

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)						
Predmet:		Računalniške komunikacije				
Course title:		Computer communications				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Interdisciplinarni univerzitetni študijski program Računalništvo in matematika		ni smeri		2	drugi	
Interdisciplinary first cycle academic study programme Computer Science and Mathematics		none		2	second	
Vrsta predmeta / Course type				obvezni / compulsory		
Univerzitetna koda predmeta / University course code:				63209		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		30			105	6
Nosilec predmeta / Lecturer:				prof. dr. Zoran Bosnić		
Jeziki / Languages:		Predavanja / Lectures:		slovenski / Slovene		
		Vaje / Tutorial:		slovenski / Slovene		
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Vpis v letnik študija.				Enrolment in the programme.		
Vsebina:				Content (Syllabus outline):		

Uvod: računalniška omrežja in internet

Osnovni pojmi: plasti, protokoli, storitve, protokolarni sklad. Hrbtenica in krajevna omrežja, kje nastajajo zakasnitve.

Aplikacijska plast: storitve, pregled standardnih protokolov. Zasnova omrežnih aplikacij, standardni protokoli HTTP, FTP, SMTP, DNS. Delovanje e-pošte, peer-to-peer aplikacij, vtičev (socket) in uporaba storitev transportne plasti.

Predstavitvena in sejna plast: vsebina in storitve, primeri.

Transportna plast: storitve, multipleksiranje, povezavni in nepovezavni prenos (TCP in UDP), zanesljiv prenos podatkov, nadzor zasičenja (congestion control), izvedba le tega v TCP.

Omrežna plast: storitve, virtualne zveze in datagrame povezave, delovanje usmerjevalnikov, naslavljanje v internetu (IP in IPv6), temelji usmerjanja.

Prenosni sistem – povezavna in fizična plast, krajevna omrežja (LAN): storitve, zaznavanje in odpravljanje napak, protokoli za skupinski prenosni medij, Fizični naslovi (MAC) in preslikava v IP naslove (ARP), delovanje stikal. Ethernet, PPP, brezžična omrežja, aktualni standardi (npr. IEEE 802.11x, Bluetooth). Celularna omrežja, mobilnost. Prenos signalov, prenosni mediji, vrste modulacije.

Omrežna varnost, zanesljivost in zaščita, celovitost sporočil, avtentikacija, pregled varovanja e-pošte, TCP povezav (SSL), omrežne povezave (IPSec), brezžične povezave. Požarne pregrade, IDS, IPS sistemi. Aktualni omrežni napadi in obramba pred njimi.

Pomen upravljanja omrežja.

Introduction: Computer networks and internet

Basic notions: layer, protocol, service, protocol stack. Backbone and local area networks, transmission latency sources.

Application layers: services, network application basics, overview of well-known protocols. Protocols HTTP, FTP, SMTP, DNS. E-mail functionalities, peer-to-peer applications, sockets, use of transport layer services.

Presentation and session layer: their purpose and services.

Transport layer: services, multiplexing, connection-oriented and connectionless transfer (TCP and UDP), reliable data transfer, congestion control and its implementation inside TCP.

Network layer: services, virtual and datagram connections, routing, addressing in internet (IPv4 and IPv6), routers.

Transmission system – data link and physical layer, local area networks (LANs): services, error detection and correction techniques, media access protocols, addressing (MAC addresses) and mapping of MAC address to IP addresses (protocol ARP), switches and their functionalities. Ethernet, PPP, wireless networks, current standards (IEEE 802.11x, Bluetooth), cellular networks, mobile networks, transmission of signals, media types, modulations.

Network security, reliability and protections. Message integrity, authentication, protection of e-mail, TCP connections (SSL), network connection (IPSec), wireless connections). Firewalls, IDS/IPS systems. Network attacks and defense from them.

	Network management.
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Temeljni literatura in viri / Readings:

<p>J. F. Kurose, K. W. Ross, M. Ciglarič, Z. Bosnić: Računalniške komunikacije. Pearson, England, 2014, ISBN 978-1-78399-776-3.</p> <p>Dodatna literatura:</p> <p>J. F. Kurose, K. W. Ross: Computer Networking, A top-down Approach Featuring Internet. 4. izdaja, Addison Wesley 2007. Poglavja 2-6 in 8.A.S. Tanenbaum, Computer Networks, 4. izdaja, Prentice Hall PTR, 2002.</p>

Cilji in kompetence:

<p>Cilj predmeta je študentom računalništva in informatike predstaviti osnove delovanja računalniških omrežij in pomembnejših protokolov. Kompetence, ki jih bo študent pridobil, so zlasti:</p> <p>spodobnost uporabe informacijsko-komunikacijske tehnologije in sistemov</p> <p>razumevanje delovanja večplastnih sistemov sodobnih komunikacij</p> <p>spodobnost uporabe in načrtovanja omrežnih storitev</p> <p>usposobljenost za načrtovanje omrežij in smiselno dodeljevanje omrežnih naslovov</p>

Objectives and competences:

<p>The main goal is to present the students of computer science and informatics the basics of computer networking and the most important communication protocols in this area. The competences that the students will acquire, are:</p> <p>capability to use information and communication systems and technology</p> <p>understanding of how multi-layer communication systems work</p> <p>use and design of network services</p> <p>being capable of designing network architectures and implementing network addressing</p>
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usposobljenost za postavitve preprostega omrežja (domače omrežje), za osnovno nastavljanje kompleksnih usmerjevalnikov in za postavitve krajevnega omrežja s stikali in brezžičnimi dostopnimi točkami.

capability for installing and administering a simple (home) network, performing basic routing settings and configuring switches and wireless access points.

Predvideni študijski rezultati:

Znanje in razumevanje:

Sposobnost samostojnega načrtovanja algoritmov in ustreznih podatkovnih struktur pri reševanju računskih problemov, sposobnost analiziranja zahtevnosti problemov in kakovosti rešitev, sposobnost samostojnega razvoja programov.

Uporaba:

Uporaba naučenih principov pri načrtovanju algoritmov in njihovem programiranju.

Refleksija:

Razumevanje osnovnih principov načrtovanja algoritmov in razumevanje njihove vloge pri reševanju računskih problemov.

Prenosljive spretnosti - niso vezane le na en

predmet:

Zmožnost načrtovanja učinkovite oz. primerne algoritmične rešitve različnih problemov, zmožnost uporabe naučenih principov pri programiranju rešitve (ne glede na izbrani programski jezik).

Intended learning outcomes:

Knowledge and understanding:

Knowledge of formal network models (TCP/IP and ISO/OSI). Understanding differences between architecture and structure. Differentiating between functionalities of different network layers. Linking the networking challenges with the appropriate network layer.

Application:

Use of network protocols and services in own configurations.

Reflection:

Becoming familiar and acquiring understanding of how the network layers are inter-dependent of each other, linking these findings with particular network implementations.

Transferrable skills:

Solving various problems using various multilayer service architecture models. Solving problems based on the structural network and network topology models.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, laboratorijske vaje, seminarski način dela pri domačih nalogah, konzultacije pri izvajanju seminarskih nalog (konkretni projekti). Poseben poudarek je na tekočem sledenju teorije in na tiskem delu in medsebojnem usklajevanju pri vajah in seminarjih.	Lectures, tutorials, homeworks in the form of seminars, consultations for preparing of seminars (particular selected projects). Special emphasis is given on the following and understanding of given theoretical knowledge and on team work and cooperation within tutorials and seminars.
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Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit ali ustno izpraševanje, naloge, projekt):	40%	Type: exam, oral, coursework, project
Sprotno preverjanje (domače naloge, kolokviji in laboratorijske vaje)		Continuing: homework, project work
Končno preverjanje (pisni ali ustni izpit)	60%	Final: written and oral exam
Ocene: 6-10 pozitivno, 1-5 negativno (v skladu s Statutom UL)		Grading: 6-10 pass, 1-5 fail.

Reference nosilca / Lecturer's references:

OCEPEK, Uroš, BOSNIĆ, Zoran, NANČOVSKA ŠERBEC, Irena, RUGELJ, Jože. Exploring the relation between learning style models and preferred multimedia types. *Computers & Education*, ISSN 0360-1315. [Print ed.], Nov. 2013, vol. 69, str. 343-355. , doi: . [COBISS.SI-ID 10047572]

BOSNIĆ, Zoran, KONONENKO, Igor. Estimation of individual prediction reliability using the local sensitivity analysis. *Applied intelligence*, ISSN 0924-669X. [Print ed.], Dec. 2008, vol. 29, no. 3, str. 187-203, ilustr. [COBISS.SI-ID 6174548]

BOSNIĆ, Zoran, KONONENKO, Igor. Comparison of approaches for estimating reliability of individual regression predictions. *Data & Knowledge Engineering*, ISSN 0169-023X. [Print ed.], Dec. 2008, vol. 67, no. 3, str. 504-516, ilustr. [COBISS.SI-ID 6923604]

ŠTRUMBELJ, Erik, BOSNIĆ, Zoran, KONONENKO, Igor, ZAKOTNIK, Branko, GRAŠIČ-KUHAR, Cvetka. Explanation and reliability of prediction models : the case of breast cancer recurrence. *Knowledge and information systems*, ISSN 0219-1377. [Print ed.], 2010, vol. 24, no. 2, str. 305-324, graf. prikazi. [COBISS.SI-ID 7555668]

BOSNIĆ, Zoran, KONONENKO, Igor. Automatic selection of reliability estimates for individual regression predictions. *Knowledge engineering review*, ISSN 0269-8889, 2010, vol. 25, no. 1, str.

27-47, graf. prikazi. [COBISS.SI-ID 7606356]