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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty** | Faculty of Electronic Engineering |
| **GENERAL INFORMATION** |
| Study program  | Electronics and Microsystems |
| Study Module (if applicable) | Electronics |
| Course title | Real Time Operating Systems |
| Level of study | ☐Bachelor x Master’s ☐ Doctoral |
| Type of course | ☐ Obligatory x Elective |
| Semester  | ☐ Autumn X Spring |
| Year of study  | I |
| Number of ECTS allocated | 5 |
| Name of lecturer/lecturers | Petrović D. Branislav |
| Teaching mode | X Lectures ☐Group tutorials ☐ Individual tutorialsX Laboratory work X Project work ☐ Seminar☐Distance learning ☐ Blended learning ☐ Other |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** |
| Acquiring of the knowledge of the basic concepts and principles of modern operating systems, as well as their structure, functions and components. Theoretical and practical knowledge of the concepts, the internal design and implementation of modern embedded operating systems. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| History of Embedded Linux, Embedded Linux distributions. Architecture of embedded Linux, Linux kernel architecture, User space, Start-up sequence, Boot loader interface, Memory map, Interrupt management. Timers, Uart, Power managemint. Embedded storage: Flash map, Memory Technology Device. File systems: Ramdisk, JFFS, NFS, PROC file system. Optimizing storage space. Tuning kernel memory. Embedded drivers: Serial driver, ethernet driver, I2C, USB. Porting applications: Programming with pthreads, Operating system porting layer, Kernel API driver. Real-Time Linux: Interrupt latency, scheduler latency and duration, user-space real-time. Proces scheduling, memory locking, POSIX shared memory, message queues, semaphores, signals, clock and timer, acynchronous I/O. Building and Debuging: building the kernel, building applications, root file system. IDE: Eclipse, Kdevelop, TimeStorm, CodeWarrior. Design exaple: Development of vehicle board computer using microcomputer and embedded Linux.Working with files on the command line, command interpreter (shell). Copy, move and delete files.Working with directories. Working with text files. Shell Programming. Fundamentals of shellprogramming. Construction of shell programming. Network environment. Introduction to TCP / IPnetwork as the Linux server. Administration process. Basic techniques of management processes andthreads. Synchronization process. Synchronization of threads. Boot (boot). Linux kernel configurationsystem. Working with modules. Translating kernel. |
| **LANGUAGE OF INSTRUCTION** |
| X Serbian (complete course) X English (complete course) ☐ Other \_\_\_\_\_\_\_\_\_\_\_\_\_ (complete course)☐Serbian with English mentoring ☐Serbian with other mentoring \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **ASSESSMENT METHODS AND CRITERIA** |
| **Pre exam duties** | **Points** | **Final exam** | **points** |
| **Activity during lectures** | **10** | **Written examination** | **20** |
| **Practical teaching** | **30** | **Oral examination** | **20** |
| **Teaching colloquia** | **20** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |