COSC 341/342 Programming Languages Fall 2025

Meets: MoWe 5:30-7:10 520 Pray Harrold
Instructor: Dr. Li Zhang (lzhang5@emich.edu)
Office: 512K Pray Harrold
Office Hours: MoWe 9:00-11:00 3:00-5:30pm or by appointment

Purpose:

Formal definition of programming languages; structure of simple statements; global properties of algorithmic languages; data description; run-time representation of programs; procedural languages such as C and C++, non-procedural languages such as Lisp or Prolog.

Prerequisite:

The formal prerequisites are COSC 211 (Programming Data Structures), COSC 221 (Computer Organization I).

Textbooks:

1. *Programming Language Design Concepts* by David A. Watt; Wiley; ISBN: 0-470-85320-4. (not required to purchase)
2. *Elements of ML Programming (ML97 edition)* by Jeffrey D. Ullman; Prentice Hall; ISBN 0-13-790387-1.

Objectives:

- Practice recursion and functional programming.
- Learn logical programming.
- Understand fundamental concepts of programming language design and implementation.
- Study concepts that will make it easier for you to learn new programming languages.
- Experience functional, logical, assembly, and GUI programming.
- Hands on dissect of compiler construction and "fancy" concepts such as dynamic binding and closures.
- Expose to many more programming languages.

Assessment:

Your course grade is determined by your performance on participation, quizzes, exercises, projects and exams, weighted as follows.

Quiz	48%
Attendance	4%
Labs	6%
Project	15%
Midterm	6%
Final	21%

Quizzes and Exercises:

The purpose of in-class quizzes is to reinforce the programming language skills. There will be around 9 quizzes. The first 5 quizzes are very similar in recursion programming. You should expect to master the still no later than the 4th quiz.

Programming Assignments:

There will be three major programming assignments which are implemented in various programming languages: ML and Prolog. You may use AI but must indicate in your report.

Exams:

There are two close-book exams: midterm (6%) will be scheduled around week 11 (October 27) and final exam (21%) will be held on the exam week (December 17) according to the university schedule.

Your grades will be assigned as follows. I reserve the right to make adjustments to the breakdown if I feel it is necessary. A grade of **F** will be given when either (a) overall score is below 63, or (b) the first 6 quizzes are all below 10.

A	92-100%
A-	88-91%
B+	85-87%
B	82-84%
B-	78-81%
C+	75-77%
C	72-74%
C-	68-71%
D	63-67%

Policy:

I expect, and your fellow students expect, that every person in this class will adhere to the highest possible ethical standards. All work which you hand in to me must be your own independent work. When an assignment source code is copied, a grade of F will be given to both participants. In general, we will adhere to the policies of the computer science department.

Course Outline:

The following is a rough outline of the topics we will cover in the course.

- **Introduction** History of programming languages, experience with various languages.
- **ML** Extensive study on functional programming language ML97.
- **Lisp, Haskell** Functional programming.
- **Prolog** Logical programming.
- **Fortran, Pascal, C** Imperative programming.
- **Cocoa, Android, JavaScript** Event driven, GUI programming. Demo only.
- **Declarations, Blocks** Names, bindings, visibility, scopes.

- **Values, Types** Extensive study of data types, polymorphism, type checking.
- **Storage, Abstraction** Expressions, statements, control, subprograms, ADT, inheritance, and polymorphism.
- **Polymorphism in Java and Kotlin** Advanced polymorphism, higher order function equivalency, closures, and Lambda.
- **Language Definitions and Translation** Syntax, semantics, lexical and syntax analysis, CCs. SableCC demo.
- **Major Programming Paradigms** Imperative, object oriented, functional, logical, concurrency, event drive, and scripting.
- **Language Experience** Alice/Alice, Bash, Erlang, F++, Java Swing, LaTeX, Lex and Yacc, Sable CC, MATLAB, Python, Tcl/Tk, esoteric languages, and more.