UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Namenski operacijski sistemi v telekomunikacijah
Course title:	Application Specific Operating Systems in Telecommunications

Študijski program in stopnja Study programme and level	Modul Module	Letnik Academic year	Semester Semester
Informacijske in komunikacijske tehnologije, 3. stopnja	Komunikacijske tehnologije	1	1
Information and Communication Technologies, 3rd cycle	Communication Technologies	1	1

Vrsta predmeta / Course type	Izbirni / Elective

Univerzitetna koda predmeta / University course code:	iKT3-648

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

Nosilec predmeta / Lecturer:	Doc. dr. Roman Novak

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Zaključen študij druge stopnje s področja informacijskih ali komunikacijskih tehnologij ali zaključen študij druge stopnje na drugih področjih z znanjem osnov s področja predmeta. Potrebna so tudi osnovna znanja matematike, računalništva in informatike.	Completed second cycle studies in information or communication technologies or completed second cycle studies in other fields with knowledge of fundamentals in the field of this course. Basic knowledge of mathematics, computer science and informatics is also requested.

Vsebina:	**Content (Syllabus outline):**

Operacijski sistemi za delo v realnem času:
    značilnosti mehkih in trdih sistemov za delo v realnem času, algoritmi razporejanja opravil, sistem v čipu, prekinitve in sistemsko jedro, preslikava navideznega pomnilnika, nadzor dostopa
Večpredstavnostni operacijski sistemi:
    značilnosti strežbe večpredstavnostnih vsebin, razporejanje dela procesorja in dostopa do diska, protokoli pretočnih vsebin, večtočkovne komunikacije
	Real-time Operating Systems:
	    defining characteristics of soft and hard real-time systems, scheduling algorithms, system-on-chip, kernel preemptiveness, address translation, admission control
	Multimedia Operating Systems:
	    requirements of multimedia data, CPU and disk scheduling algorithms, network management
	Smartphone Operating Systems:
	    smartphone platforms, supported features, kernel structure, processes and threads,

Operacijski sistemi pametnih telefonov: aktualni operacijski sistemi, podprta funkcionalnost, struktura sistemskega jedra, lastnosti procesov in niti, upravljanje s pomnilnikom, zagotavljanje aplikacijske varnosti, mehanizmi overjanja in nadzora dostopa, opisovanje in uveljavljanje pravil dostopa do sistemskih virov	memory management, application security, authentication and authorization mechanisms, specification and enforcement of the access rules to the system resources

Temeljna literatura in viri / Readings:

Izbrana poglavja iz naslednjih knjig: / Selected chapters from the following books:
- A. Silberschatz, P.B. Galvin, and G. Gagne, *Operating System Concepts (9th edition).* Wiley, 2013. ISBN 978-1-118-09375-7
- A.S. Tanenbaum, and H. Bos, *Modern Operating Systems (4th edition).* Pearson Education, 2014. ISBN 978-1-292-06142-9
- B. Jacob, S.W. Ng, and D.T. Wang, *Memory Systems: Cache, DRAM, Disk.* Morgan Kaufman, 2008. ISBN 978-0-123-79751-3
- D.A. Patterson, and J.L. Hennessy, *Computer Organization and Design (5th edition).* Morgan Kaufman, 2013. ISBN 978-0-124-07726-3

Cilji in kompetence:	**Objectives and competences:**
Podati študentom koncepte modernih namenskih operacijskih sistemov, ki so prisotni na področju telekomunikacij. Posredovanje najpomembnejših rešitev in algoritmov z namenom usmeriti študente v učinkovito uporabo operacijskih sistemov pri snovanju telekomunikacijske opreme in storitev. Študenti bodo pridobili kvalitetno osnovno znanje o procesih, mehanizmih vzporednega izvajanja, postopkih upravljanja s pomnilnikom, interakciji z vhodno/izhodnimi enotami, datotečni arhitekturi, zaščiti in varnosti namenskih operacijskih sistemov.	The aim of the course is to present the fundamental concepts and algorithms of modern operating systems in the field of telecommunications. Students gain knowledge that allows an efficient use of application specific operating systems in the design of telecommunication equipment and services. Students gain quality basic knowledge about the architectures of highly specialized operating systems, which include the concepts of processes and concurrency, memory-management schemes, interaction with the input/output devices, storage systems, protection and security.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Študent, ki bo uspešno končal ta predmet, bo pridobil: - poznavanje in razumevanje arhitekturnih konceptov operacijskih sistemov, vsebovane programske in strojne opreme - najpomembnejših rešitev in algoritmov povezanih z delovanjem operacijskih sistemov na področju telekomunikacij - sposobnost prenašanja rešitev iz okolja operacijskih sistemov na sorodne probleme pri snovanju informacijskih sistemov in rešitev	Students who complete this course successfully will acquire: - broad understanding of operating system structures and concepts, its software and hardware components - the most important solutions and algorithms related to operating systems in telecommunications - ability to transfer learned problem solutions to other related problems in the field of information technology

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar, konzultacije, individualno delo	Lectures, seminar, consultancy, individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Seminarska naloga	50 %	Seminar work
Ustni zagovor seminarske naloge	50 %	Oral defense of seminar work

Reference nosilca / Lecturer's references:

- **R. Novak**, "Loop optimization for divergence reduction on GPUs with SIMT architecture," *IEEE Transactions on Parallel and Distributed Systems*, (PrePrint), 2015
- T. Petrovic, M. Vencelj, M. Lipoglavsek, **R. Novak**, and D. Savran, "Efficient reduction of piled-up events in gamma-ray spectrometry at high count rates," *IEEE Transactions on Nuclear Science*, vol. 61, no 1, pp. 584-589, 2014
- **R. Novak**, and M. Vencelj, "Compton scattering of annihilation photons as a short range quantum key distribution mechanism," *Engineering and Technology*, vol. 5, no. 7, pp. 708-714, 2011
- **R. Novak,** "Networking implications of using multiple HAP constellations," *D. Grace, and M. Mohorcic (eds.), Broadband Communications via High-Altitude Platforms*, Wiley, pp. 345-368, 2010
- A. Vilhar, **R. Novak**, and G. Kandus, "The impact of network topology on the performance of MAP selection algorithms," *Computer Networks*, vol. 54, no. 7, pp. 1197-1209, 2010