

## **CS 6390 Fall 2025: Programming Languages**

### **Instructor:**

Jacob Laurel, PhD  
jlaurel6@gatech.edu  
Office: Klaus Advanced Computing 2332

### **Course Summary:**

CS 6390 is a graduate course on the fundamentals of Programming Languages (PL). We will study the foundations of different programming paradigms and techniques in the programming languages literature. Instead of focusing on applied or industry-specific topics, this course is highly theoretical and geared toward students wanting to pursue graduate research in programming languages.

Topics include the syntax and formal semantics of programming languages, applications of logic to programming languages, functional programming, lambda calculus, type systems, program verification, and contemporary programming paradigms (including differentiable and probabilistic programming).

By the end of the course, students should be able to pick up a PL research paper (e.g., POPL, OOPSLA, PLDI, ICFP) and understand the various contributions (e.g., type derivations, operational semantics, formalizations, etc.) made. In addition, by the end of the course, students should be able to formulate their own novel PL ideas into a course research project.

### **Course Expectations:**

Students are expected to attend lecture, ask questions, be proactive, and complete a course project.

### **Desired Outcome:**

By the end of this course the desired outcome is that students will have developed an understanding of the fundamentals of programming languages. The goal of this course is also for students to apply their understanding toward a novel PL problem in the form of a course project. While publishing a course-project as a paper represents a best-case scenario, that outcome is not necessary to obtain an A for this course.

### **Grading:**

Homework Assignments: 20% - There will be a few homework assignments throughout the semester

Midterm 1: 20%

Midterm 2: 20%

Participation: 10%

Project: 30% - The project is designed to be done in groups of 1-3 students and involves a final report. The expectations will be commensurate with the team size.

There will also exist opportunities for bonus points periodically throughout the semester. Students are not graded on a curve against each other, hence it is possible for multiple students to receive good grades, indeed that is the hope!

### **Academic Integrity**

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

### **Policy on using LLMs**

While it is acceptable to use LLMs to reword a sentence that you have already written, it is not acceptable to have an LLM completely write your report or do your assignment for you.

### **Accommodations for Students with Disabilities**

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404) 894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail the instructor as soon as possible in order to set up a time to discuss your learning needs.

### **Student-Faculty Expectations Agreement**

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

### **Student Resources:**

Diminished mental health, including significant stress, mood changes, excessive worry, substance/alcohol abuse, or problems with eating and/or sleeping can interfere with optimal academic performance, social development, and emotional well being. Georgia Tech offers a variety of confidential services at no additional cost. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of Georgia Tech's resources provided below.

Seeking help is a smart and courageous thing to do -- for yourself and for those who care about you. <https://mentalhealth.gatech.edu/>

**Religious Observances:**

Requests for absences due to religious observances may be made directly to the instructors of classes that will be missed and worked out in an informal manner. The full policy can be found at <https://registrar.gatech.edu/info/institute-approved-absence-form-for-students>

**Makeup Policy and Extensions:**

Students get one no-questions asked week-long extension on a homework assignment. Exams missed with a valid excuse will be made up at the end of the semester.

**Title IX Resources:**

All Title IX rules governing Georgia Tech apply to this course, and resources can be found at: <https://eoc.gatech.edu/>

**Miscellaneous:**

Please feel free to reach out to the instructor at any point with questions or concerns. My goal is for every student to succeed in this course.