

**Outline.** This is an introductory graduate course. Its intent is to provide all students that are interested in software systems with a basic background that will help them succeed in subsequent endeavors (courses, research, and work in industry) related to software. The course is intended to be “hands-on” — there is a large project component that involves building a software system.

**Content.** The course is divided broadly into three components: software systems (~40%), mathematical logic (~15%), and data structures (~45%). Under software systems, we will cover topics such as systems programming and operating systems, scripting, system calls, libraries, compilers and interpreters. Under mathematical logic, we will cover topics such as propositional logic, syntax, semantics, entailment, deduction and the use of logic in software. Under data structures, we will cover topics such as stacks, heaps, trees, and graphs, and algorithms to manipulate them.

**Instructor.** Dr. Werner Dietl, [wdietl@uwaterloo.ca](mailto:wdietl@uwaterloo.ca), <https://ece.uwaterloo.ca/~wdietl/>

**Prerequisite.** Graduate standing in the ECE department at Waterloo.

**Grading.** Project: 50%, Final exam: 50%.

**Project.** The project will comprise 5 or 6 stages that span the term. It will involve the use of various software tools and techniques to solve a problem. It will exercise skills involving systems programming, use of libraries, and use of third-party software. All programming is to be done in C and using bash scripts only. If you are unfamiliar with C or are weak at programming or scripting, you can do some extra work on your own in parallel with the course to strengthen those skills.

**Text books.** All material will be (made) available online. There is no textbook that needs to be bought. Some of the sources from which material will be drawn:

- Advanced Linux Programming, <http://www.advancedlinuxprogramming.com/>
- Logic for Computer Scientists, Uwe Schoning, <http://www.springerlink.com/content/978-0-8176-4762-9/>
- Introduction to Algorithms, Cormen et al., 2 ed. (Accessible online via <http://lib.uwaterloo.ca/>.)