

CS450 Structure of Higher Level Languages – Syllabus

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Course Description and Objectives

The syntax and semantics of higher-level languages are treated. Formal specifications of syntax and models of semantics will be used. Important topics include mechanisms for parameter passing, scoping, dynamic storage allocation and systems interfacing. Both compiled and interpreted languages will be used as examples. The language of instruction is Scheme, a dialect of LISP, which is taught in the course.

Prerequisites

- CS310 (Advanced data structures and algorithms)
- CS220/Math320 (Applied discrete mathematics, formerly CS320)
- You should be comfortable working in the Linux environment. CS240 and CS310 should take care of that.

Textbook

Structure and Interpretation of Computer Programs, Second Edition (paperback), by Harold Abelson and Gerald Jay Sussman with Julie Sussman
MIT Press, 1996
ISBN: 978-0-262-51087-5

Topics

- Chapters 1 and 2 cover functional programming, data abstraction, and the duality between data and operations on data (we will cover this part very quickly)
- Chapter 3 covers imperative programming, programs with mutable state, delayed operations, and some remarkable programs that can be built with these capabilities.
- Chapter 4 describes a Scheme interpreter written in Scheme. We will modify that interpreter in order to study different ways in which languages behave and how they can be implemented so as to behave in those ways.
- Chapter 5 discusses three programs:

1. An abstract register machine simulator. This simulator reads programs written in an assembly language. Each such program describes a special-purpose register machine. The simulator "assembles" such a program into a model of the machine and then runs the machine.
2. An explicit-control evaluator that is similar to the Scheme interpreter from Chapter 4, except that it is itself a register machine, rather than a Scheme program, and so is executed by the register machine simulator.
3. A Scheme compiler, which like the interpreter of Chapter 4 is itself a Scheme program that takes as input a Scheme expression or program, but instead of interpreting the Scheme source code, it generates register machine code out of Scheme input. This code can then itself be executed by the register machine simulator.

Assignments and Grading

There will be no exams. Your grade will be a (possibly weighted) average of 10[†] homework assignments.

[†] 10 is the maximum, we may not be able to go over the entire material. . An in-class quiz may be added.

Final Grade

Your final grade will be calculated using the following table. The minimum standard for passing the course is a percentage score of 40%. You also must pass the final exam (score at least 40% in the final exam). Keeping this in mind, your grade for the course will be calculated using the following table. Assume your final percentage score for the course is P:

$P > 90$	A
$85 < P \leq 90$	A-
$80 < P \leq 85$	B+
$75 < P \leq 80$	B
$70 < P \leq 75$	B-
$65 < P \leq 70$	C+
$60 < P \leq 65$	C
$55 < P \leq 60$	C-
$50 < P \leq 55$	D+
$45 < P \leq 50$	D
$40 < P \leq 45$	D-
$P < 40$	F

Accommodations

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, M-1-401, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of Drop/Add period.

Student Conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the catalog of Undergraduate Programs, pp. 44-45, and 48-52. The Code is available online at: www.umb.edu/student_services/student_rights/code_conduct.html

Communication With the Class

In Fall 2020 the course will take place remotely. Therefore it is important for everyone to be able to communicate effectively online.

- I will communicate with you primarily through your umb email. Please make sure you read it regularly.
- Please follow Piazza for discussions and the course webpage for contents and announcements.
- Make use of (virtual) office hours and don't hesitate to ask for a (virtual) meeting off-hours.

Homepage

The course home page is <http://www.cs.umb.edu/cs450>. This directory is visible in the filesystem of our UNIX machines as `/data/htdocs/cs450`. All material for this course will be kept in this area, which may sometimes be called `$cs450`.