

98-008: Student Taught Courses (StuCo): Intro to Rust *Updated January 15, 2024*

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Office Hours: by appointment
Time: Tuesday 7:00-7:50pm

Web: <https://rust-stuco.github.io>
Location: BH A36

Course Description

This course is an introduction to the Rust programming language, a memory-safe systems programming language. We will cover a range of topics, from the Rust borrow checker to parallelism and the `unsafe` keyword. Outside of lecture, there will be basic programming exercises, and during the second half of the semester there will be a small student-defined project.

This course is taught in Rust, and you are not expected to have any prior exposure to Rust. However, this course assumes knowledge of topics covered by **15–122**, or equivalent experience with the C programming language. Knowledge of functional programming idioms taught in **15–150**, as well as knowledge of systems programming taught in **15–213** is a bonus, but not strictly required.

Learning Objectives

Students in this course will be able to read, write, and reason about Rust code which includes:

- Core Rust syntax such as `struct`, `enum`, `impl` blocks, pattern matching, polymorphism, and traits
- Common Rust types such as `Vec<T>`, `String`, `&str`, `Option<T>`, and `Result<T, E>`
- Use of the borrow checker through ownership and `move` semantics
- Advanced Rust features such as iterators, lifetimes, closures, and smart pointers
- Advanced Rust patterns such as parallelism, concurrency, macros, and `unsafe`

Additional Materials

Access to a computer able to run `rustc` (the Rust compiler) and `cargo` (the Rust package manager) is required for this course. If you are on stable versions of Mac, Windows, or Linux, you should be fine. We'll go over how to set these up in class with `rustup`, Rust's official tool chain manager, or you can follow the steps from the official Rust [website](https://www.rust-lang.org/learn/getting-started).

Course Schedule

Date	Topic(s)
Week 1	Introduction
Week 2	Ownership
Week 3	Structs & Enums
Week 4	Standard Collections and Generics
Week 5	Error Handling and Traits
Week 6	Cargo, Modules, Crates, and Testing
Week 7	Lifetimes
Week 8	Iterators, Closures, and Advanced Functional Topics
Week 9	<code>Box<T></code> and Trait Objects
Week 10	Smart Pointers and <code>unsafe</code>
Week 11	Parallelism
Week 12	Concurrency
Week 13	Macros

Attendance Policy

Attendance is mandatory, as well as 50% of your grade. **As per StuCo guidelines, if you have three unexcused absences, you will automatically fail this course.**

Grading

The final course grade will be calculated using the following categories.

Assessment Type	Total Points
Participation and Attendance	500
Programming Assignments	500
Total	1000

Grades will be assigned as follows, based on the number of points earned.

Grade	Points
P (or S)	600–1000
NP	0–600

Participation

We will take attendance with a sign-in sheet or an interactive activity.

If you need to miss a session for a reason we can reasonably excuse, contact us and we will determine an appropriate alternative so you don't miss out on that week's content.

Homework

There will be weekly homeworks where you will write Rust code applying topics we've discussed in lecture. Homeworks are designed to take around an hour per week. If they take longer than this, please tell us! **All homeworks are due the week after they are released.**

We expect you to turn in a submission for every homework, but they are mainly graded for effort, not correctness. If you put in a good faith effort to complete the homework and do not manage fully complete it, you will still receive credit.

Late work

Students have 7 late days to be used for any assignment. Under special circumstances, if you let us know in advance, you can get more late days.

Course Note

Academic Integrity

Discussion of homework problems, written or verbal, is not only permitted, but encouraged. That being said, verbatim or like-verbatim copying of answers over any medium is expressly forbidden. If you find yourself needing to do this, talk to us! It might be the case that a change needs to happen on our end, not yours.

Accommodations for students with disabilities

If you have a disability and have an accommodations letter from the Disability Resources office, we encourage you to discuss your accommodations and needs with us as early in the semester as possible. We will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, we encourage you to contact them at access@andrew.cmu.edu.

Statement on student wellness

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is almost always helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at <http://www.cmu.edu/counseling/>. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

Statement on Diversity, Equity and Inclusion

We must treat every individual with respect. We are diverse in many ways, and this diversity is fundamental to building and maintaining an equitable and inclusive campus community. Diversity

can refer to multiple ways that we identify ourselves, including but not limited to race, color, national origin, language, sex, disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Each of these diverse identities, along with many others not mentioned here, shape the perspectives our students, faculty, and staff bring to our campus. We, at CMU, will work to promote diversity, equity and inclusion not only because diversity fuels excellence and innovation, but because we want to pursue justice. We acknowledge our imperfections while we also fully commit to the work, inside and outside of our classrooms, of building and sustaining a campus community that increasingly embraces these core values.

Each of us is responsible for creating a safer, more inclusive environment.

Unfortunately, incidents of bias or discrimination do occur, whether intentional or unintentional. They contribute to creating an unwelcoming environment for individuals and groups at the university. Therefore, the university encourages anyone who experiences or observes unfair or hostile treatment on the basis of identity to speak out for justice and support, within the moment of the incident or after the incident has passed. Anyone can share these experiences using the following resources:

- Center for Student Diversity and Inclusion: csdi@andrew.cmu.edu, (412) 268-2150
- Report-It online anonymous reporting platform: **reportit.net**
 - username: tartans
 - password: plaid

All reports will be documented and deliberated to determine if there should be any following actions. Regardless of incident type, the university will use all shared experiences to transform our campus climate to be more equitable and just.