

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Komunikacijska omrežja naslednje generacije
<b>Course title:</b>	Future Communication Networks

Študijski program in stopnja Study programme and level	Modul Module	Letnik Academic year	Semester Semester
Informacijske in komunikacijske tehnologije, 2. stopnja	Komunikacijske tehnologije	1	2
Information and Communication Technologies, 2 <sup>nd</sup> cycle	Communication Technologies	1	2

**Vrsta predmeta / Course type** Izbirni / Elective

**Univerzitetna koda predmeta / University course code:** IKT2-635

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Druge oblike	Samost. delo Individ. work	ECTS
15	15			15	105	5

*\*Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transferred to individual work.*

**Nosilec predmeta / Lecturer:** Prof. dr. Aleš Švigelj

**Jeziki / Predavanja / Lectures:** slovenščina, angleščina / Slovenian, English  
**Languages: Vaje / Tutorial:**

**Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:**

Zaključen študijski program prve stopnje s področja naravoslovja, tehnike ali računalništva.

**Prerequisites:**

Student must complete first-cycle study programmes in natural sciences, technical disciplines or computer science.

**Vsebina:**

Uvod: Prihodnja heterogena omrežja.  
 Prenos govora prek IP (VoIP):  
     H.323 in sorodni protokoli, RTP, SIP, MGCP and Megaco / H.248  
 Arhitektura NGN (Next Generation Network):  
     dostava večpredstavnostnih storitev v paketnih omrežjih, medijski prehod, krmilnik medijskega prehoda, signalizacijski prehod  
 Multimedijski podsistem IP (IMS):  
     arhitektura in koncepti, krmilna ravnina seje, podatkovna ravnina, storitve, IMS v mobilnih okoljih, IMS v fiksnih omrežjih  
 Upravljanje z mobilnostjo:  
     horizontalna predaja zveze, vertikalna predaja zveze.

**Content (Syllabus outline):**

Introduction:  
     future heterogeneous networks  
 Voice over IP (VoIP)  
     H.323 and related protocols, RTP, SIP, MGCP and Megaco / H.248  
 NGN (Next Generation Network) Architecture:  
     multimedia services delivery over packet networks, media gateway, media gateway controller, signalling gateway  
 IMS (IP Multimedia Subsystem):  
     architecture and concepts, session control plane, media plane, services, IMS in the mobile environment, IMS in the wire line environment  
 Mobility management  
     horizontal handover, vertical handover

**Temeljna literatura in viri / Readings:**

Izbrana poglavja iz naslednjih knjig: / Selected chapters from the following books:

- T. Plevyak, V. Sahin, *Next Generation Telecommunications Networks, Services, and Management*, Wiley-IEEE Press, 2010. ISBN 978-0-470-57528-4
- D. Grace, M. Mohorcic, *Broadband Communications via High-Altitude Platforms*, Wiley, 2010, ISBN 978-0-470-69445-9
- J. H. Ortiz, (ed.), *Telecommunications networks : current status and future trends*, Rijeka: InTech, cop. 2012. ISBN 978-953-51-0341-7
- M. Poikselka, A. Niemi, H. Khartabil, G. Mayer, *The IMS: IP Multimedia Concepts and Services*, Third Edition John Willey & Sons, 2009. ISBN 978-0-470-72196-4
- A. B. Johnston, *SIP understanding the Session Initiation Protocol*, 3rd edition, Artech House, 2009. ISBN 978-1607839958

**Cilji in kompetence:**

Cilj predmeta je seznaniti študente s koncepti prihodnjih heterogenih omrežjih, ki bodo temeljila na IP protokolu.

Podana bo arhitektura in značilnosti bodočih omrežji s poudarkom na uporabljenih protokolih in konvergenci.

Kompetence študenta bodo po uspešno opravljenem predmetu obsegale sposobnost upravljanja s komunikacijskimi omrežji naslednje generacije.

**Objectives and competences:**

The objective of this course is to acquaint students with future heterogeneous networks, which will base on IP protocol.

In particular the architecture and characteristics of future networks will be given with the emphasis on protocols and convergence.

The competencies of the students completing this course successfully will include the ability to manage future communication networks.

**Predvideni študijski rezultati:**

Študenti bodo z uspešno opravljenimi obveznostmi tega predmeta pridobili:

- poznavanje značilnosti bodočih heterogenih omrežij
- znanje o protokolih, ki se uporabljajo v heterogenih omrežjih
- razumevanje protokolov za zagotavljanje večpredstavnostnih vsebin preko paketnih omrežij
- poznavanje problematike konvergence telekomunikacijskih omrežij

**Intended learning outcomes:**

Students successfully completing this course will acquire:

- knowledge of characteristics of future heterogeneous networks
- knowledge of protocols which are used in heterogeneous networks
- understanding of protocols for delivery of Multimedia Services over packet networks
- understanding the convergence of telecommunications networks

**Metode poučevanja in učenja:**

Predavanja, seminar, konzultacije, individualno delo

**Learning and teaching methods:**

Lectures, seminar, consultancy, individual work

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Seminarska naloga

50 %

Seminar work

Ustni zagovor seminarske naloge

50 %

Oral defense of seminar work

**Reference nosilca / Lecturer's references:**

- A. Švigelj, R. Sernec, K. Alič., "Network-traffic modeling for load prediction: a user-centric approach", IEEE Network, vol. 29, no. 4, pp. 88 - 96, 2015.

- K. Alič, E. Pertovt, A. Švigelj, "Bearer-opportunistic network coding", *International Journal of Computers, Communications & Control*, vol. 10, no. 2, pp. 154-164, 2015
- R. Libnik, A. Švigelj,, G. Kandus, "A novel SIP based procedure for congestion aware handover in heterogeneous networks *Computer Communications*", vol. 33, no. 18, pp. 2176-2184, 2010
- T. Aljaž, B. Imperl, **A. Švigelj**, "Border gateway function performance requirements for the lawful intercept of voice at IMS architecture", *AEÜ, International Journal of Electronics and Communications*, vol. 62, no. 8, pp. 610-621, 2008
- **A. Švigelj**, M. Mohorčič, L. Franck, G. Kandus, "Signalling analysis for traffic class dependent routing in packet switched ISL networks", *Space communications*, vol. 22, no. 2/4, pp. 191-203, 2013