

ECE P 520: Software Engineering for Embedded Applications

Modern embedded systems programming starts with the hardware and extends all the way to the cloud. The resulting myriad of programming languages, libraries, tools, data structures, and algorithms may seem difficult for any one programmer to master. In this course, we introduce the fundamentals of programming languages and software engineering common to all levels of embedded systems programming, giving students the conceptual tools they need to tackle any project.

Specifically, this course takes a detailed look at two programming languages, C++ and Javascript; teaches students how to use Docker, build tools, version control, and advanced editors; describes how to use and create software libraries; and ties everything together with a more substantial software engineering project. No experience in C or C++ is assumed, but some experience with basic programming (e.g. in MATLAB or Python) is helpful.

Note: This is not a course on embedded systems. No hardware is used. Rather, general software engineering principles are covered.

Lectures: Thurs 6pm - 9pm

Homework: Due weekly

Instructor: Prof. Eric Klavins.

Syllabus (Approximate)

- Week 1: Basic tools: Git, Docker, Make, UNIX, and the C compiler
- Week 2: C syntax and data types
- Week 3: Building APIs in C
- Week 4: Fundamentals of C++ and object oriented programming
- Week 5: C++ Standard Template Library
- Week 6: Event loops, process control, and scheduling
- Week 7: Events and finite state machines
- Week 8: Networking
- Week 9: Cloud computing
- Week 10: Projects