CS 381 – Programming Language Fundamentals

Winter 2021 – Syllabus

CS 381, Programming Language Fundamentals, is a four-credit course for undergraduate students. The course introduces concepts found in a variety of programming languages and exposes students to non-imperative programming paradigms. Topics to be covered include: functional programming in Haskell, logic programming in Prolog, syntax, scoping, parameter passing, types, polymorphism, exception handling, semantics.

Course Staff and Logistics

Instructor	Eric Walkingshaw (walkiner@oregonstate.edu)
TAs	Parisa Ataei (ataeip@oregonstate.edu) Fariba Khan (khanfari@oregonstate.edu) Jeffrey Young (youngjef@oregonstate.edu)
Lectures	Mon/Wed 2:00–3:50pm, Zoom (via Canvas)
Web page	http://web.engr.oregonstate.edu/~walkiner/teaching/cs381-wi21
Office hours	(see course web page)

Learning Objectives

At the end of the course, students should be able to . . .

1. **Create** functional programs using *algebraic data types* and *recursive functions*.
2. **Produce and explain** the *type* and *result* of an expression in the context of functional programming.
3. **Produce** an *abstract syntax* for a language given its concrete syntax.
4. **Create** a *denotational semantics* for a language given its abstract syntax and an informal specification of its behavior.
5. **Produce and explain** the behavior of a program under *static* vs. *dynamic typing*, and discuss the benefits and drawbacks of each approach.
6. **Produce and explain** a program's output under *static* vs. *dynamic* scoping of names.
7. **Produce and explain** a program's output under different parameter passing schemes, such as *call-by-value* vs. *call-by-name* vs. *call-by-need*.
8. **Create** logic programs and express queries using *predicates*.

Tentative Schedule (subject to change)

Week	Monday	Wednesday
1	Course Intro, Haskell	Haskell
2	Haskell	Haskell
3	*No class (MLK Day)*	Syntax, *Quiz 1 (Haskell)*
4	Syntax	Intro to Semantics
5	Semantics, *Quiz 2 (Syntax)*	Semantics of State
6	*Midterm exam*	Semantics of Names
7	Semantics of Procedures	Type Systems
8	Language Design	Paradigms, *Quiz 3 (Adv. Semantics)*
9	Prolog	Prolog
10	Prolog, *Quiz 4 (Prolog)*	Prolog, Review

Final exam: Wed Mar 17, 12:00–1:50pm

For the latest scheduling information, check the course web page regularly!

Course Policies

On **quizzes and exams**, you may use the following:

- Notes that you have taken yourself during the class.
- Course slides and example code posted to the course web page.
- Programming tools used in the course: a text editor, GHCi, and SWI-Prolog.

On **quizzes and exams**, you may *not* use:

- The internet, outside of Canvas for taking the quiz/exam (e.g. you may not search the web).
- Your classmates. Communication during quizzes and exams is cheating.

On **homework**, collaboration with classmates is *strongly encouraged*. Although homework is graded, its role is to help you learn the course material, not evaluate your performance. Having teammates to discuss homework with is much more effective for this than working alone. To ensure that every student gets the most out of the homework, you must follow the following rules when collaborating:

- Teams of up to 3 students may submit a common homework solution. Include the name and ID number of all team members at the top of the file.
- Teams should *work on the assignment together, at the same time*, not divide it up and then try to combine the results. Dividing up an assignment means that each student only learns from a subset of it, which defeats the purpose of the homework.
- All team members must *contribute significantly* to the solution and will receive the same grade. A good practice is to rotate who is actually typing the solution into the file. This keeps everyone engaged and ensures that everyone has a chance in the drivers' seat.
- All team members must be able to *explain* any aspect of the solution. If you don't understand something a teammate does or says, ask them to explain it to you! Teaching something is the best way to learn it, so asking questions of your teammates helps everyone learn more.

- If you discuss homework with classmates or others who are *not* part of your team, you should follow the *30-minute rule*: after the conversation, do something unrelated to the assignment that takes ~30 minutes (go for a walk, make and eat something tasty, watch a show) before returning to your solution. This ensures that you actually understand what you're doing, not just offloading information from your short-term memory cache.

Grading

Grades will be computed using the following weights:

Homework	30%
Quizzes	20% = 4 × 5% each
Midterm Exam	20%
Final Exam	30%

Grades are assigned using the following ranges: ≥93% = A, 90–92% = A-, 87–89% = B+, 83–86% = B, 80–82% = B-, 77–79% = C+, 73–76% = C, 70–72% = C-, 60–69% = D, ≤59% = F. Overall grades will not be curved. Scores on individual quizzes and exams may occasionally be adjusted upward by a constant factor for the entire class.

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255).

Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.