# Essentials of Microprocessors

Embedded 1

EMBD-uPS-ILT (v1.0)

**Course Specification**

## Course Description

Learn what makes microprocessors tick! This class offers insights into all major aspects of microprocessors, from registers through coprocessors and everything in between. Differences between RISC and CISC architectures are explored as well as the concept of interrupts. A generic microprocessor is programmed and run in simulation to reinforce the principles learned in the lecture modules. The student will leave the class well prepared for the Xilinx Zynq® All Programmable SoC training curriculum.

**Level** – Embedded 1

**Course Duration** – 1 day

**Price** – $800 or 8 Xilinx Training Credits

**Course Part Number** – EMBD-uPS-ILT

**Who Should Attend?** – Novices to microprocessors or those who just need a refresher on microprocessor architecture.

**Follow-up**

- Embedded Systems Design (course)
- Embedded Systems Software Design (course)
- Zynq Master Training for Experienced FPGA Designers (course)

**Prerequisites**

- None

**Software Tools**

- Microprocessor simulator provided with the lab materials

**Hardware**

- Architecture: N/A*
- Demo board: None*

* This course does not focus on any particular architecture. Check with North Pole Engineering, Inc. for the specifics of the in-class lab board or other customizations.

After completing this comprehensive training, you will have the necessary skills to:

- Describe the key components of a processor
- Write a simple assembly language program
- Explain how processors handle interrupts
- Describe some modern processor features
- Compare some existing processor architectures

## Course Outline

- Processor Architecture Overview
- Exercise 1 – Processor Components
- Introduction to Assembly Language
- Exercise 2 – Playing Computer
- **Lab 1:** Programming a Microprocessor
- Interrupts
- **Lab 2:** Writing an Interrupt-Driven Program
- Interfacing with Memory
- Advanced Processor Features
- Processor Architecture Comparison

## Lab Descriptions

- **Lab 1:** Programming a Microprocessor - Explore how to control a basic microprocessor and move data to and from memory by using assembly language.
- **Lab 2:** Writing an Interrupt-Driven Program – Examine the benefits of coding by using interrupts to detect external activities. Special interrupt instructions are covered, including enabling and disabling interrupts, writing interrupt handlers, and how the stack and registers are affected during an interrupt.

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