**DVA494**
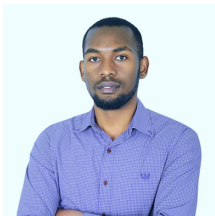
Programming of Reliable Embedded Systems

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## Course Overview

- The course is on **intermediate** level!
- Grading system 3-5
    - 3-5 (passed), U (failed)

- To pass the course students have to fulfill the following requirements:
    - Complete the labs and have them approved (4 credits).
    - Project (3.5 credits)

## Course Objectives & Roadmap

- **By the end of this course, you will be able to:**
    - Translate complex algorithms into efficient hardware architectures using the **Register Transfer Methodology (RTM)**.
    - Design and simulate digital systems using **VHDL (IEEE 1076)**.
    - Analyze timing constraints (**setup**, **hold**, **clock skew**) to ensure stability.
    - Implement control logic using **FSMs** and **ASM charts** to drive datapaths.
    - Develop reliable embedded systems on **Xilinx Artix-7 FPGAs** using **Vivado**.

- **Course Roadmap (9 Lectures, 3 Parts)**

    - **Part 1:** **The Fundamentals (Lectures 1–2)**
      Digital Logic, Boolean Algebra, VHDL syntax (review + refresh).

    - **Part 2:** **FPGA Architecture & Sequential Design (Lectures 3–6)**
      Timing analysis, FSMs, ASM methodology for control.

    - **Part 3:** **Advanced Reliable Systems (Lectures 7–9)**
      Memory design, Fault Tolerance, industry coding standards.
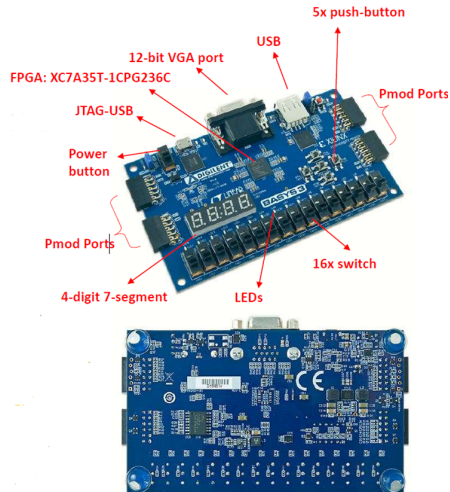
- **Labs and project**
  - Students work in groups (**max 3** per group).

- **Hardware**
  - **BASYS3** board for the labs.
  - Some labs require **simulation only** (no hardware required).

- **Software tools**
  - VHDL editor and synthesizer
    - ▶ **AMD Vivado**



5x push-button
USB
12-bit VGA port
FPGA: XC7A35T-1CPG236C
Pmod Ports
JTAG-USB
Power button
Pmod Ports
4-digit 7-segment
LEDs
16x switch

Check the **Course Page** on Canvas for more and detailed information!!

**Anything else …**