



## Fundamentals of **FPGA**

### ❖ Course Objectives

- To discuss the basics of Programmable Hardware.
- To discuss the basics of VLSI.
- To study the basics of Hardware Description Language.
- To study the VHDL Language.
- To learn FPGA Advantage Software.
- To prepare a project using ISE and FPGA Advantage.

### ❖ Type of Delivery

Instructor-Led Training

### ❖ Duration

5 Weeks – 3 Sessions per week  
3 hours/ Session

### ❖ Training Benefits

- Professional Instructor
- Professional Presentations
- Software Simulation
- Software Emulation
- Exam & Final Project
- CEUs certificate for Professional Engineers
- Special discount for IEEE members
- Internationally recognized certificate

❖ **A few of the covered topics are**

- About VHDL
- VHDL Terms
- Describing Hardware in VHDL
- Design Flow
- EDA Tools
- Translation of VHDL Code into a Circuit
- Fundamental VHDL Units
- Library Declaration
- Architecture
- Object Types
- Data Types
- Signed and Unsigned Data Types
- Introduction to Behavioral Modeling
- Transport versus Inertial Delay
- Inertial Delay
- Simulation Deltas
- Bad Multiple Driver Model
- Block Statements
- Guarded Blocks
- VHDL Operators and Attributes
- Assignment Operators
- Logical Operators
- Arithmetic Operators
- Comparison Operators
- Shift Operators
- Pre-Defined Attributes
- Concurrent versus Sequential
- Combinational versus Sequential Logic
- Concurrent versus Sequential Code
- Design of the Lower (Sequential) Section
- Design of the Upper (Combinational) Section
- Barrel Shifter
- Signed and Unsigned Comparators
- Carry Ripple and Carry Look Ahead Adder
- Vending Machine Controller
- Memory Design

*Please refer to course catalogue to see full covered topics.*

### ❖ Target Audiences

This course is Suitable for Communications Engineering students at level 3 and 4 and newly admitted engineers. It is suitable also for Computer Engineering students at level 3 or 4 or newly admitted engineers.

### ❖ Prerequisites

- Digital Signal Processing.
- Digital Image Processing.
- Logic Circuits.
- Matlab Fundamentals

### ❖ Course certification

Upon successfully completing course assessment, quizzes, final project and exam, you will be eligible to get your internationally recognized certificate. This course is offering CEUs from IEEE and IACET for more information: [www.ieee.org/partners](http://www.ieee.org/partners)

### ❖ About the Instructor

This course is delivered by **Dr. Mohamed Abdel Azim**. He is currently an assistance professor at Mansoura University. He has wide experience of teaching Electronics and Communications Engineering courses in various Universities in Egypt.

<http://mansvu.mans.edu.eg/cv/en/showcv.php?id=5063>

### ❖ Course References

- Gustavo D. Sutter, “Synthesis of Arithmetic Circuits”, 2006.
- AMOS R. OMONDI and JAGATH C. RAJAPAKSE, “FPGA IMPLEMENTATIONS OF NEURAL NETWORKS,” 2006.
- Stephen Brown and Zvonkon Vranesic, “Fundamentals of Logic Design with VHDL,” 2005.