CSc 372: Comparative Programming Languages

Online

Note: All dates and times mentioned in this document are Tucson time. If you are in a different time zone, it is your responsibility to make sure you adjust accordingly.

Course Description

Introduction to several major high-level programming languages and their characteristics. Programming projects are required in at least three languages.

Instructor and Contact Information

Melanie Lotz
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Teaching Assistants:

Nathan Oswald <nathanoswald1@arizona.edu>
Gabriel Hernandez <gabehernandez07@arizona.edu>

Office Hours:

- Office hours are held online over Zoom. The links will be on the D2L calendar.
- Our scheduled office hours have an open door policy, which means you do not have to make an appointment, but there may be a waiting room. If you need to meet with any of us at an unscheduled time, you can email to set up an appointment.

Course Format and Teaching Methods

- This class is online. Most of the content is provided asynchronously and organized week by week. The deadline for each week's assignments is 11:59 PM (Tucson time) on Sunday. There is also a requirement for you to attend some live online discussion sessions, which you must sign up for by Wednesday of the first week. More details about this are provided later.
- The material for each week is set up on D2L. Since this is the first time I've offered this course online and during the summer, I cannot guarantee that the material will be available earlier than the given week, but each week's material should be available no later than Sunday at 11:59 PM of the previous week, ensuring that you have a full week to work through it.
- A checklist is provided for each week to help guide you through the material.
- Please note that the week's material is meant to take *a week*, and it is not in your best interest to wait until the weekend to start it. This is also true because office hours are offered throughout the week (M - F) but not usually on the weekends.
- The course runs for 9 weeks plus a half week, which will only include the final exam. Most of a week's assignments are due at the same time (Sunday at 11:59 PM). There are a few exceptions to this, so you should pay close attention to the checklist deadlines.

Course Objectives

This course will cover

- programming language design including abstract syntax trees, typing, and cost models
- functional programming using Standard ML
- logical programming using Prolog

Expected Learning Outcomes

By the end of this class, students should be able to

- describe various programming languages with appropriate vocabulary
- define the syntax of a language using abstract syntax trees
- compare different languages and paradigms
- compare different kinds of type systems
- demonstrate understanding of the relationship between cost models and writing efficient programs
- write programs in at least three different languages, including Standard ML and Prolog

Makeup Policy for Students Who Register Late

Students who register late are encouraged to work through the missed material, but credit will not be given for any missed assignments.

Course Communications

There will be various ways that communication will take place in this course, and it is important that you keep track of all of them.

- **Email**: Check your UA email regularly.
- **D2L**: This is the main website for the course and includes
    - the syllabus
    - the course materials (including the videos available in Panopto)
    - the assignments
    - the official calendar
    - the Zoom links for office hours and discussion sessions
    - the official gradebook
    - announcements
    - the weekly checklists
- **Piazza**: Announcements may be made on Piazza, which is also used for questions and discussions *about course content*.
    - **Please do not use Piazza to ask about grades or request a regrade.**
    - Please note that although you are able to post anonymously to other students, none of your posts are anonymous to the instructor or the TAs.
    - You may be added automatically, but if you register late, you can add yourself using the following link: https://piazza.com/arizona/summer2025/csc372
- **Gradescope:** Gradescope is used for grading some of the assignments and can also be used for submitting regrade requests on said assignments. Please note that the official gradebook is in D2L, but grades from Gradescope will not be transferred to D2L until after the regrade request window has closed.

Required Texts or Readings

There is no *required* textbook for this class, but much of the material will come from the following *recommended* textbook:

Modern Programming Languages: a Practical Introduction, 2nd Edition, Adam Brooks Webber, ISBN #978-1-59028-250-2

Required or Special Materials

- Device for programming
- Internet access

Assignments and Examinations: Schedule/Due Dates

Practice Problems (120 points).

Each week, videos and other material will be provided to present the course material. You will also need to complete short quizzes on D2L to check your understanding. Not every video/item will have practice problem sets, but if you follow the checklist, you will know what to do. The points for each set will vary, but the total for each week will be 15 points. That comes out to be 135 points for the whole course, which means that there is some flexibility in this part, as your points are capped at 120. You will have two attempts per set and the highest of your two scores will be your score. **Practice Problems will not be accepted late and cannot be made up for any reason. In extreme cases and with appropriate documentation, I might excuse an assignment, but you must understand that excusing an assignment means that the rest of the assignments in that category will count for more AND you likely miss out on the point flexibility.**

Homework (250 points).

Each week, you will have a homework assignment that may include written response questions and/or programming questions. You need to make sure you read and follow all the instructions carefully because you may need to submit in multiple places. Each homework assignment is worth 30 points, which totals 270 points for the whole course. Your points are capped at 250, so there is some flexibility. **Homework will not be accepted late and cannot be made up for any reason. With appropriate documentation, I might excuse an assignment, but you must understand that excusing an assignment means that the rest of the assignments in that category will count for more AND you likely miss out on the point flexibility.**

Language Project (250 points).

This course requires that you program in at least three languages. I will cover two of those languages (SML and Prolog) in the materials and you will have homework assignments on those. The third language will be done through this project, which will span the majority of the summer session. For most weeks, you will have specific requirements to complete so that you don't have one big deadline but smaller deadlines throughout the course. You may choose the language you learn for this project, but *it must be a language you do not already know.* You may not choose Python, Java, or C because those are covered in other courses in our program, and of course you may not choose SML or Prolog because those are covered in this course. Other than that, as long as the language is *new to you* and it is a programming language, it should be fine. One of the first requirements will include submitting the name of your language, so if I have any concerns about your choice, I will let you know. Each time you have a deadline for this project, the points associated with it will be made clear in the assignment description, but the total points for the project will be 250.

Discussion Sessions (250 points).

One of the challenges in offering a course online is trying to make sure that you are learning the material and not using ChatGPT or other resources to avoid learning. My job is to provide opportunities for you to learn and to try to ensure that you learn. To that end, one

of the requirements for this course is that you attend an hour-long live online session once per week (except the first week). During these sessions, you will meet with either myself or a TA and a small group of students to discuss the course content. This will usually include a short discussion of the material from the previous week, as well as additional questions for you to practice with and discuss during the session. You will be asked to explain questions from previous assignments and new questions that are posed during the session, and you are graded according to your preparation and understanding of the material. So if you don't actually do the assignments and learn the material, you are unlikely to do well in this part of the course. A rubric will be provided in the first week of the course to let you know how you will be graded during these sessions, but please be aware from the beginning that attendance is not enough. You must show that you have truly engaged with the material and done the assignments. That does not mean that you have to get everything right the first time. Learning from mistakes is an important part of the learning process. It DOES mean that you have to come prepared and participate in a meaningful way, showing that you have done the assignments and truly engaged with the course material. At the end of each session, you will also need to submit the work you did during that session, which will be part of your grade for that session. Each of these sessions is worth 40 points, and there are 8 of them, so that comes out to be 320 points, which provides a lot of flexibility in the category. This is mainly to cover cases where you cannot attend. You will be asked to sign up for a regular weekly session in the first week, and you should make every effort to attend that session regularly throughout the course. If you cannot attend your session for a given week, you may also request to join another session by contacting me (Lotz), but this should only be done when absolutely necessary as these sessions are more likely to be effective if the number of students is kept small. These sessions are held on Zoom and will be recorded, but they will not be shared with other students. The purpose of the recording is to have a record in case of any grade disputes.

Note: You will be asked to sign up for a regular session in the first week, and if you do not sign up for one by the deadline (which is Wednesday of the first week, by 11:59 PM), you will be placed in one. You will need to give three options in case your first choice is full, so choose three times that will work for you on a regular basis throughout the summer session.

Final Exam (130 points).

The final exam will be given as a D2L quiz. It will be cumulative and open-note but NOT open Internet. You also must complete it on your own. You are also not allowed to use any kind of artificial intelligence while completing the exam. The exam will be available for 24 hours, but once you start it, you must complete it within the 2-hour time frame. It must be completed by the final deadline, which is August 13, 2025 at 11:59 PM (Tucson time). If you receive extra time on exams due to DRC accommodations, that will be done automatically based on your DRC requests, but it is your responsibility to make sure you give yourself enough time to complete the exam before the deadline. **I do not allow late submissions or make-ups for an exam. You need to plan accordingly and make sure you get it done. In extreme circumstances and with appropriate documentation, I may make an exception, but it's not likely.**

"Appropriate Documentation": Dean's Excuses and Letters from the Dean of Students Office.

I only allow make-ups and excuse assignments in cases where I receive official documentation in the form of a Dean's Excuse or an official letter from the Dean of Students Office. Below is information about how that works.

- Dean's Excuses are special excuses provided for students *for school-sanctioned events*, such as sporting competitions.
- A Letter from the Dean of Students Office is an official notification from the Dean of Students Office that they may send out to your instructors if you contact them about an emergency situation, typically when it causes you to miss class for a week or more. Please note that just talking to someone in that office is not sufficient. I require an official letter from them indicating the dates of your absence and verifying that they have deemed it an emergency situation. (Note that they don't usually share details of the situation, just a general idea.) This is required for my class because I am not allowed to ask for medical documentation. The Dean of Students information can be found here: https://deanofstudents.arizona.edu/

Please note that each type of assignment has its own makeup/excuse/late work policy, which are described above. This is just general information about how to get appropriate documentation, when it is possible and applicable.

Final Examination

The final exam will be on D2L and will be available on the last day of the summer session, which is August 13, 2025. It will be open for a full 24 hours, but once you start it, you must finish it within 2 hours. You must also finish it before the final deadline, which is August 13, 2025 at 11:59 PM (Tucson time).

Grading Scale and Policies

Your grade will be calculated based on the following point distribution.

Category/Assignment	**Points**
Practice Problems	120
Homework	250
Language Project	250
Discussion Sessions	250
Final Exam	130

The following are the expected grade cut-offs. Although these can vary a bit at the end of the semester (sometimes I lower them a bit, but I never raise them), you should expect them to be around the same as what is listed.

Points	**Grade**
900+	A
800-899	B
700-799	C
600-699	D
0-599	E

University policy regarding grades and grading systems is available at https://catalog.arizona.edu/policy/courses-credit/grading/grading-system

Incomplete (I) or Withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at https://catalog.arizona.edu/policy/courses-credit/grading/grading-system.

Dispute of Grade Policy:

- Regrade requests and grade disputes must be handled within 72 hours of the grade being released. No regrade requests will be considered outside of that window and no regrade requests will be considered after Friday, August 8, 2025.
- You must also follow the instructions for how to handle regrade requests, which will be given when the grades for an assignment are released.
- The specific guidelines may vary depending on the assignments, so make sure you read the announcements and/or Gradescope emails when the grades are released.
- It is your right as a student to know how you are being graded and to ask for regrades. However, requesting regrades through Gradescope is a privilege, and you are expected to do so by following the guidelines and with courtesy to the graders. I reserve the right to turn off the regrade request feature on Gradescope and require all regrade requests and grade disputes to be handled by me during office hours.

Scheduled Topic and Activities

Note: This is a tentative schedule and may change as necessary.

Date	Lecture Topics
Week 1	• Introduction to Programming Languages • Syntax & Semantics
Week 2	• Types, Type Checking, & Polymorphism • SML: basic syntax, recursion, simple functions, lists, type system
Week 3	• SML: pattern matching, let-blocks, functions as parameters
Week 4	• SML: higher-order functions, anonymous functions, currying, built-in higher-order functions
Week 5	• SML: tail recursion, cost models
Week 6	• Problem-solving with a declarative language • Prolog: basics, unification, evaluating expressions
Week 7	• Prolog: lists
Week 8	• Prolog: solving more complex problems
Week 9	• Prolog: cost models
Week 10	**Final Exam**

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations during live online discussion sessions, and are expected to be engaged in the discussion session and not doing other things. Students are also asked to refrain from posting anything inappropriate on any of the online platforms and to engage with other students and with instructional staff in a respectful manner.

Course-specific Academic Integrity Policy

Whenever you submit work in this class, it must be your own work from beginning to end. Although you are allowed to use available resources, you must be using them in a way that furthers *your work* and *your learning*.

Unless you are told otherwise *by your instructor*, the following behaviors are considered violations of the academic integrity policy in this class:

- Posting any assignments online or into any artificial intelligence system
- Using code that you did not write yourself (note that "writing" does not mean "typing" – it means you designed and implemented it yourself from beginning to end)
- Using any unauthorized resources in order to complete assignments, including, but not limited to ChatGPT and other AI systems.
- Looking at solutions that are not your own for any of the assignments (unless the deadline for the assignment has passed)
- Sharing your solutions to any assignments with anyone except instructional staff for the course (unless the deadline for the assignment has passed)
- Asking AI to do any assignments for you or to write or fix code for you.
- Asking AI to put things into sentences for you.

Note about Artificial Intelligence. To be safe, I recommend avoiding AI altogether. I recognize that AI is part of life now and that you will likely use it in your careers. However, I have yet to be convinced that it is a truly useful tool when you are *learning* a programming language for the first time or that students in general use it effectively for *learning* and not just getting quick answers. So, for the time being, the use of artificial intelligence for doing assignments in this class is strictly forbidden. **I HAVE caught people using AI and I HAVE failed them for it, so if you want to pass this course, it's in your best interest to follow the rules.**

This is not an exhaustive list and individual assignments may have additional academic integrity details, so read and follow the instructions. When in doubt, ask.

If I believe, after investigation, that you have violated the academic integrity policy, I will file a report with the Dean of Students office, and the recommended sanction will be that you fail the course. It is hard enough for me to ensure that you are learning in an online course, so I have zero tolerance for cheating.

Safety on Campus and in the Classroom

For a list of emergency procedures for all types of incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview

Also watch the video available at

https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/app/me/ledetail;spf-url=common%2Flearningeventdetail%2Fcrtfy000000000003841

University-wide Policies link

Links to the following UA policies are provided here: https://catalog.arizona.edu/syllabus-policies

- Absence and Class Participation Policies
- Threatening Behavior Policy
- Accessibility and Accommodations Policy
- Code of Academic Integrity
- Nondiscrimination and Anti-Harassment Policy

Department-wide Syllabus Policies and Resources link

Links to the following departmental syllabus policies and resources are provided here, https://www.cs.arizona.edu/cs-course-syllabus-policies :

- Department Code of Conduct
- Class Recordings
- Illnesses and Emergencies
- Obtaining Help
- Preferred Names and Pronouns
- Confidentiality of Student Records
- Additional Resources
- Land Acknowledgement Statement

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.