CS 381, Programming Languages 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)
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Lectures: Mon/Wed/Fri 11:00–11:50am, Withycombe Hall 109
Web page: http://web.engr.oregonstate.edu/~walkiner/teaching/cs381-wi19
Office hours: (see course web page)

Learning Objectives

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

1. **Design and implement** a functional program, using *algebraic data types* and *recursive functions*, from an informal specification and example input-output pairs.

2. **Produce and explain** the *type* and *result* of an expression within a larger functional program.

3. **Produce and explain** an *abstract syntax*, using a context-free grammar, for a language given a definition of its concrete syntax.

4. **Analyze and reduce** a language, by applying the concept of *syntactic sugar*, to its minimal core of essential features.

5. **Produce and explain** how a program’s output and behavior differs based on a variety of language design decisions related to naming, such as *static vs. dynamic scope* and *call-by-value vs. call-by-name vs. call-by-need* parameter passing.

6. **Design and implement** a denotational semantics or interpreter for a language given its abstract syntax and an informal specification of its behavior, which may include features such as naming, state, functions, and/or exceptions.

7. **Design and implement** a logic program, using *queries* over recursively defined *predicates*, from an informal specification and example results.
Tentative Schedule (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction, Haskell</td>
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<td>2</td>
<td>Haskell</td>
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<td>Haskell, Syntax</td>
<td>Quiz #1</td>
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<td>4</td>
<td>Syntax</td>
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<td>5</td>
<td>Semantics</td>
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<td>Types</td>
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<td>Naming, Parameter Passing</td>
<td>Quiz #2</td>
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<td>State, Exceptions</td>
<td>Midterm #2</td>
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<td>10</td>
<td>Prolog, Review</td>
<td>Quiz #3</td>
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**Final exam**: Wed Mar 20, 12:00–1:50pm

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

**Grading**

Grades will be computed using the following weights:

- Homework: 25%
- Quizzes: $15\% = 3 \times 5\%$ each
- Midterms: $30\% = 2 \times 15\%$ each
- Final Exam: 30%

Grades are assigned using the following ranges: $\geq 93\% = A$, $90–92\% = A-$, $87–89\% = B+$, $83–86\% = B$, $80–82\% = B-$, $77–79\% = C+$, $73–76\% = C$, $70–72\% = C-$, $60–69\% = D$, $\leq 59\% = F$. 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.

**Course Policies**

All quizzes and exams are closed book and closed notes.

Teamwork on homework is allowed and encouraged. Teams of two or three students may submit a common homework so long as all members are clearly identified on the submission. All students in a team must contribute to a team solution and will receive the same grade. Adding the name of a student who has not contributed to a solution will be regarded as cheating. Submitting work that is not yours will also (obviously) be regarded as cheating. All team members must be able to explain their homework contribution to the instructor, if asked.

**Students with Disabilities**

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.