

Dedicated to teaching and mentoring students, I strive to guide them in becoming independent innovators and researchers who will shape the future of AI. I have engaged in many teaching and mentoring roles. Based on these experiences, I have developed my teaching (T) and mentoring (M) principles.

Teaching

I TA six times for both foundations of AI and introductory computer science courses. During the time when I served as a TA for Foundations of AI, I independently designed and ran a new coding assignment on teaching students to learn SAT solvers. Recognizing the diverse backgrounds and varying levels of programming experience among the students, I structured the assignment so that the difficulty increased problem by problem. This design offered optional challenges for advanced students while ensuring that the earlier problems could be solved by just following lectures. By catering to different proficiency levels, I was able to engage all students effectively and maintain their interest. I also held weekly office hours; in these sessions, I provided guidance by listening to the difficulties students were facing and guiding them to answers by asking questions. This one-on-one interaction allowed me to address individual learning needs and build stronger relationships with the students. Additionally, I engaged with students on online platforms, such as discussion forums and course management systems. I made a special effort to encourage students to help each other by providing credits to those who answered their peers' questions.

I have closely worked with ten undergraduate and master's students, guiding them through multiple research projects. For instance, I mentored a master's student at Cornell to study the limitations of k -nearest neighbor language models. I helped him turn a general research topic into concrete hypotheses and design experiments to test these hypotheses. I also provided hands-on guidance to overcome technical challenges. From this experience, the student was able to prepare a first-author submission to a top-tier NLP conference. Additionally, I have mentored two groups of undergraduate researchers, assisting them in completing research projects by running weekly group meetings. During these meetings, they give updates about their progress and discuss the challenges they face, and together we identify the next steps. Beyond day-to-day research work, we have regular conversations to identify their interests and long-term goals. Some of these students are now strongly committed to pursuing a Ph.D. or have developed a strong interest in a machine learning engineering career. One was nominated by the department for a CRA Outstanding Undergraduate Research Award.

- **(T) Effective course management:** To ensure smooth operation of courses, I will prioritize clear communication and organization. I will provide comprehensive syllabi and detailed schedules, and utilize learning management systems for distributing materials, collecting assignments, and posting announcements. By leveraging TAs effectively – through thorough training and clear expectations – I aim to provide consistent grading and support to students. Additionally, I plan to offer discussion forums to address student questions and facilitate community building within the class.
- **(T) Personalization:** Through my teaching experience on both introductory and advanced CS courses, I have learned the importance of encouraging self-paced exploration, allowing students to progress through materials at their own speed. I plan to design adaptive content with optional advanced topics and supplemental materials to cater to diverse proficiency levels.
- **(T) Interactivity:** To help students gain hands-on experience with the concepts they learn, I plan to incorporate various online tools such as Colab into my teaching. These platforms allow students to experiment and receive real-time feedback, enhancing their understanding through active engagement. In addition to traditional lectures, I intend to include in-class activities like the Role-Playing Paper-Reading Seminar¹, where students take on more active roles in the learning process. By integrating these methods, I aim to foster deeper comprehension and enthusiasm for the subject matter.
- **(M) Clear expectations & constructive feedback:** I believe in establishing clear expectations by

¹Jacobson and Raffel, 2021. <https://colinraffel.com/blog/role-playing-seminar.html>

collaborating with students to set realistic short-term and long-term research goals, and defining small milestones to guide their progress. I will provide constructive and timely feedback through regular reviews, scheduling consistent meetings to discuss progress, challenges, and next steps. My feedback will be actionable. With this approach, I hope to empower students to develop their capabilities while they feel supported throughout.

- **(M) Collaborations within and across groups:** I will encourage healthy group dynamics through biweekly stand-up lab meetings and collaborative research projects within the group. I will manage these collaborations with a GitHub-centric approach². I will pair a junior student with a senior student on their first projects to foster mentorship and knowledge sharing. When appropriate, I will help my students form collaborations with labs within and outside of the department.
- **(TM) Independence:** My ultimate goal is to cultivate my students into independent thinkers and researchers. I will collaborate with them to identify their interests and develop projects that align with those passions. I will also support risk-taking by encouraging them to explore innovative ideas, understanding that failure is an integral part of the learning process. Rather than providing answers, I will help them find their own solutions to challenges. Although this approach may lead to slow progress for junior students, I firmly believe that it will ultimately help them succeed in their careers.
- **(TM) Inclusivity:** I plan to establish clear ground rules that set expectations for respectful discussions. For example, to support those who are less proficient in English or more introverted and hesitant to speak up, I will create a safe and welcoming environment where they feel comfortable communicating their thoughts and ideas. I also aim to promote diversity by incorporating diverse voices, experiences, and cultures into our discussions, readings, and examples.

Tutorials in my research field

I led a cutting-edge tutorial on complex reasoning over natural language at ACL 2023, aiming to convey a wide range of reasoning challenges in modeling and evaluation. I designed the content of the tutorial and identified an instructor for each topic. To ensure our tutorial had a cohesive structure across different subjects, I organized meetings and practice talks for the other instructors. In addition to this tutorial, I also gave talks to teach audiences how to use my research work, such as WildChat. Preparing these tutorials and talks taught me how to design informative lectures that consider the audience's background. I also gained experience in designing teaching materials from scratch for cutting-edge topics.

Teaching Plan

I am enthusiastic about teaching courses in NLP, ML, and AI at both the undergraduate and graduate levels. I am also keen to lead courses and seminars that are closely aligned with developing technologies. I am excited about developing and teaching a course on modern language modeling, which would cover topics such as transformer architectures, training strategies, and evaluation. This course would provide students with in-depth knowledge of state-of-the-art techniques in language modeling and offer opportunities for hands-on projects where they can develop and evaluate their own models.

By integrating practical experiences with theoretical knowledge, I aim to equip students with the skills necessary to excel in the evolving landscape of AI and NLP. I envision leading another course on *reasoning* with language models, where students critically examine current research papers on this topic. I aim to encourage discussions on connecting modern language reasoning back to search and learning algorithms that have been extensively developed in AI and Reinforcement Learning. By exploring these connections, I can help students understand how to build upon historical foundations to advance this fast-growing and important field. This course would encourage students to engage with cutting-edge research and contribute their own ideas to the discipline.

²<https://rachit.pl/post/gh-project-management/>