CS 395T: Foundations of Modern Generative AI

Fall 2026 The University of Texas at Austin

Meeting time: Monday/Wednesday, 2:00–3:30 p.m.
Location: WAG 308 (Waggener Hall)
Course Canvas: https://utexas.instructure.com/courses/1451792
Course Ed: https://edstem.org/us/courses/102409/discussion

Instructional Team

Instructor	Noah Golowich (nzg@cs.utexas.edu)
Office hours	Wednesdays, 3:30–4:30 p.m., GDC 4.808 (Starting August 31)
Teaching assistant	Joey Zhou (joeyzhou@cs.utexas.edu)
TA office hours	Friday, 10:00–11:00 a.m., GDC 4.416; in person or on Zoom. For the first few weeks, office hours are Zoom-only.

Course Overview and Learning

Course description & philosophy. This course will cover many of the foundational ideas behind the remarkable progress in generative AI in the last few years, focusing primarily on recent research on large language models (LLMs) and diffusion models. Topics include: the transformer architecture, pretraining/scaling laws, optimization, post-training & reinforcement learning, diffusion models, and selected topics on AI safety/alignment.

In general, the course will approach these topics from a "CS theory-friendly" perspective: for most of the topics, we will partition the material into two parts, describing both (a) what is done empirically and (b) some theoretical models that have been developed to help us better understand the former. The hope is to illuminate what is known (and what remains to be done) around how ideas from theory can help us to develop predictive "toy" models of training and inference for generative AI.

Prerequisites. There are no formal prerequisites. Students should have "mathematical maturity" (ability to write and understatnd proofs at a level of CS 331). Experience with modern deep learning frameworks (e.g., training language models or diffusion models with pytorch/jax) is not required, though students will be encouraged to try out small-scale experiments during the course (and, if they choose, in the course of their projects).

How learning will be assessed. Student learning is assessed through attendance (10%), a paper presentation (30%), and a course project (60%). The project grade is divided between the project presentation (20%) and written report (40%).

Syllabus. Please see the course website for the syllabus: https://noahgol.github.io/teaching/cs395t-f26/.

Attendance and Class Meetings

Attendance is expected in person for students expecting a grade and accounts for 10% of the final course grade. Missing a few lectures because of travel or other circumstances is completely fine, but students should otherwise plan to attend class.

Assignments and Grading

Paper presentation (30%). Some of the course lectures are designated as "Student Presentation" on the syllabus. For those lectures, students will team up, with 2-3 students assigned per lecture, and present a few papers on that lecture's topic.

Project (60%). Students will complete a theory-focused or empirical-focused project (either individually or in teams of 2 students; 3-student teams may be possible with instructor approval). The project presentation is worth 20% of the final grade and the written report is worth 40%. Project presentations will occur on the last 3-4 lectures. Written report due date: December 11, 5:30pm Central Time.

Final Examination

There is no final examination.

Course Materials and Resources

The course is primarily a research-based seminar course, so most of the course material derives from research papers. All materials will be linked from the course website: `https://noahgol.github.io/teaching/cs395t-f26/`.

The following related courses and references are recommended resources:

- Stanford CS336: Language Modeling from Scratch.
- UC Berkeley EE 290/194: Scalable AI.
- CMU 10-423/623/723: Generative AI.
- Cornell CS5788: Deep Generative Models.
- Berkeley CS194/294-267: Understanding LLMs—Foundations and Safety.
- Berkeley CS294-280: Advanced LLM Agents.
- UIUC CS598: Machine Learning Algorithms for LLMs.
- Princeton COS597G: Understanding Large Language Models.
- Cornell CS4787/5777: Principles of Large-Scale Machine Learning Systems.
- Stanford CME296: Fundamentals of Diffusion Models.
- Washington CSE599J: Social Reinforcement Learning.
- Anthropic Alignment Science Blog.
- Austin et al., *How to Scale Your Model: A Systems View of LLMs on TPUs* (2025).

University-Wide Policies

Classroom Recording

HOP 2-9970 prohibits students from recording class instruction (audio or video) unless a student obtains the instructor's permission or Disability & Access has approved audio recording as an accommodation.

Course Artificial Intelligence Policy

In accordance with the University's Institutional Rules on Student Services and Activities, Chapter 11, students accept the responsibility to always uphold academic integrity and an honor code reflective of a scholarly community devoted to academic and personal success. All members of the University community are fully accountable and responsible for any output they produce as part of academic work.

In this course, generative AI use is permitted. The primary goal is for students to learn the material, and students are encouraged to use as much or little of generative AI so as to maximize their learning.

Senate Bill 212 and Title IX

Instructors for this course are required to report any information pertaining to sexual harassment, assault, dating violence, and stalking committed against UT students or employees, as well as sex and gender-based discrimination and misconduct (i.e., Title IX incidents). If you need to talk to someone who can maintain confidentiality, please contact University Health Services at (512)-471-4955 or the UT Counseling and Mental Health Center at (512)-471-3515. For reporting Title IX incidents, please contact the Title IX Office.

Health and Safety

For personal crises, please contact the Counseling and Mental Health Center Crisis Line at (512)-471-2255. For any concerns about safety or behavior at UT, please contact the Behavior Concerns Advice Line at (512)-232-5050. Your call can be anonymous.

Academic Integrity

Plagiarism is taken very seriously at UT Austin. You are responsible for understanding UT's Standards of Conduct and the University Honor Code, see here. Students who violate these rules are subject to disciplinary penalties, so let us please avoid this (talk to me instead). For more information, see the Student Conduct and Academic Integrity website.

Disability and Access

The University is committed to creating an accessible and inclusive learning environment for students with disabilities consistent with University policy and federal and state law. Please let me know if you experience any barriers to learning so I can work with you to ensure you have equal opportunity to participate fully in this course.

If you are a student with a disability, or think you may have a disability, and need accommodations, please contact Disability & Access (D&A). Contact and more details are available on D&A's website. If you are already registered with D&A, please share your accommodation letter with me as early as possible in the semester so we can discuss your approved accommodations and needs in this course.

University Policies and Resources for Students

The University's required collection of policies and student resources is available on the University Policies and Resources for Students Canvas page.