

FALL 2010

Universal Compiler: Theory and Construction

CSC 5640/4640

General Information

Instructor: Professor Boris Stilman
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Office hours: Monday: 09:45 am – 11:30 am
 Wednesday: 09:45 am – 12:00 pm
 Schedule an appointment at (303) 556-3614 or by email
 (**subject:** appointment)
 I am also available early mornings before classes:
 6:00 am – 7:00 am.

Class meetings: Monday and Wednesday, 7:00 am – 8:15 am
 Room: NC 1322

Catalog Data

Theoretical foundations and step-by-step hands-on experience in the development of a compiler, which can tune itself to a new programming language. This is a must-take course for future software developers as well as those interested in applications of the theory of Computer Science. CSC 5640 is a Category B graduate course.

Textbooks

- **Lecture Notes** in PDF format will appear on the web after each class in the teaching section of my web site. Download and study.
- Charles N. Fisher, Richard J. LeBlanc, Jr., *Crafting A Compiler*, The Benjamin/Cummings Publ, 1988. Chapters 1-5, 7, 8, 17 (recommended).
- Charles N. Fisher, Richard J. LeBlanc, Jr., *Crafting A Compiler with C*, The Benjamin/Cummings Publ, 1991. Chapters 1-5, 7, 8, 17 (recommended).

Course Objectives

Study of the principals of compilation and construction of compilers with emphasis on actual development of a universal compiler. This course includes programming assignments following the material studied in class and two exams, midterm and final.

Course Topics

Topics include construction of two compilers, Ad Hoc and Universal, elements of theory of scanning, grammars and parsing, LL(1) parsers, semantic processing, symbol tables structure and other topics.

Preliminary Course Outline*

Lecture	Date	Topic	Reading	Assignments
1	8.23	Ad Hoc Compiler: Scanner	Notes, Ch. 1-2	1
2	8.25	Ad Hoc Compiler: Grammar	Notes	
3	8.30	Ad Hoc Compiler: Parser	Notes	2
4	9.01	Ad Hoc Compiler: Generator 1	Notes	
	9.06	Labor Day		
5	9.08	Two Lectures 7:00 am: Applications of LG 8:30 am: LG: A Historical Prospective	Notes	
6	9.13	Ad Hoc Compiler: Generator 2	Notes	3
7	9.15	Ad Hoc Compiler: Comp. Example	Notes	
8	9.20	Univ. Compiler: Scanner Analysis	Notes, Ch. 3	4

9	9.22	Univ. Compiler: Scanner Driver	Notes	
10	9.27	Univ. Compiler: LL(1) Grammar	Notes, Ch. 4	5
11	9.29	Univ. Compiler: LL(1) Predict	Notes, Ch. 5	
12	10.04	Univ. Compiler: LL(1) Lambda	Notes	6
13	10.06	Univ. Compiler: LL(1) First-Follow	Notes	
14	10.11	Univ. Compiler: LL(1) Table	Notes	7
15	10.13	Univ. Compiler: LL(1) Generator	Notes	
16	10.18	Univ. Compiler: LL(1) Parser Driver	Notes	8
17	10.20	Midterm Review		
18-19	10.23 Sat	Midterm Exam (3h)		
20	10.25	Univ. Compiler: Semantic Data	Notes, Ch. 7	9
21	10.27	Univ. Compiler: Semantic Stack	Notes	
22	11.01	Univ. Compiler: Semantic Example	Notes	
23	11.03	Univ. Compiler: Semantic Intermed. Rep.	Notes	
	11.08-12	Dr Stilman's travel to AI Conf (no classes)		
24	11.15	Univ. Compiler: Symbol Table	Notes, Ch. 8	10
25	11.17	Univ. Compiler: Symbol Block Table	Notes	
	11.22-26	Fall Break		
26	11.29	Error Repair	Notes, Ch. 17	
27	12.01	Error Recovery	Notes	11
28	12.06	Additional Chapters	Ch. 15	
29	12.08	Final Review		
30-31	12.11 Sat	Final Exam (3h)		

*) Course Outline is a preliminary document, which can be adjusted during the semester in response to student performance, scheduling changes, unanticipated events.

Grading Policy

The grading policy for the course will be as follows:

Homework	Weekly Assignments	40%
Exams	Midterm & Final Exams (30% each)	60%

Submission of assignments after the due date is allowed with 10% grade reduction. Also, multiple resubmissions are allowed. This is the way to learn and improve your grade up to the maximum (if the first submission was on time). Don't postpone submissions. It will be difficult to skip assignments and later make up, because, usually, every next assignment is based on the previous one.

Homework Guidelines

Fully read problem statements and answer each element of the problem. The programming language for programming assignments is of your choice. Every submitted program must be documented properly with program text (with comments), sample inputs and outputs.

Submissions should be made by email only to Boris.Stilman@UCDenver.edu. No paperwork will be accepted. Every submission must have the following text in the email subject:

UC Homework XX *lastname* mm/dd/yyyy/

XX is the double-digit assignment number from 01 to 11, which you are submitting or resubmitting, *lastname* is your last name, mm/dd/yyyy is the today's date. For example,

UC Homework 07 Dow 10/01/2010

Different homeworks should be submitted by different emails. Submission of several homeworks should be done via several messages, one homework

per message. Graded homework will be emailed to the address that you provided or the address from which this homework was sent.

Due to legibility concerns, the mode for submission is typed work or computer program output. Multiple submissions of homeworks are accepted so short narrative description of corrected portions is required. Email with any issues regarding what you see as an incorrect deduction and generally these issues may easily be resolved.

CSE Policy on Cheating

The penalty for cheating - wherever or whenever the cheating is determined to have occurred - is failure of the course.