General Information

Welcome to ECE540! The goal of this course is to provide you with a solid understanding of the theoretical and practical aspects of building modern optimizing compilers. The lectures will cover topics such as: intermediate representations, basic blocks and flow graphs, data flow analysis, partial evaluation and redundancy elimination, loop optimizations, register allocation, instruction scheduling, memory hierarchy optimizations and parallelization. The programming assignments will provide an opportunity to implement significant optimizations within the framework of a modern research compiler.

Instructor

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Timetable

The following is the timetable for the course. Attending the lectures is a must. Attending the lab is optional.

- Lectures: Tuesdays 10-12pm, BA1230
- Lab hours: Mondays 1-4pm, GB243 (optional)

Prerequisites

- Basic understanding of computer architecture (pipelines, caches, etc.).
- Experience programming in C.
- CSC467/488 (Compilers & Interpreters) is NOT a prerequisite.

Course Web Site

Information on ECE540, including important announcements, a copy of this handout, copies of assignment handouts, and course marks may be found on the web site for the course. Simply log onto Blackboard and you should find the course listed under your courses. The web site also provides a discussion board where you can post questions regarding the programming assignments.

Textbook and Other Reference

The following books are recommended but not required:

- Steven Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers.

Pointers to other reference material will be posted on the course’s web site.

**Programming Assignments**

The lab assignments consist of number of programming exercises using the C programming language and the SUIF compiler. A handout describing each assignment will be made available on the web site for the course. The lab assignments do take a substantial amount of your time. Hence, it is important to start as early as possible on your assignments and to avoid procrastination.

While lab access and use are possible any time and the assignments may be done with remote access, you are strongly encouraged to regularly attend your scheduled lab period; a Teaching Assistant (TA) will be available to answer any questions and offer help during these periods.

The following is a list of the assignments:

1. Basic blocks and dominators
2. Natural loops
3. Dataflow and live variables
4. Available expressions
5. Open optimization project

**Topic Outline**

The following is a list of the main topics of the course.

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<th>Topic</th>
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<tr>
<td>Intermediate Representations</td>
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<td>Control Flow Analysis</td>
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<td>Redundancy Elimination</td>
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<td>Register Allocation</td>
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<td>Instruction Scheduling</td>
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<td>Parallelization and memory optimizations</td>
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**Marking and Evaluation**

The midterm test scheduled for Tuesday March 6\textsuperscript{th}, 2012, in class. A final exam will be given during the final exams’ period. The composition of the final mark is as follows:

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<tr>
<th>Programming Assignments</th>
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<tr>
<td>Midterm Test</td>
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<td>Final Exam</td>
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