COURSE OVERVIEW

Full Course Title: Chip Design

Instructional Hours (Contact Hours): 24

Course Description:

In line with the growing demand in the VLSI and semiconductor industry, this course is designed to provide a solid foundation in chip design. Covering both theoretical concepts and practical implementations, it introduces key topics like digital design, hardware description languages, functional verification, and chip design workflows. Students will gain hands-on experience with RTL coding, testbench creation, and simulation using industry-standard and open-source tools.

Learning Outcomes:

- Develop a thorough understanding of digital logic design.
- Gain proficiency in Verilog/SystemVerilog coding and testbench creation.
- Learn the basics of functional verification.
- Acquire insights into the complete chip design flow, from RTL to GDSII.
- Understand synthesis, timing analysis, and power optimization.
- Explore open-source EDA tools for RTL design and verification.
- Apply knowledge to a hands-on project, reinforcing theoretical learning.

Learning Activities:

☒ Class Discussions/Discussion Boards

☒ Peer-to-Peer Work (pairs, small groups)

☒ Written Assignments (reports, essays)

☒ Case Study Analysis

☒ Student Projects

☒ Readings

☒ Textbook/Workbook Exercises

Methods of Assessment/Grading Criteria:

☒ Class/Discussion Boards Participation

☒ Written Assignments (reports, essays)

☒ Exams/Quizzes

☒ Individual Projects/Presentations

☒ Group Projects/Presentations

Course Topics:

- **Fundamentals of Digital Design.**
- **Comprehensive Overview of HDL (Verilog/SystemVerilog).**
- **CMOS Basics.**
- **Functional Verification.**
- **Protocols (SPI, I2C).**
- **Hands-On Work**:
    - Designing and simulating logic gates, combinational circuits, sequential circuits, and FSMs using Verilog.
    - Implementing SPI and I2C protocols coding, simulation, and verification using Verilog and SystemVerilog.