

CptS355 - Programming Language Design

I. Course Logistics

A. Semester and Year:

Spring 2022

B. Course number and name:

CptS355 - Programming Language Design

C. Catalog Description

Course Prerequisite: CPT S 223 or 233, with a C or better; admitted to the major or minor in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or Data Analytics. Design concepts of high-level programming languages; survey of existing languages, experience using some languages. Typically offered Spring.

D. Credits and contact hours

3 credits; 3 lecture hours

Mon, Wed, Fri 1:10 p.m. - 2:00 p.m., EVRT 452

II. Instructor Information

Jeremy E. Thompson, Scholarly Associate Professor
School of Electrical Engineering and Comp Sci
Washington State University Everett
Office: EVRT 406

Email: j.e.thompson@wsu.edu

Phone: (425) 405-1627 (email greatly preferred)

Student Hours: M,W,Th 2:10 – 3:00 p.m., EVRT 406 and via Zoom:

<https://wsu.zoom.us/j/91865688842?pwd=c2JDcVNISDhYdUdVbFVZbU9pNnNHUT09&from=addon>

Teaching Assistant(s):

TBD (for grading purposes only)

III. Required or Recommended Materials

A. Required

None.

B. Recommended

We will not follow any textbooks closely. You may use the following as reference.

- Programming Language Pragmatics, Michael L. Scott, 4th Edition, Morgan Kaufmann Publishers (ISBN-10: 0124104096)
- Learning Haskell, by Gabriele Keller and Manuel M T Chakravarty (<http://learn.hfm.io/>)
- Real World Haskell, by Bryan O'Sullivan, Don Stewart, and John Goerzen (<http://book.realworldhaskell.org/>)
- Composing Programs (<http://composingprograms.com/>)
- The Python Tutorial (<https://docs.python.org/3/tutorial/>)

IV. Course Learning Objectives

By the end of the course, students will:

- ✓ Understand components of programming languages including control structures, names, types, objects, exceptions, etc.

- ✓ Understand different kinds of programming language paradigms such as imperative, functional, and object-oriented languages.
- ✓ Demonstrate skills in using several programming languages (Haskell, Python, Java).
- ✓ Master specific language concepts such as, scoping, parameter passing, function closures, garbage collection, etc.
- ✓ Develop a basic understanding of programming language implementation, especially insofar as the implementation impacts the design.
- ✓ Develop the skills necessary to learn new programming languages quickly.

In the context of the CptS degree programs' objectives, this course contributes to the achievement of the ABET¹ outcomes outlined in Appendix-B.

V. Expectations for Student Effort

This is a challenging course. Students should expect to spend numerous hours each week outside the classroom to successfully complete the programming assignments.

VI. Course Timeline

Posted on Canvas ([Subject to change](#))

VII. Assignments, Assessments, and Grading Policy

Labs and attendance	5%
Programming assignments	50%
Midterm and final exams	45%

A. Attendance (5%)

Attendance is expected at all lectures. Lecture notes will be posted on Canvas, but reading the notes is not an adequate substitute for attendance. You are also expected to participate in class discussions to a reasonable extent.

In all lectures, attendance will be taken via Canvas quizzes.

5% of your course grade will be based on the attendance quizzes.

Attendance and assignment/project submissions on time is a strong indication that you care about this class and are serious about success. I will look at your attendance scores and assignment/project submission dates before finalizing letter grades.

B. Assignments (50% - 6 projects: 6%, 7%, 6%, 6%, 15%, 10%)

There will be 6 programming projects (around every 10 to 15 days). All assignments will be posted on Canvas. Turn-in will be via file upload (onto Canvas) and you *may* need to demo certain projects. The submission instructions for the assignments will be provided along with the assignment descriptions. The tentative deadlines for the assignment will be listed on the course schedule on Canvas. Please make sure to check the announcements regularly for updates.

C. Exams (15% each)

There will be two midterm exams and one final exam. All exams will be take-home exams. You will be given 24 hours to complete the exam. It is expected you will use notes from class and reference materials for the relevant languages.

¹ ABET is a nonprofit, non-governmental accrediting agency for programs in applied and natural science, computing, engineering, and engineering technology.

D. Grading Scale

The following scale will be used to convert your course percentage into a grade. Grades will not be rounded.

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Total Score	≥96%	90% – <96%	84% – <90%	80% – <84%	77% – <80%	74 – <77%	70% – <74%	67% – <70%	64% – <67%	60% – <64%	<60%

E. Brief list of topics to be covered

Topics	# Lectures
Introduction; Overview of programming languages	2
Functional programming	1
Haskell (Variable Bindings, Functions, Tuples, Lists, Options, Pattern Matching, Tail Recursion, High-order functions, Data types, Recursive Types, Trees)	11
Types in programming: type systems and inference	1
Python	4
Scope and scoping	2
Postscript (Dynamic Scoping)	2
Parameter Passing, Function Closures	2
Concepts in Object Oriented Languages: Java	2
Java classes and inheritance; Java systems architecture	1
C++: Objects and multiple inheritance	1
Garbage Collection	2
Partial functions and computability	2

VIII. Key Classroom Policies

A. Attendance and Make-up Policy

1. COVID-19-Related Absences

Students are responsible for ensuring that they attend all class meetings and complete all in-class and out-of-class work as assigned by the instructor. Students are also responsible for communicating with the instructor should they need to be absent. During the semester it is possible that some students will be required to quarantine or will fall ill for an extended period. I will do my best to exercise understanding and generosity in responding to students' requests to keep up with the coursework or make up missed work. I only ask that students do their best to avoid abusing this policy to the detriment of all involved.

2. Attendance Policy

The expectation is that you will attend the classes per the schedule unless otherwise arranged. Please contact me (<mailto:j.e.thompson@wsu.edu>) ASAP if you foresee any obstacles preventing regular attendance to the lectures. **Attendance will be measured with in-class quizzes.**

3. Absences

Students should make all reasonable efforts to attend all class meetings. However, in the event a student is unable to attend a class, it is the responsibility of the student to inform the instructor as soon as possible and plan for any missed work. **Missing class meetings may result in reducing a student's overall grade in the class, as 5% of your grade is determined by class attendance.**

B. COVID-19 Policy

Students are expected to abide by all current COVID-19 related university policies and public health directives. These directives may be adjusted to respond to the evolving COVID-19 pandemic. Directives may include, but

are not limited to, compliance with WSU's COVID-19 vaccination policy, wearing a cloth face covering, physically distancing, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at <https://wsu.edu/covid-19/>. Students who do not comply with these directives may be required to leave the classroom; in egregious or repetitive cases, student non-compliance may be referred to the Center for Community Standards for action under the Standards of Conduct for Students.

C. Academic Integrity Policy

All members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Students are responsible for understanding the full [Academic Integrity Statement](#). Students who violate WSU's Academic Integrity Policy (identified in WAC 504-26-010(3) and -404) will **at a minimum, receive a zero** on the assignment/exam question, with the possibility of a zero for the entire assignment/exam, or in extreme cases, a failing grade for the entire course. Students will be reported to the WSU academic integrity/student conduct office, will not have the option to withdraw from the course pending an appeal, and will be reported to the Center for Community Standards. If you have any questions about what is and is not allowed in this course, ask your course instructor.

Cheating includes, but is not limited to, plagiarism and **unauthorized collaboration** as defined in the Standards of Conduct for Students, WAC 504-26-010(3). **Cheating includes both representing other's work as your own, and also allowing your work to be represented as another's.** Read and understand all [the definitions of cheating](#). If you have any questions about what is and is not allowed, ask your course instructor.

D. Reasonable Accommodation

Reasonable accommodations are available for students with documented disabilities or chronic medical or psychological conditions. If you have such a condition and need accommodations to fully participate in this class, please visit your campus' Access Center/Services website to follow published procedures to request accommodations. Students may also contact their campus offices to schedule an appointment with a Disability Specialist. All disability related accommodations are to be approved through the Access Center/Services on your campus. It is a university expectation that students connect with instructors (via email, Zoom, or in person) to discuss logistics within two weeks after they have officially requested their accommodations.

For more information, contact a Disability Specialist on your home campus:

- Pullman, WSU Global Campus, Everett, Bremerton, and Puyallup: 509-335-3417 [Access Center](#) (<https://www.accesscenter.wsu.edu>) or email at access.center@wsu.edu
- Spokane: 509-358-7816 [Access Services](#) (<https://spokane.wsu.edu/studentaffairs/access-resources/>) or email j.schneider@wsu.edu
- Tri-Cities: [Access Services](#) (<http://www.tricity.wsu.edu/disability/>) or email g.hormel@wsu.edu
- Vancouver: 360-546-9238 [Access Center](#) (<https://studentaffairs.vancouver.wsu.edu/student-wellness-center/access-center>) or email van.access.center@wsu.edu

E. Accommodation for Religious Observances or Activities

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with the instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodations for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who feel they have been treated unfairly in terms of this accommodation may refer to Academic Regulation 104 - Academic Complaint Procedures.

F. Safety and Emergency Notification

Classroom and campus safety are of paramount importance at Washington State University and are the shared responsibility of the entire campus population. WSU urges students to follow the "Alert, Assess, Act," protocol for all types of emergencies and the ["Run, Hide, Fight"](#) response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus

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safety, and related topics, please view the FBI's [Run, Hide, Fight video](#) and visit the [WSU safety portal](#).
Full details can be found at <https://provost.wsu.edu/classroom-safety/>