

VLSI Design courses are designed to provide students with sufficient hands on experience with VLSI design tools and to provide industry exposure for future career selection in VLSI industry. This total six months PG Diploma course offers 26 weeks of theory with practical and hands on industry standard EDA tools.

Course Structure for Three Months Certificate Course

Module 1. ASIC Design

- Different Technology Options
- ASIC styles
- ASIC Design Flow
- Design Flow (Design Specification, Verification Plan, RTL Description, Functional Verification, Synthesis)
- Power Calculations
- Clock Methodologies

Module 2. Digital Design Module

- Combinatorial Logic Design
- Sequential Logic Design
- State Machines
- Advanced Design Issues: Metastability, Noise Margins, Power, Fan-out, Timing Consideration

References- Digital Design Principles and Practice by John F. Wakerly.

Digital Design by M. Morris Mano, Michael D. Ciletti

Module 3. Hardware Design Language Module And Synthesis

- VHDL- Introduction to HDL
 - VHDL Flow
 - Language Constructs
 - Concurrent Constructs
 - Sequential Constructs
 - Subprogram
 - Packaging
 - Timing Issues
 - The Concept of Simulation and Synthesis
 - State Machine Synthesis
 - Efficient Coding Styles
- Verilog HDL- Data Types
 - Modelling Concepts
 - Task and Functions

Specify Block and Timing Checks

Verification and Writing Test Benches

References- VHDL: Programming by Douglas L. Perry

A VHDL primer by Jayaram Bhasker

Verilog HDL (paperback) by Samir Palnitkar

Advanced ASIC chip synthesis by Himanshu Bhatnagar

Course Structure for Six Months PG Diploma in VLSI Design

Module 4. MOS Fundamentals

- MOSFET channel length modulation
- Small signal model, AC equivalent circuit
- T model
- Biasing a MOSFET at DC
- Modelling body effect
- Short channel effects

References- Solid State Electronic Devices by Ben G. Streetman

Device Electronics For Integrated Circuit by Richard S .Muller

VLSI design Technique for Analog and digital circuit by Randell Geiger

Module 5. CMOS Subsystem Design module

- System
- VLSI design flow
- Structured design approach
- Architectural issues
- Circuit Families
 - Restoring Logic: CMOS and its variants - NMOS and Bi CMOS
 - Other circuit variants
 - NMOS gates with depletion (zero -threshold) pull up
 - Bi-CMOS gates
- Switch logic: Pass Transistor and Transmission gate (TG)
- Examples of Structured Design
 - MUX
 - DMUX
 - D Latch and Flop
 - A general logic function block

Reference- Digital Integrated Circuits- A Design Perspective by Jan M. Rabaey,

Anantha Chandrakasan, and Borivoje Nikolic

CMOS Logic Circuit Design by John P. Uyemura

Module 6. Analog CMOS IC module

- Review of MOSFET Device Models
- Review of BJT Device Models
- Self-reading IC Technology
- Differential Amplifiers
- Current Mirrors
- Opamp Design
- Frequency Response
- Stability and Compensation
- Two-stage Amplifier

Reference- Design of Analog CMOS IC by Behzad Razavi
Analog Design Essential by Willy M.C. Sansen