Course Title: Introduction to Secure Digital Systems
Course No: SEC2244
Credits: 4
Meeting Times:

Lecture: Monday, Wednesday, Friday 10:45 AM – 11:40 AM
Lab: Wednesday 5:00 PM – 7:00 PM

Course Description:
The course introduces students to the design and security of digital circuits, digital systems and digital components using digital logic. The topics will provide a bridge between simple digital circuits that consist of a few gates and advanced large-scale circuits such as a pipelined microprocessor. Students will be introduced to modern hardware design languages, as well as the necessary simulation and analysis tools for these languages. Starting from simple registers, the course builds knowledge of both combinational and sequential digital circuits. Students will implement simple digital designs and transfer them to a Field Programmable Gate Array (FPGA) for testing. The security of digital circuits, threats such as trojans and countermeasures such as testing, verification and certification will be discussed. Assured digital microelectronics and their importance in society will be discussed.

Learning Outcomes:
- Students will be able to describe the operation of a Boolean logic gate.
- Students will be able to differentiate between a multiplexer and decoder.
- Students will be able to design a multilevel logic circuit and run it on hardware.
- Students will be able to simulate a digital circuit written in a hardware description language.
- Students will be able to describe various types of flip flops and latches.
- Students will be able to differentiate between Mealy and Moore finite state machines.
- Students will be able to design, build and test a digital circuit using a hardware description language.
- Students will be able to explain the different types of memory available to a digital circuit, as well as their capabilities and tradeoffs.
- Students will be able to describe various hardware-based threats to digital circuits

Textbook:
Sarah L. Harris, David Harris, "Digital Design and Computer Architecture (RISC-V edition)", Morgan Kaufmann, 2022, ISBN 9780128200643

Key Grade Factors:
Homework: 25%, Laboratory: 20%, Exams: 30%, Summative Assessment/Project: 25%