EE P 535 – Digital Systems Design with FPGAs - 4 Credits

Instructor: Sep Makhsous – sosper30@uw.edu

Why Take This Course?

Accelerate your ability to design high-performance digital systems using **Field-Programmable Gate Arrays (FPGAs)**—the same tech powering breakthroughs in genomic computing, finance, robotics, and beyond.

This course teaches you how to:

- Design and implement **combinational and sequential logic**
- Work with **System Verilog and EDA tools**
- Master **FPGA timing, constraints, and architecture**
- Build real-world systems through **individual labs and design projects**

What You'll Learn

By the end of the course, you'll gain skills in:

- Combinational & Sequential Logic Design
- Algorithmic State Machines (ASM)
- Clock Domain Crossing & Meta-stability
- FPGA Architecture & Design Flow
- System Verilog for FPGA development
- Timing Analysis, Constraints, and Optimization

Course Format

- **Lecture:** 2 times per week, 4:30 – 6:20 PM - In-person with Zoom option
- **In-Class Team Exercises (ICTEs):** Hands-on design work during the second hour of each class
- **Labs:** Four project-based labs for real-world FPGA design experience
- **Midterm:** One take-home exam
- **No Required Textbook**

Prerequisites

- Programming experience in Java or C++
- Familiarity with data structures (queues, trees, recursion)
- Basic electrical circuit knowledge

Designed For:

- Engineers in embedded systems, robotics, or hardware acceleration
- Software developers transitioning to hardware design
- Professionals aiming to boost their **hands-on digital design** experience