison-Wesley. 5. Članki, objavljenih v revijah, npr. / Articles published in magazines, i.e.: IEEE Communications Surveys & Tutorials, <http://www.comsoc.org/livepubs/surveys/index.html> | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Cilj predmeta je podati poglobljen pregled gradnikov, mehanizmov ter sodobnih konceptov delovanja omrežnih sistemov. Spoznavanje naprednih omrežnih protokolov ter storitev internetnih omrežnih sistemov. Spoznavanje novih povezovalnih načinov ter virtualizacije omrežnih in sistemskih virov.  Študenti bodo pridobili potrebna znanja in veščine s teh področij. | |  | | The objective of the course is to provide an advanced insight into concepts, architectures and protocols in modern telecommunication systems. The focus is on advanced network protocols mechanisms, and service models.  Students will acquire fundamental knowledge and skills in these fields. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Poznavanje in razumevanje naprednih konceptov, arhitektur, protokolov in storitvenih modelov internetnih omrežij v operaterskih okoljih. | | |  | Knowledge and understanding of advanced concepts, architectures, protocols, and service models of internet networks in network operator and service provider environments. | |
|  | | |  |  | |
| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja, na katerih se študent seznani s teoretičnimi osnovami, ter laboratorijske vaje, kjer probleme spozna tudi praktično in jih v timu rešuje skozi projektno delo. Eizobraževanje. Ogledi in vabljeni predavatelji. | | |  | Lectures for theoretical aspects,  laboratory exercises and team work for real-case scenarios and problem solving through project work. Elearning. Study visits and invited lecturers. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Način: pisni izpit, ustni izpit.  Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.  Uspešna izvedba 80% laboratorijskih vaj je predpogoj za prijavo na pisni izpit.  Prispevki k oceni:  pisni izpit  ustni izpit | 50%  50% | | | | Type: written exam, oral exam.  Negative grades: from 1 to 5, positive grades: from 6 to 10.  Successful completion of at least 80% of the laboratory exercises is prerequisite for the written exam.  Contributions to final grade:  written exam  oral examination |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1. KOS, Andrej, HOMAN, Peter, BEŠTER, Janez. Performance evaluation of a synchronous bulk packet switch under real traffic conditions. IEICE transactions on communications, ISSN 0916-8516, 2003, vol. E86-B, no. 5, str. 1612-1624. 2. RUGELJ, Miha, STERLE, Janez, KOS, Andrej. Funkcionalna in zmogljivostna primerjava odprtokodnih in komercialnih rešitev multicast. Elektrotehniški vestnik, ISSN 0013-5852. [Slovenska tiskana izd.], 2011, letn. 78, št. 4, str. 211-216. 3. KOS, Andrej, BEŠTER, Janez. Evolucija hrbteničnih IP-omrežij v smeri MPLS. Elektrotehniški vestnik, ISSN 0013-5852. [Slovenska tiskana izd.], 2001, letn. 68, št. 4, str. 200-206. 4. VOLK, Mojca, STERLE, Janez, SEDLAR, Urban, KOS, Andrej. An approach to modeling and control of QoE in next generation networks. IEEE communications magazine, ISSN 0163-6804. [Print ed.], Aug. 2010, vol. 48, no. 8, str. 126-135. 5. RUGELJ, Miha, SEDLAR, Urban, VOLK, Mojca, STERLE, Janez, HAJDINJAK, Melita, KOS, Andrej. Novel cross-layer QoE-aware radio resource allocation algorithms in multiuser OFDMA systems. IEEE transactions on communications, ISSN 0090-6778. [Print ed.], Sep. 2014, vol. 62, no. 9, str. 3196-3208. | | | | | |