

Teaching Statement

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Generative AI presents unique opportunities and challenges for teaching and mentoring students. It can make feedback and exploration more accessible. However, it can also hurt students' ability to think critically and grow independently [8]. **My teaching and mentoring philosophy is productive friction: challenging students to think for themselves and giving them the support they need to learn and become more independent.** This philosophy grew from my research on human learning [1, 2], participation in workshops [4], and personal use of generative AI. These experiences guide how I mentor students and plan to design courses.

New Tools for Learning in the Age of AI

AI assistance can improve immediate performance but reduce persistence and subsequent independent problem solving [3]. These findings motivate my commitment to tools that support lasting learning. **I have built AI-based tools and algorithms to support human learning and long-term retention using principles from cognitive science.** In particular, I studied the *testing effect*: recalling information during a test can improve long-term retention [6]. I applied this principle in *V for Vocab*, a gamified flashcard application [2]. The application combined short-answer tests with automated feedback to help learners acquire advanced vocabulary. I later developed algorithms to predict mistakes made by second-language learners using Duolingo [1]. The *Zone of Proximal Development* [7] informed this work. I examined how linguistic context could support learners at their current level of ability. Building on these experiences, I will continue to engage with cognitive scientists to develop tools and strategies that improve human learning.

Mentoring

I have mentored several students over the years. I believe in creating a positive atmosphere for students to work on exciting research problems. Below, I describe the principles that guide my mentoring.

Test ideas quickly and reason systematically. Two principles guide how I help students evaluate research ideas: **fail fast** and **strong inference**. I encourage students to test a minimal proof of concept before investing in extensive infrastructure. If the initial results are promising, we move on to more detailed experiments. Following Platt's *Strong Inference* [5], I ask students to formulate alternative hypotheses and design experiments to easily test them out. Together, these principles help students identify weaknesses early, learn from negative results, and make systematic progress in their research.

Regular Meetings. I plan to meet with students weekly to discuss their research and review progress. During these meetings, we will set **concrete plans for the coming week and discuss alternative approaches** while recording any new ideas for later consideration. Together, we identify priorities and break larger goals into manageable tasks. We will set milestones to make progress on current ideas and pivot to new ideas only after evaluating whether the current direction remains promising. This helps us **avoid the common research trap of the shiny object syndrome**, where the appeal of new ideas leads students to repeatedly shift their focus before adequately evaluating or following through on existing ones. This approach gives students room to explore new ideas and helps them stay focused on their current research.

These regular meetings also give me opportunities to adjust the support each student needs. I begin with hands-on guidance in reading papers, designing experiments, and interpreting results. As students gain confidence and demonstrate sound judgment, I shift toward broader feedback. I encourage them to formulate their own questions and lead projects. I adapt this progression to each student's preparation and goals and make expectations clear in our regular meetings.

Use AI mindfully and understand the details. In my meetings with students, I ask them to walk me through their work and the reasoning behind their choices, including how they used generative AI tools. My goal is to encourage them to critically think about their experiment design choices. At the same time, I want them

to develop the attention to detail needed for rigorous research. I plan to iterate on and refine these strategies as AI tools continue to advance.

Teaching

I plan to teach introductory courses in deep learning, natural language processing, and machine learning. I will also create graduate seminars on data-centric machine learning and advanced deep learning techniques with the goal of advancing the frontier. In these courses, I plan to have in-class quizzes to encourage students to engage with the material and build their intuition. I will encourage students to mindfully use generative AI tools with a greater emphasis on understanding and explaining their reasoning. I will also seek feedback through brief anonymous surveys and use it to adjust pacing, revisit explanations, and identify where students need additional support. Below I have described my approaches that will guide my course design:

Connect fundamentals to the larger system. I will teach introductory courses by connecting them to a larger AI system because breaking down larger AI systems into their individual components and seeing how they all fit together has helped my understanding of these topics. At the same time, I plan to introduce newer topics, such as Diffusion LLMs, which are in their infancy, to help students understand the current challenges in these directions. **The goal is to help students understand why these techniques are useful in building large AI systems** and how to apply them to unfamiliar problems.

Engage with the frontier. Graduate seminars will build on these foundations. Students will analyze influential papers on data-centric machine learning and advanced deep learning and examine how the techniques are used at scale in frontier AI systems. **They will lead discussions and prepare short in-class quizzes for their peers.** Designing questions will encourage them to think carefully about the material and help their peers engage with it. Students will also **work together on research projects** where the goal will be to use the techniques they learned during the seminar to discover new techniques and applications.

References to My Work

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Other References

- [3] G. Liu, B. Christian, T. Dumbalska, M. A. Bakker, and R. Dubey. AI Assistance Reduces Persistence and Hurts Independent Performance. In *Conference on Language Modeling (COLM)*, 2026.
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- [8] E. Zohar, P. Bloom, and M. Inzlicht. Against frictionless AI. *Communications Psychology*, 4:39, 2026. doi: 10.1038/s44271-026-00402-1.