SYLLABUS – CS 4536: Programming Language Design  
Instructor: Rose Bohrer (pronouns: she/her)  
Time: Tue,Fri |11:00 AM – 12:50 PM     
Classroom: Innovation Studio 205  
Instructor Office: Fuller Labs 139  
Office hours: **TBA, in-person in FL 139**

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Sections About People (The Important Stuff)

Inclusion + Classroom Climate Expectations

Computer science is for all of us. That means you too. It is important to take say this because many of us can remember experiences in computer science where we did not feel welcome.

Computing culture only gets more inclusive when people work together to make it that way. I expect all of you to welcome each other, in your own way. On my part, I hope to create a classroom climate where you would feel comfortable sharing any feedback you have on this topic, and also feel comfortable reaching out for help if you do experience any ignorant behavior. Though I have not lived through all the things that my students live through, I know what it is like to look around the room and see that nobody looks like you. I will do my best.

To be clear, here is an incomplete list of things that need to be said more in CS classrooms: All Black Lives (Still) Matter, Anti-Asian Racism is a Pandemic, No Human is Illegal, and Disability Rights are Human Rights.

Mental Health (is in the Back)

I have put my mental health statement at the end of the syllabus. I encourage you to read it when you are in the right mood because mental health is more important than school.

Disability + Accommodations

The best way to arrange accommodations is to have OAS (Office of Accessibility Services) [notify me](https://clockwork.wpi.edu/ClockWork/custom/misc/home.aspx) – this helps me keep everything organized. It is standard to remind you of this on the syllabus.  
**OAS Email:** AccessibilityServices@wpi.edu **OAS Phone:** (508) 831-4908

***Do you want to know what accommodations are or whether you can get them?*** OAS and your doctor are good people to ask. I’m also happy to give my non-professional advice for things I personally live through: autism, ADHD, Hypermobile Ehlers-Danlos Syndrome.

***Is there an accommodation that would help you, but OAS does not usually provide?*** I would love to discuss with you. I can’t promise anything, but we should try.

### Stupid Question Policy

It is course policy that there are no stupid questions. If you still feel that your question is stupid, it is course policy that you should ask it anyway. This policy matters because when you need help, you may not be sure how to ask a perfect question yet. You may also have questions that relate to background knowledge or life outside of class, and these might be even more important. This is a list of questions that are not stupid. It is not complete (there are no stupid questions):

* What happened in the last two weeks of class?
* What do I do if English is hard?
* What does the school counseling center really do? Does it really even help?
* I’m having a hard time in school. What are accommodations? Do I count?
* How do I do well in school if I work two jobs and I’m still hungry?
* How am I supposed to be motivated when **<\*waves hands wildly at the world in general\*>**

I cannot do my job well if my students are afraid to ask for help.

Deciding Whether to Take the Course

What’s This Course About?

The scope of this course is broader than the course description may imply: we cover a broad range of perspectives on programming language. This does not mean that it covers debates like “Should we program in language X vs. Y?” Rather, I cover: what do different kinds of people care about when they think about programming languages? How do researchers in theory, software engineering, social sciences, and humanities ask different kinds of questions about programming languages?

What Will I Do In This Class?

You will do the following in your homework assignments:

1. Implement parts of a programming language (parsing, evaluation, type-checking) in the Rust programming language
2. Perform miniature language design exercises
3. Perform a usability study about language design with your classmates
4. Engage critically with academic research about the intersections of human-computer-interaction with social issues as it pertains to programming languages.

Learning Objectives

Through the above activities, we aim to meet the following list of course objectives:

1. Identify problems where programming language design can be used
2. Communicate with clarity and technical depth about language design
3. Develop a mathematically-precise definition of a language’s syntax
4. Develop a mathematically-precise definition of a language’s semantics
5. Implement interpreters for programming languages
6. Situate your own work among the schools of thought discussed in class

Why Should I Take It?

Potential reasons include:

* You will work as a programmer. Most people don’t write compilers for a living, but most career programmers will use language design skills one day, because most big programs contain “little languages” – features that use these same design skills
* You will work in human-computer interaction (HCI) or other fields that rely substantially on design skills. I often recommend the course to students who enjoyed WPI’s HCI course
* You want to be prepared to perform or read research about programming languages

### What is The Course Schedule?

Each lecture has material associated with it in the HCPL textbook. Make sure to do the reading for each chapter to help understand the lecture material.

**Schedule note:** The second day of class is canceled to attend because the instructor is attending a research conference. To deal with this schedule, we will **jump right into material on the first day.** Another important day is Dec 3rd, when you will spend class time conducting user studies of your own design on one another.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Topic | Date | Read Ch. | Deadline |
| 1 | Rust | 22-Oct | 1,2 |  |
| 2 | NO CLASS: TRAVELING | 25-Oct | 3 |  |
| 3 | Regex+Context-Free | 29-Oct | 4,5 | A1 |
| 4 | Syntax Trees, PEGs | 1-Nov | 6,7 |  |
| 5 | Evaluators | 8-Nov | 7 | A2 |
| 6 | Op. Semantics | 12-Nov | 8 |  |
| 7 | Types | 15-Nov | 9 | A3 |
| 8 | Design 1 | 19-Nov | 10 |  |
| 9 | Design 2 | 22-Nov | 12,13 |  |
| 10 | Gender+Disability | 26-Nov | 17 | A4 |
| 11 | Natural Language | 3-Dec | 13,14 | USER STUDIES |
| 12 | Media+Play | 6-Dec | 15,16 |  |
| 13 | Review | 10-Dec |  | A5 |
| 14 | Final | 13-Dec |  |  |

How Do Grades Work?

The grade breakdown is:

* 75% assignments: 5 assignments x 15% each
  + The average assignment, by point count, is roughly 75% programming, 25% written problems such as design exercises
* 5% attending and participating on the day we do user studies in class
* 20% final exam
* I do not provide built-in extra credit opportunities, but if the default grading scheme is not serving you well, I am open to discussing additional options. If so, the important thing is to talk with me early enough that we have time to act.

The majority of the assignment work is auto-graded programming work where the score is based on how many tests your code passes. On each assignment, a minority of the work is design work, which is graded by completion, i.e., the percentage of tasks where an honest effort is made.

To provide significant flexibility without compromising rigor, all grades follow the **Honest Effort Policy:**

* If you make an honest effort on an autograded assignment /submission by the deadline, you gain the privilege to resubmit the assignment as many times as you want, at any time up to the last day of class, without grade penalty.
* All homework which is not autograded, is graded based on whether an honest effort is made, on a per-problem basis
* We wish to reward students who reach out to course staff for help when needed. If you attend office hours or otherwise connect with course staff for help on an assignment, we will always consider that assignment to be an honest effort.
* If a student makes an honest effort on the midterm and every assignment, they earn the right to take the midterm a second time without penalty at the end of the course, upon request
* If a student makes an honest effort on every assignment and test but would otherwise have a failing grade, they pass the course with the minimum grade required to use it toward their degree. I do not award A’s for effort but I do award passes for effort.

## Course Details

Textbook(s) / Learning Materials

The textbook for this course is “Human-Centered Programming Languages” (HCPL), a free e-textbook I wrote specifically for this course. The book is available at [bookish.press/hcpl](https://bookish.press/hcpl). The book is not currently available in hardcopy, but you are welcome to print it out.

Some students seek additional study materials outside the textbook. This course encourages such curiosity. My textbook contains extensive references to other works. Curious students are recommended to start their exploration with these works, whose quality I have already vetted.

The HCPL textbook is based on a semester’s worth of notes from a previous version of this course and a summer of intensive writing – it is a thorough and complete resource. At the same time, revisions are expected to continue. Students are welcome to send professionally-worded feedback on the book. As is typical, I plan to list your name in the acknowledgements if I use your feedback.

Do I Need Any Software?

You will need to install the Rust language and an editor for it. Visual Studio Code is the typical editor. You should also join the course Piazza, used for announcements and asking questions:

<https://piazza.com/class/m1v0k4o3ein3pi/>

***Please use Piazza instead of email for questions***. This allows all the members of the course staff to share the work between us fairly. See the Academic Integrity section for details about which questions should be private or public on Piazza.

We also use Canvas. You should automatically be enrolled to the Canvas course.

### Student Hours/Office Hours

**TBA**

***Am I Stuck Enough for Office Hours?***Yes. Actually, you do not need to be stuck. You can come because you just feel like it. I want people to come.

***What are They?*** Office Hours, also called Student Hours, are time specifically set aside for the instructor (me) to give hands-on help to students (you). Office hours are one of the main and first places you should go if you would like help understanding anything in the course, both for help with a specific task or general help. One advantage of office hours is that you can ask for direct or detailed help with course work. Although we spend most of the office hours time talking about things from the course, they can also be a good opportunity for unstructured learning. If you are curious about anything such as related topics or current research in this area, feel free to ask.

***What if I Need More Help?*** I know there will limited scheduled hours of office hours each week, so it can be hard to get enough individual help in a busy week. I want to help you despite these limits, so here is my advice for how to get help despite our limited resources:

* If my office door is open, you can always ask whether I am free to answer a question.
* You are always welcome to ask questions on the course Piazza at any time. You are encouraged to ask questions early and often.
* You can post the question on Piazza where other students can see it and even answer it. This also reduces the number of duplicate questions and helps me answer you faster
* I will check Piazza at least once every weekday during business hours. I usually answer it much more, but questions asked at night are usually not answered until the next day.
* Using Piazza helps me be more available to help you
* If you want more scheduled office hours, tell me. I cannot promise them, but I will try.
* If you want an individual meeting for 1-on-1 help, tell me. I may respond by scheduling general office hours instead, but it's good to ask because sometimes I can do 1-on-1.
* If you want a specific kind of office hours such as a review session, tell me.
* If you're not sure how to start, here are [tips](https://ceils.ucla.edu/wp-content/uploads/sites/2/2018/05/Meeting-With-Faculty-In-Person.pdf) for how to ask questions that get good answers.

Attendance

Regular attendance is a social expectation in the course because it is good for you. However, you are also an adult and you do not need to notify me or provide an explanation for missing the occasional class. The exceptions are user study day and exam day, which are directly graded. If you must miss these days, you must contact me as soon as practical to make arrangements and must provide a reason.

Where Do I Find The Course Content Online?

Canvas. I do not have a separate course website.

### Extension Policy

Because of the honest effort policy, I do not build in late days/extensions. Extensions can be requested for surprise circumstances, e.g., if you slept through a deadline, I would not want you to miss out on the opportunity to submit. I typically say yes if the timeline is reasonable. In contrast, if you request at the end of the term to submit all work in the final week, I will typically say no, because cramming everything in the last week is inconsistent with learning the material thoroughly.

### Holiday Policy

Because our students come from many different backgrounds, there is potential that I inadvertently schedule important activities on a day when you have an important holiday (e.g., religious, cultural, national). If required course activities such as exams interfere with your holiday, please contact me as soon as you can to make alternative arrangements.­

Technology Policy

If you have one, bring a laptop or tablet computer to class. We might allocate class time for you to work on programming homeworks, for example. If you choose to use a laptop or tablet for non-class activities during class time, this is not against the policy, but please be careful that it does not become a distraction for classmates, out of respect for their learning environment.

Academic Integrity Policy

WPI’s website has university-wide academic integrity policies. You are always allowed to ask us about policy when you’re not sure. The policy for this course is that you are encouraged to talk together about problems but that you should write (i.e., personally type on your own keyboard) everything you submit. You should not distribute any part of your solutions to any other person without explicit permission from course staff. There are some cases in which asking for permission to distribute might be appropriate, such as if you wish to use project work in a personal portfolio.

Piazza allows you to ask questions publicly to all classmates or privately to the course staff, and allows you to edit solutions to each other’s questions. Here is how to follow the policy while using Piazza:

* **Asking Private Questions:** If your question contains part of your homework solution, such as your code, it must be asked privately. If it would be difficult for others to answer your question without violating the policy, it should also be asked privately. If you are unsure, you are always allowed to make your question private.
* **Asking Public Questions:** Questions should be public if you can ask it and someone else can answer it without either person sharing their homework solutions. Acceptable examples:
  + Clarifying assignments
  + Helping each other more deeply understand the lecture slides or textbook
  + Helping each other with programming in a high-level way. Posting code, especially one-line snippets, is fully acceptable as long as it is comfortably detached from the specifics of the assignment. This could be reviewing the syntax of a feature, sharing an interesting feature that helped you, or helping each other understand errors.
  + Preparing for the exam together

We want you to help each other, so we will assume you are acting in good faith if you accidentally make small policy violations. That is, we typically respond to first-time accidents by converting a post to private and privately reminding the student to be careful, without a penalty.

* **Answering Questions:** It should not be possible for the asker to copy-paste part of your answer into their submission. Other than that, you should feel free to provide each other significant or detailed help.
* In practice, this policy may be applied more loosely for written assignments compared to programming assignments, consistent with their different grading policies. For example, public brainstorming of interesting project ideas is acceptable.

Our policy for generative AI tools such as ChatGPT or Copilot is that the tool itself does not matter, what matters is how you use it. If your submission contains code or text generated or revised by these tools, then you have violated the policy that you must write your own solutions. If you use these tools to explain error messages, provide alternate explanations of course concepts, or summarize course materials, you have not violated the policy. The same policy applies to older technology like search engines: it is perfectly normal to look up error messages or programming language tutorials online; but searching for solutions from previous students is not acceptable.

# Boundary Expectations Policy

The goal of this policy is to communicate the instructor’s professional boundaries as a person so that it is easier for students to respect those boundaries.

Work-life balance is important to instructor mental health, just as for students. My working hours are 9am-5pm Monday-Friday. Students should not assume that I will respond to emails or posts during this time – if I do, it’s a bonus. I am quite responsive when I am at my computer, but occasionally there of delays of 1-2 days, for example if I am traveling or have a day with many meetings. When you have time-sensitive questions, make sure to ask them early enough to account for response delays. If you do not, I may respond late. If you send follow-up emails with waiting a day or two, I may respond by reminding you that this is considered rude.

Students are expected to respect the instructor’s right to set grading policy. If you have me double-check the grading of work and I confirm that it was graded as intended, students are expected to respect the decision.

Consistent with the classroom climate expectations, the instructor expects to receive the same level of respect as any other instructor. To be clear, it is not disrespectful to point out typos, engage in academic debate, or ask deep questions – these make for a stimulating classroom. Rather, the point is that “presumption of competence” has historically not been given equally to all instructors; intersectional women often do not receive good faith in the way that men in the majority do.

This policy is not meant to scare anyone away. On the contrary, I pride myself on trying to be approachable and understanding; this policy is here to explain the limits of my flexibility. Almost all requests I get are inoffensive, and when you are not sure, you should just ask. This policy exists because a handful of disrespectful students create burnout, such as a single student who asserted that my mental health policy entitled them to a higher grade than the one defined in the syllabus.

# Mental Health

Content warning: suicide, transphobia, racism, xenophobia, and police brutality.

I started this job in Fall 2021. My first year here coincided with the peak of the worst mental health epidemic in WPIs history, with the deaths of 7 students in 6 months. Most of the deaths were by suicide and most of the victims were in computing-related majors.

On a personal level, I want my students to know this profoundly shapes how I view the job. When compared against your personal well-being, academic achievement ***does not matter to me.*** This does not mean that every student will get an A, but it means that if you come to me with a human problem, I will care about being part of the solution. I don’t want to just repeat some boilerplate, so here are some things I want you to know instead:

1. I have been there. There is nothing you can say or do that will scare me. I’ve seen some shit.   
   I mean that in a good way.
2. Social connection is good for you, so I try to encourage social interaction in the course design.
3. I’m not going to judge you, period, I just want you to be okay. Missed class? Don’t know what’s going on? Cried in lecture? Vomited on my office floor? I’m not going to judge you. ***I need you to internalize this fact.***

I have been encouraged to tell you to contact the counseling center for non-emergency treatment ([sdcc@wpi.edu](mailto:sdcc@wpi.edu), [508-831-5540](tel:508-831-5540), 16 Einhorn Road) or call Campus Police ([508-831-5555](tel:508-831-5433)) if someone’s life is in immediate danger. However, nobody is stopping me from also telling you:

1. There are many therapists in Worcester that take student insurance
2. General practitioners (“your regular doctor”) are the main source of antidepressant prescriptions.
3. Calling American police during mental health crises has gotten innocent patients killed, especially Black, Brown, trans, and disabled patients. They have traumatized people who I personally cherish. Mobile crisis response teams are an alternative and are often much better at avoiding violence. Community HealthLink has one in Worcester. I do not know whether it is good, but I feel I should share a link: <http://www.communityhealthlink.org/chl/youth-and-family-services/youth-mobile-crisis-intervention-ymci>
4. The Trans Lifeline (877-565-8860) is a crisis-intervention hotline (“suicide hotline”) run by binary and nonbinary trans people. As of 2020, they do not call police unless required by law.

The family of one of the victims (Nathan S. Morin) called for donations to [American Foundation for Suicide Prevention](https://supporting.afsp.org). In his memory, consider this a standing invitation to support mental health orgs in our community.

In conclusion: I think about mental health a lot. Like, a lot a lot. Don’t be shy, okay?