Education and Culture
TEMPUS

TEMPUS
CD_JEP-40017-2005

UNIVERZITET CRNE GORE
ELEKTROTEHNIČKI FAKULTET

ZÁPADOČESKÁ UNIVERZITA V PLZNI

Guest Lectures - Seminar

As part of CD_JEP-40017-2005 Tempus Programme, there will be a series of guest lectures (seminars) given by professors from University of West Bohemia, Pilsen, Czech Republic. These talks are open to students and staff of University of Montenegro.

The talks are currently scheduled through following

PROGRAMME

22/01/08 (Tuesday), Introductory Speech, 11:00

- Introduction with University of West Bohemia, Faculty of Electrical Engineering, by Professors **Vjaceslav Georgiev and Martin Poupa**, New auditory of ETF (kod stud. službe).

24/01/08 – 14/02/08, SEMINAR

- PLDs and VHDL language, by **Dr. Martin Poupa**

  Each Tuesday and Thursday, 10.00-12.00

24/01 – 14/02, SEMINAR

- Information theory - coding, by Prof. **Vjaceslav Georgiev**

  Each Tuesday and Thursday, 12.00-14.00

Admission: Faculty of Electrical Engineering, Room 305, Prof. R. Stojanovic, till 23/01/2008.

For more information please visit web site www.spiea.cg.ac.yu

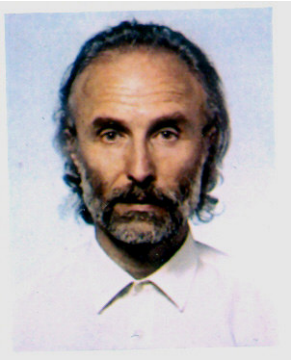
TITLE: "Programmable Logic Devices and VHDL language"

BY: Dr. Martin Poupa, University of West Bohemia, Pilsen, Czech Republic
PLACE: New auditory of ETF (kod Studentske sluzbe)

SHEDULE

1. Introduction to PLD devices, architectures of PLD devices, PLD design flow, VHDL language, introduction to simulations with VHDL test benches.
2. Processes, sensitivity list, wait command, description of MUX, DMX, coders and decoders in VHDL.
3. Description of flip-flops (RS, latch, D, T, JK), parameterizable code in VHDL, registers, synthesizing to FPGA.
4. Description of memories (async./sync. ROM, single/dual port RAM, FIFO) in VHDL.
5. Realization of simple serial transmitter / receiver (UART) in VHDL, functional, post-synthesis and timing simulations on VHDL simulator.
6. Attributes, Libraries and packages, Library of Parameterized Modules, using Library of Parameterized Modules (LPM) in VHDL design.
7. Work with text and binary files in test benches, description and realization of state automatons in VHDL.
8. Software processors in FPGA devices (Altera, Lattice, Xilinx) – demonstration of Altera NIOS II processor.
9. Altera Mega-Wizard Plug-In Modules, Altera Signal-Tap Embedded Logic Analyzer, Altera DSP Builder – demonstration. Very high level languages for description of hardware – C to hardware languages – demonstration of Celoxica's Handel-C compiler.

Seminar work, in groups.



TITLE: "Information theory – coding"

BY: Prof. Vjaceslav Georgiev, University of West Bohemia, Pilsen, Czech Republic
PLACE: New auditory of ETF (kod Studentske sluzbe)

SHEDULE

1. **Introduction into information theory**, brief history of information theory.
2. **Basic categories of information theory** Sources ensembles of messages and their models. Uniqueness of amount of information measure, entropy and its properties. Source redundancy and necessity of its reduction.
3. **Source coding and data compression.** Non-uniform source coding. Prefix code and Kraft inequality. Coding theorem for non-uniform codes. Arithmetic and Huffman codes. Coding theorem for uniform codes.
4. **Communication channels and capacity theorems.** Channels, their mathematical description and classification. Mutual information and information capacity. Residual entropy (equivocation) and reverse coding theorem for an arbitrary discrete channel. Brief grounding of direct coding theorem for a discrete stationary memoryless channel.
5. **Primary insight into channel coding.** Redundancy introduction as a general way of improving data transmission noise immunity. Block and trellis, systematic and non-systematic codes.
6. **Block codes: general discussion.** Length, rate and Hamming distance of the block code. Error detection and correction. Relations between error-controlling power and minimal distance of the code. Maximal likelihood and minimum distance decoding. Fundamental bounds in coding theory (Hamming, Plotkin, Varshamov-Gilbert). Soft and hard decoding.
7. **Linear block codes.** Vector space over finite field, binary space. Linear code as a subspace, basic parameters of the linear code. Generator and parity-check matrices. Minimal distance of the linear code. The most important codes: Hamming, simplex, orthogonal and Reed-Muller codes.
8. **Cyclic codes.** Cyclic codes as a particular case of linear codes. Polynomial description of cyclic codes. Generator and parity-check polynomials. Hamming and simplex codes as cyclic ones. Further insight into finite fields: primitive elements and roots of polynomials. BCH and Reed-Solomon codes. Cyclic redundancy check (CRC) codes and ARQ protocols.
9. **Convolutional codes.** Basic parameters and ways of representation of the convolutional codes, tree, trellis and state diagrams. Viterbi decoding algorithm as a maximal likelihood decoding. Metrics of hard and soft Viterbi algorithms. Transfer function of convolutional code and free distance.

Seminar work, in groups.