

Title: Digital design

Lecturer: doc dr. Matej Možek, prof. dr. Slavko Amon

Aim of the course:

The objective of the course is to present the key concepts in the modern digital systems design with emphasis on HDL programming (VHDL) and other CAD software. The course is focused on advanced design methods of digital circuits and components used in electronic and computer systems. Presented development approaches and practical skills for designing contemporary digital systems using advanced CAD tools enable students to independently design complex digital circuits using modern design tools.

Required (pre)knowledge:

Digital structures

Contents:

VHDL: behavioral and structural modeling.

Algorithmic and register-level design

Simulation and 'testbench' methods

Synthesis modeling

CPLD.

Fundamentals of FPGA.

Complex combinational arithmetic circuits in VHDL: Parallel counters, multipliers.

Designing finite automata with VHDL.

Different methods of implementation of finite automata - considering the specific characteristics of the machine.

Design of a simple CPU.

The implementation of complex digital system: simple CPU (VHDL).

Asynchronous circuits: synthesis, applications.

Fundamentals of fuzzy logic: algebra, fuzzy logic function, fuzzy, usage.

Selected references:

1. *Fundamentals of digital logic with VHDL design* / Stephen Brown, Zvonko Vranesic,.McGraw-Hill, 2005, ISBN 007-246085-7
2. *Logic and computer design fundamentals* / M. Morris Mano, Charles R. Kime. Upper Saddle River : Pearson Prentice Hall, 2007 ISBN 978-0-13-198926-9
3. *Digital design : principles and practices* / John F. Wakerly Upper Saddle River : Pearson/Prentice Hall, 2006 ISBN 0-13-186389-4