SYLLABUS

1. Course title:

System Desing on a Chip

2. Code:

AR304

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

[AR103] Linear Automatic Control Systems I

7. Class restrictions:

Students of Faculty of Electrical Engineering, Study program "Electrical Engineering and Computer Science"

8. Duration / semester:

1 7

9. Weekly contact hours:

9.1. Lectures: 3

9.2. Seminars: 0

9.3. Laboratory/Practice classes: 2

10. Faculty:

Faculty of Electrical Engineering

11. Department/study program:

Electrical Engineering and Computer Science

12. Lecturer:

Ph.D. Lejla Banjanović-Mehmedović, Assoc. P

13. Lecturer's e-mail:

lejla.mehmedovic@untz.ba

14. Web site:

www.lejla-bm.com

15. Course aims:

Introducing to the embedded systems, providing the design knowledge of microcontroller-based systems and FPGA based system-on-chip.

16. Learning outcomes:

At the end of the semester/course, successful students will be able to design microcontroller-based systems of special purposes using high programming languages and FPGA based system-on-chip using hardware description language.

17. Course content:

Introduction in embedded systems. Microprocessors vs. Microcontroller vs. DSP. vs. ASIC vs. ASSP vs. FPGA Designs. Microcontroller architecture. Processors. Memories. Timers. WDT. Integrated hardware peripherals. Fundamentals of the hardware/software interface, techniques for sensing and controlling the physical world. Real-Time systems. Real-time clock. Interrupts. Embedded Operating Systems (EOS). Design of system-on-chip (SOC). Architecture of FPGA based embedded systems. Logical cells. Logical blocks. Embedded multipliers and memory. Clock Managers. Configurable input/ouput. Communication. FPGA-based embedded processors (Hard-, Soft-). Finite state machine. Synthesis using hardware description languages (HDL). Advanced Verilog design of systems-on-chip. Embedded processors based design (hard- vs. soft- cores). Software-Hardware Co-design. Cyber-physical systems. Examples of microcontroller and FPGA based system applications in engineering.

18. Learning methods:

Lectures, seminar/practice classes, homeworks.

19. Assessment methods:

An exam is based on the continuous assessments, which are performed throughout the semester with the midterm tests and the final exam, which includes the questions related to the entire content of the course, focusing on the areas that are not covered by the midterm test.

20. Assessment components:

The final grade is based on the total sum of points from assignments, written midterm and final exam.
Presence to lectures and practice classes: 5
Midterms tests: 45
Final exam: 50
Summary: 100

21. Required reading list:

1. Peter Marwedel: Embedded System Design, Springer, 2006.
2. J. Nurmi: Processor Design, System-on-Chip Computing for ASICs and FPGAs, 2007.
3. Rahul Dubey: Introduction to Embedded System Design Using Field Programmable Gate Arrays, Springer, 2008.
4. S. Brown, Z. Vranesic: Fundamentals of Digital Logic with Verilog Design, 2014.
5. M. Maxfield: FPGAs: Instant Access, 2008.

22. Web sources:

(max. 687 characters)

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016.