

<b>Study program: Information Technology</b>			
<b>Course title: OPERATING SYSTEMS</b>			
<b>Teacher(s): Marjan D. Milošević, Željko Jovanović</b>			
<b>Course status: mandatory</b>			
<b>Number of ECTS credits: 6</b>			
<b>Prerequisite courses: none</b>			
<b>Course objectives</b>			
Introduction to principles of modern operating systems functioning. Acquiring theoretical and practical knowledge about design and structure of operating systems. Getting to know the core kernel functions: controlling processes, memory and input/output devices. Introduction to mechanisms of Linux and other modern systems. Training for advanced Linux system administration and system programming.			
<b>Learning outcomes</b>			
Students can describe and explain functions of the operating system; they make distinction of different kernel categories (monolithic, micro-kernel, hybrid kernel); compare operating in user-mode and kernel-mode; explain scheduling and synchronisation algorithms, memory control and I/O control and identify their advantages and disadvantages; are able to describe and explain principle of virtual memory; can explain forms of file systems organisations, such as ext and NTFS; describe synchronisation techniques; explain protection mechanisms incorporated in the operating system; perform administrative tasks (system configuration, optimisation, administering users, processes, network operating and file systems); analyse processes, signals and system calls in the Linux system; are able to write simple programmes interacting with the Linux kernel and use system calls.			
<b>Content of the course</b>			
<i>Theoretical teaching</i>			
Introduction. Operating system as a hardware abstraction. Preview of evolution of the operating systems. Features of the modern operating systems: Linux, UNIX, Windows, Android. Processes and threads. Deadlock. Controlling and synchronisation of the processes. Memory control techniques. Virtual memory. Controlling input/output systems. File system management. Operating systems protection.			
<i>Practical teaching</i>			
Practical work with mechanisms of the Linux operating system. Demonstration of operating system's functions on example of modern systems (Linux, Windows, UNIX): working with processes and signals, simulation of concurrency via specialised tools, memory management, I/O management and file systems management, system calls analysis, writing Linux modules.			
<b>Literature</b>			
[1] V. Stalings, Operativni sistemi, principi unutrašnje organizacije i dizajna, prevod 9. izdanja, CET, 2018.			
[2] M.Hussain, A journey in creating an operating system kernel,: the 539kernel book, 2022, freely available online: <a href="https://539kernel.com/book/index.html">https://539kernel.com/book/index.html</a>			
[3] B. Đorđević, D. Pleskonjić, N. Maček, Operativni sistemi: teorija, praksa i rešeni zadaci, Mikro knjiga, Beograd, 2005			
[4] R.Arpaci-Dusseau, A.Arpaci-Dusseau: Operating systems, three easy steps, Arpaci-Dusseau Books, 2018 freely available e-version at: <a href="http://pages.cs.wisc.edu/~remzi/OSTEP/">http://pages.cs.wisc.edu/~remzi/OSTEP/</a>			
[5] R.Herzog, R.Mas, The Debian Administrator's Handbook, 2021, freely available at <a href="https://debian-handbook.info/browse/stable/">https://debian-handbook.info/browse/stable/</a>			
[6] D.Milićev, Osnovi operativnih sistema, Mikroknjiga, Beograd, 2020, ISBN - 978-86-7555-446-2			
<b>Number of active teaching classes: 4</b>		<b>Theoretical teaching: 2</b>	<b>Practical teaching: 2</b>
<b>Teaching methods</b>			
Popular lecture, monolog-dialog method and heuristic method, case study, problem-based teaching, individual practical work on computer, demonstration method.			
<b>Evaluation of knowledge (maximum number of points 100)</b>			
<b>Pre-exam obligations</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>
Activities during teaching process	/	Final exam (written):	/
Practical teaching	/	Final exam (oral):	40
Colloquium	60		
Practical teaching			