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| **UNIVERSITY OF NIŠ** | | | | | | |
| **Course Unit Descriptor** | | **Faculty** | | | Faculty of Electronic Engineering, Niš | |
| **GENERAL INFORMATION** | | | | | | |
| Study program | | | | Electrical Engineering and Computing | | |
| Study Module (if applicable) | | | | Electronics | | |
| Course title | | | | Embedded System Design | | |
| Level of study | | | | ☐Bachelor ☐ Master’s ☐ Doctoral | | |
| Type of course | | | | ☐ Obligatory ☐ Elective | | |
| Semester | | | | ☐ Autumn ☐Spring | | |
| Year of study | | | | II | | |
| Number of ECTS allocated | | | | 10 | | |
| Name of lecturer/lecturers | | | | Stojčev K. Mile, Nikolić R. Tatjana | | |
| Teaching mode | | | | ☐Lectures ☐Group tutorials ☐ Individual tutorials  ☐Laboratory work ☐ Project work ☐ Seminar  ☐Distance learning ☐ Blended learning ☐ Other | | |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** | | | | | | |
| The goal of this course is to highlight the crucial development directions and challenges during design of modern embedded systems. The course covers wide range of different fields including design for low power, optimization of hardware and software, SoC and MPSoC design, configurable processors, retargetable compilers and others.  Student's ability: 1) to correctly evaluate the cost-performance ratio of embedded systems/products, 2) to form a team and offer a competitive product on the market in a relatively short period of time. Phases of the product development should include matterial needed for optimal design of software and hardware constituents. | | | | | | |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** | | | | | | |
| Embeded versus general purpose processors. Design methodology. Calculation models. Limitations and challenges (high reliability, high performance, low cost, low power). Selection of resources. Duality of hardware-software. Code generation and compilation. Techniques for design optimization. Programming. Performance analysis. Development tools. Testing. Operating systems. Task scheduling in real time. Selection and installation of the operating system. Verification. Multiprocessor architectures. Types. Homogeneous and heterogeneous multiprocessor structures. Process elements. Interconnection networks. Memory systems. Phisical distributed systems. Design methodologies and algorithms. Multiprocessor software. Operating systems. Services and middleware. Verification of design. SoC design. The design of complex SoCs at system level. Configurable processors. Software and hardware aspects. Application specific processors. Automatic configuration of processor and instruction set. Retargetable compilers. Accelerator units. MPSoCs. Designing SoCs using cores and configurable cores. Busses and networks on chip. Operating systems for MPSoC. Testing and verification. Typical applications.  Preparation of seminar papers in the field of application specific processor, input-output modules with specific purpose, interconnection on- and off-chip networks, and multiprocessor systems-on-chip. Evaluation of system performance in terms of operating frequency, power consumption, and the silicon area. Designing and testing simulators for synchronous and asynchronous circuits and multiprocessor systems. | | | | | | |
| **LANGUAGE OF INSTRUCTION** | | | | | | |
| ☐Serbian (complete course) ☐ 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** |  | | **Written examination** | | |  |
| **Practical teaching** | **50** | | **Oral examination** | | | **50** |
| **Teaching colloquia** |  | | **OVERALL SUM** | | | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** | | | | | | |