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# CS 451: Language, Logic and Computation

Fritz Ruehr • Willamette University Computer Science • Spring 2006

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## Introduction

In this upper-level course we will study logics, computational calculi and other formal systems in order to learn how they can make programs, languages and programmers work better. The use of formal methods brings new clarity to complex programming situations, raising confidence that code actually does what it is supposed to do. Defining what a program “should” do, and showing that it does, requires a grounding in algebraic methods, logic, formal syntax and semantics, and abstract models of computation. All programmers can benefit from these ideas and techniques, which are becoming ever more relevant due to renewed concern about program quality and security. Those students interested in research issues, graduate school or ground-breaking industrial jobs will find this course especially helpful.

## Instructor

**Fritz Ruehr**, Associate Professor of Computer Science

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**E-mail:** [fruehr@willamette.edu](mailto:fruehr@willamette.edu)

Phone: 503-370-6165

Course homepage:

<http://www.willamette.edu/~fruehr/LLC>

**Office hours:** TTh 2:00-4:00; by appt.; or drop by

## Logistics and attendance

Event	Day and time	Room
Lectures	MWF 3:00-4:00	Collins 408
Labs	MWF 4:00-5:00	Collins 411 (and 408 at first)

Students are expected to attend all lecture and lab sessions unless arrangements have been made in advance. You are in any case responsible for all content, changes in assignments or policies, etc., which are made during the course of scheduled classes. I will try to make important announcements available on the course homepage or by e-mail.

## Textbooks

No formal textbook will be used in this class, so your primary sources for information will be lecture (and the notes you take there), class hand-outs, lab assignments and possibly readings assignments based on web-accessible material. You should be careful to make arrangements to get lecture notes from someone else in class if you cannot attend.

## On-line resources

The course homepage (address above) will fill out over the semester. We will be using the Haskell programming language for at least some of our programming work—compilers are available on the lab machines in Collins 411.

## Due dates

Homework will generally be due one to two weeks after it is assigned—on occasion, class-wide extensions may be announced. If you think you will not be able to complete an assignment, contact me as soon as possible: extensions may be granted for official business, emergencies, etc. It is better to ask for an extension before the due date, if possible.

## **Grading policy**

Grades will be based on exams, in-class quizzes, homework assignments and class participation. Individual grades will be given in numeric form and then combined to determine a composite at the end of the semester according to numeric weights listed below. I grade on a modified curve basis; that is, I grade students relative to each other's performance, but with no necessity of "fit" to a normal curve. I am happy to give out all high grades (and will give out all low grades if necessary), depending on the absolute performance of the class as a whole.

I plan to give one midterm exam and a longer, comprehensive final exam during the regular scheduled period, as well as several shorter in-class quizzes. The weights used for the final grade will be:

- 45% for the exams (split 25/20 for the final and midterm);
- 30% for homework assignments and labs;
- 15% split evenly among in-class quizzes;
- and 10% for class participation.

## **Collaboration and related issues**

All work you hand in should be your own. You are allowed (and encouraged) to seek help from other students for general study purposes, but you should never allow other people to do your work for you. You are also responsible for attributing any material you quote from outside sources, including other students (this is especially relevant for homework assignments). Violations of these rules will result in penalties according to usual College policies, but would normally include at least a failing grade for the assignment.