VLSI
SYLLABUS COPY

Engineered for skill enhancement.

PROGRAM HIGHLIGHTS

Accredited Certificates :
✓ Program approved ISO Certification

Internships :
✓ Industry-relevant opportunities provided-

Placement Assistance :
✓ Career guidance from industry experts-

Basic to Advanced Level Training :
✓ Learn from experienced AI professionals .

Live & Recorded Lectures :
✓ Flexible learning at your convenience .

Real-Time Projects :
✓ Hands-on minor & major projects

ABOUT US

- **OUR MISSION :**

    Nxt Sync is a pioneering EdTech company committed to bridging the gap between theoretical learning and practical application. Our mission is to empower students with cutting-edge AI skills that enhance employability and prepare them for a tech-driven future.

- **OUR VISION--UPSKILL**: Empowering minds for the future.

- **INNOVATE**: Fostering creativity and breakthroughs .

- **EXCEL**: Preparing industry-ready professionals.

WHY VLSI?

- ➢ Foundational Language for All Modern Programming
  ➢ Ideal for System-Level Programming and Embedded Systems
  ➢ Improves Logical Thinking & Problem Solving
  ➢ Widely Used in Operating Systems, IoT & Robotics
  ➢ Strong Base for Learning C++, Java, and Python
  ➢ High Demand in Core Software Development Roles

LEARNING PATH

- Introduction to VLSI Design
- Digital Electronics Fundamentals
- CMOS Technology & Fabrication
- RTL Design Using Verilog/SystemVerilog
- VHDL & FSM Modeling
- Functional & Timing Simulation
- Verification Using SystemVerilog/UVM
- Synthesis & STA
- Physical Design Flow & DRC/LVS
- DFT & ATPG
- Capstone Projects & Industry Collaboration

DETAILED MODULE BREAKDOWN

Module 1: Introduction to VLSI Design

- VLSI Evolution & Applications

- Moore's Law & Scaling

- Overview of ASIC & FPGA Design Flows

Module 2: Digital Electronics Fundamentals

- Combinational & Sequential Circuits

- Logic Gates, Flip-Flops, Latches

- Multiplexers, Counters, Registers

Module 3: CMOS Technology & Fabrication
•CMOS Inverter Characteristics
•NMOS & PMOS Operation
•Fabrication Steps & Layout Design
Module 4: RTL Design Using
Verilog/SystemVerilog
•HDL Basics & Syntax
•RTL Modeling & Hierarchical Design
•Testbenches & Simulation
Module 5: VHDL & FSM Modeling
•VHDL Syntax & Constructs
•State Machine Design
•Structural vs Behavioral Modeling

Module 6: Functional & Timing Simulation
•Simulation with ModelSim & Questa
•Delay Modeling & Timing Checks
•Testbench Creation & Assertions
Module 7: Verification Using SystemVerilog/UVM
•Functional Coverage & Assertions
•UVM Methodology & Test Environments
•Reusable Verification Components
Module 8: Synthesis & Static Timing Analysis (STA)
•Logic Synthesis Tools (Design Compiler)
•Timing Constraints (SDC)
•STA Reports & Setup/Hold Analysis

Module 9: Physical Design Flow & DRC/LVS

•Floorplanning, Placement & Routing

•Clock Tree Synthesis (CTS)

•DRC, LVS & IR Drop Analysis

Module 10: DFT & ATPG

•Scan Chain Insertion

•BIST, MBIST, JTAG

•ATPG Tools & Fault Coverage

Module 11: Capstone Projects & Industry Collaboration

•Real-Time RTL/Verification/PD Projects

•Project Review & Presentation

•Industry Mentorship & Portfolio Building

ASSIGNMENT'S &ASSESSMENTS

➢ Weekly Lab Assignments & Quizzes
➢ Mid-Term Mini RTL or Verification Projects
➢ Final Capstone VLSI Project
➢ Code Reviews, Viva & Live Presentations

TOOLS & FRAMEWORKS USED

Design & Simulation:
ModelSim, Questa, Vivado, Xilinx ISE
Synthesis & Analysis:
Design Compiler, PrimeTime, Genus
Verification:
SystemVerilog, UVM, Cadence Incisive
Layout & Physical Design:
Cadence Virtuoso, Innovus, Calibre DRC/LVS
DFT & ATPG:
TetraMAX, FastScan, SpyGlass DFT

RECOMMENDED READING

VLSI Design:
"CMOS VLSI Design" – Neil Weste & David Harris
"Digital Integrated Circuits" – Jan M. Rabaey
"HDL Programming (VHDL and Verilog)" – Nazeih Botros
"Principles of CMOS VLSI Design" – Neil Weste

WHY CHOOSE NXTSYNC?

- ☑ Industry-Aligned VLSI Curriculum
- ☑ Hands-on Real-World Chip Design Projects
- ☑ Expert Mentorship from Semiconductor Professionals
- ☑ Flexible Learning Schedule
- ☑ ISO-Certified VLSI Training Program

Start Your Digital Marketing Journey with NxtSync Today!