

CS 8803-O08: Compilers - Theory & Practice

Santosh Pande

santosh.pande@cc.gatech.edu

Georgia Institute of Technology

Overview

The objective of this course is to learn the theory and practice behind building automatic translators (compilers) for high-level programming languages by creating a compiler for a mini-language. The course covers the following topics:

- Front end
 - Scanners (regular expressions, NFA/DFA, scanner generators)
 - Parsers (grammars, ambiguity removal, LL, LR, and other deterministic parsing)
 - Semantic analysis (symbol tables, syntax driven analysis, type systems, attribute grammars)
- Middle
 - Intermediate forms
 - Syntax directed translation
 - Function and procedure calls
 - Runtime organization
- Back end
 - Instruction selection
 - Register allocation
 - Code layout
 - Code generation
 - Code optimizations

Pre-requisites

Students are expected to have a solid foundation in data structures and algorithms and good programming skills. Experience writing sizable software in an object-oriented language is recommended.

Course Materials

The course schedule, lectures, and assignments are available on Canvas. The required textbook is *Engineering a Compiler, 2nd Edition* by Keith D. Cooper and Linda Torczon (ISBN 13: 978-0120884780).

Learning Accommodations

We will make every effort to provide accommodations for students with documented disabilities. If you need any accommodations, please inform the instructors as soon as possible and provide the approval letter from the Office of Disability Services. These accommodations **must** be arranged in advance and in accordance with ODS guidelines.

Grading

Grades will be calculated using the breakdown below:

Homework	Four assignments focused on theory	28%
Project	Separated into phases to build a working compiler	37%
Final Exam	Comprehensive exam covering all of the topics taught	35%

Letter grades will be assigned using the weights above and the following cutoffs:

A: [90%, 100%] B: [80%, 90%) C: [70%, 80%) D: [60%, 70%) F: [0%, 60%)

These cutoffs *might* be lowered based on the overall class performance, however, they will never be raised.

Late Policy

Late assignments will incur the following deductions from the total possible points for the assignment:

Late up to an hour and a half	0%
Late more than an hour and a half but less than 24 hours	10%
Late more than 24 hours but less than 48 hours	15%
Late more than 48 hours	100%

Re-grade Requests

Once grades are published for an assignment, students will have one week to submit a re-grade request if a mistake has been made during grading. Students are expected to prove why their answer was correct. A re-grade request can result in a lower score if additional mistakes are discovered.

Academic Integrity

Academic dishonesty will not be tolerated and all violations will be reported to the Office of Student Integrity. This includes cheating, lying about course matters, plagiarism, or helping others commit a violation of the Honor Code. Plagiarism includes reproducing the words of others without both the use of quotation marks and citation. Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at www.honor.gatech.edu. All software turned in as a part of this course will be thoroughly checked for plagiarism and the fullest penalties will be imposed upon detection of violations of the honor code.

Use of Artificial Intelligence (AI) and Large Language Model (LLM) Tools

Any use of AI-assisted tools (e.g., Copilot, Gemini, ChatGPT or similar systems) in homework, programming assignments, or project work **must be fully disclosed** — for example, by including a statement in code comments or in a footnote acknowledging how the tool was used.

- Permitted Uses
 - generating boilerplate code or documentation
 - obtaining debugging suggestions
 - exploring conceptual explanations or practice problems similar to textbook study.
- Prohibited Uses
 - generating solutions for graded work
 - using AI tools to design or implement core project algorithms or assignment logic
 - submitting AI-produced text, code, or analysis as original work
 - failing to disclose AI assistance

All use of AI tools must comply with the Georgia Tech Academic Honor Code. Undisclosed or prohibited use of AI will be treated as an academic integrity violation equivalent to plagiarism or unauthorized collaboration.