

**CMSC 445: Compiler Design (3 credits)
Spring 2009**

Instructor: Robert Marmorstein **E-mail:** rmmarm@sdf.lonestar.org **Phone:** 395-2185

Course Web Site: <http://narnia.homeunix.com/~robert/Spring2009/cs445.html>

Office Hours: Ruffner 329, 10:00am-10:50am MTWRF **Lecture:** Ruffner 352, 3:00pm-3:50pm MWF

Course Description:

A course covering the theory and techniques of compiler and code translation systems. Topics include lexical analysis, parsing, and code generation, and the various techniques used when handling differing source language classes. A programming intensive course. Also covered are the techniques of top-down and bottom-up parsing.

Prerequisites:

You must have taken CMSC 300. Even though it is not officially a prerequisite, CMSC 240 is also extremely helpful, so if you have not had data structures yet, I strongly recommend that you come see me to discuss whether you are adequately prepared for this course.

Course Objectives:

The student will learn to construct a scanner and parser for an example language and construct an interpreter for that language. The student will learn the advantages and disadvantages of the various types of lexers and parsers. The student will become familiar with tools for automated construction of a compiler.

Textbook and Other Resources:

The textbook for this class is "Compilers: Principles, Techniques, and Tools, 2nd edition" by Aho, Lam, Sethi, and Ullman, published by Addison-Wesley in 2006. Make sure you get the 2nd edition! You may also find the notes and free online book at <http://www.scifac.ru.ac.za/compilers/> helpful.

Course Requirements:

The final exam and the midterm exam will each count for 15% of your grade. Pop quizzes will comprise 20% of your grade in this class. Homework assignments will comprise an additional 20%. There will also be programming projects which will comprise the remaining 30% of your grade.

Grading Policy:

Late work will not be accepted unless you have a serious medical condition or family emergency which prevents you from completing the assignment on time. You do not need a doctor's note, but you must send me e-mail at least 12 hours before the assignment is due to request a new due date. At your option, you may work with a partner on the semester project.

Grading Scale:

A+: 100, A: 99-96, A-: 95-90, B+: 89-87, B: 86-83, B-:82-80, C+:79-77,
C:76-73, C-:72-70, D+:69-67, D: 67-63, D-:62-60, F: 60 or less.

Attendance:

I expect you to attend class unless you are sick or engaged in a school-sponsored sport or extracurricular activity (such as the programming contest). I will rely on your honor to enforce the attendance policy. In accordance with Longwood policy, missing more than 10% of scheduled class time to unexcused absences may result in loss of one letter grade. Missing 25% of class or more (whether excused or not) may, at my discretion, result in a failing grade.

Collaboration:

You may freely discuss the homework problems and programming projects with other students as long as you write down your own answers **in your own words** and do not copy code electronically. The exams and quizzes are to be completed entirely on your own. Infractions of this policy will be dealt with under the Longwood Honor Code. A student convicted of an honor offense involving this class will automatically receive an F in addition to any penalties imposed by the Honor Board.

Cell Phones and Laptops:

Cell phones and laptops are to be turned off and put away during lecture unless I instruct you to bring them to class for use with one of the lab sessions. Violations of this policy may be considered an unexcused absence.

Food and Drinks:

Food is not allowed during lecture unless I bring it. You may bring non-alcoholic beverages to class.

Tentative Course Schedule:

Jan. 12-16	Introduction, Organization of a Compiler (Chapter 1)
Jan. 19	Holiday -- No Class
Jan. 21-23	Lexical Analysis (Chapter 2, Sections 3.1-3.4) and Regular Expressions
Jan. 26-30	Lex, Flex, and Automata (Sections 3.5-3.9)
Feb. 2-6	Review, MIDTERM I
Feb. 9-13	Parsing and Grammars (Sections 4.1-4.3)
Feb. 16-20	Top-Down Parsing and LL Parsers (Section 4.4)
Feb. 23-27	Bottom-Up Parsing and LR Parsers (Sections 4.5-4.6)
Mar. 2-6	LALR Parsers and Ambiguity (Sections 4.7-4.8)
Mar. 9-13	Holiday — No Class
Mar. 16-20	YACC and Bison (Section 4.9)
Mar. 23-27	Catchup and Project Work Week
Mar. 30-Apr. 3	Syntax Directed Translation (Chapter 5)
Apr. 6-10	Code Generation (Sections 6.1-6.5)
Apr. 13-17	Code Generation (Sections 6.6-6.10)
Apr. 20-24	Optimization and Advanced Topics
Apr. 30	FINAL EXAM (11:30am-2:00pm, Thursday)