

Teaching and mentoring are essential parts of an academic's life. I am excited by the opportunity to train and mentor future generations of researchers and engineers. Inculcating curiosity and imparting an in-depth understanding of a subject are things I take a great deal of pride in. Teaching and mentoring are akin to solving puzzles as they necessitate employing different teaching strategies to cater to the diverse learning capabilities of students. As the students grow and excel, it is rewarding to know that I played a significant role in their exciting journey. Moreover, teaching, to me, is a two-way street. Students take unique and varied paths to tackle problems, and through assisting in exploring these various paths, I am often left with a fresh perspective or a meaningful insight. Finally, I especially value teaching as it is a practical means to promote positive societal change.

### Teaching Approach

The most useful learning experiences inculcated a deep interest in the subject, built solid theoretical foundations, enabled hands-on experience, and challenged me to expand my analytical thinking. My goal will be to create such a learning experience in my classrooms.

**Undergraduate and graduate courses:** My lectures will be interactive, emphasize building intuition, and provide concrete examples to explain abstract concepts. To keep the students engaged and help cement key ideas from the lectures, I plan to conduct mini-quizzes as they are an effective learning tool [1]. Moreover, to provide a hands-on learning experience, I will include programming assignments and projects as part of the course curriculum. Initially, the course will have simple assignments to help build familiarity with the subject and fluency with the languages, frameworks, and tools being used. Subsequently, complex and *realistic* programming assignments will be given. In my interactions with students as a Teaching Assistant for a graduate-level operating systems course, I gathered that students greatly valued complex programming assignments (e.g., building various components of PinTOS) as it offered system-building experience and enabled them to apply the concepts taught in the class.

Beyond this, I will also encourage the submission of technical reports for select projects to help improve technical writing skills. Finally, the classes will include in-class participation and discussion, with support for alternate modes of communication and collaboration (e.g., slack/discord). These alternate modes have two advantages – (i) ensure that fear of public speaking, social anxiety, etc., does not create a barrier to learning [2], and (ii) allow customization of instruction based on student interest.

**Advanced graduate courses:** These courses will primarily involve a deep dive into the research literature. I will compile a list of papers from top-tier programming languages, software engineering, and systems conferences. These papers will be thoroughly discussed to help students understand the problem domain and approaches used to address these problems. Each paper will be “championed” by a student who will present and defend its contributions. This helps nurture deep comprehension of the concepts, public speaking skills, and openness to new ideas. I also plan on adding a select fraction of papers outside the aforementioned areas to encourage cross-pollination of ideas. Students will also be expected to define and execute a mini-research project as a team. This will help build collaboration skills and give students a gentle introduction to research.

### Advising Approach

I was fortunate to receive excellent mentorship, which enabled me to grow as a researcher and as an individual. I will apply a few key strategies that were beneficial to me in mentoring my students. I plan to employ different mentoring styles at various stages of the students' careers. I will encourage

undergraduate students to establish foundations in the core areas of computer science and gain hands-on experience in a few areas based on their interests. In the initial years of graduate school, the goal for students will be to gain the necessary background, build the research muscles by working on projects with well-defined research agendas, and develop the capacity to identify open research opportunities. I plan to provide ample support during this phase in identifying research problems and designing solutions. As the student gains more expertise in later years, I will encourage them to *independently* explore open-ended research questions and establish an individual research style and identity.

It is also vital for students to feel a sense of belonging and find their research community. To achieve this, I will encourage students to participate in research competitions and mentoring workshops, submit their early research results to poster and workshop venues, attend conferences, and obtain summer research internships to build their network. In due course, I find that publishing at premier conferences and journals and releasing the research artifacts are great ways for students to push themselves to produce high-quality work and gain visibility. Furthermore, I will nominate senior Ph.D. students and postdocs to serve on Artifact Evaluation Committees and Program Committees so that the research community better hears their voices.

Finally, graduate school can be an intense experience, and mentors play a vital role in ensuring the students' well-being. I want to establish an open line of communication with my students that supports honest conversations. During my time in graduate school and at MIT, I have supported and mentored students through their struggles and celebrated their victories. For example, I played an instrumental role in preventing a master's student from dropping out by proactively offering my assistance to find the right set of research opportunities and acting as an unofficial mentor. As a result, she successfully graduated with a master's degree and enrolled in a top Ph.D. program. This experience solidified my belief that mentoring techniques also need to be fine-tuned based on individual needs. As a faculty member, I will use the opportunities and available resources to ensure students have a well-rounded university experience.

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## Course list

Given my background, I am interested in teaching undergraduate courses on Programming, Data Structures, Compilers, and Software Engineering. Additionally, I am interested in teaching graduate courses on Program Analysis and Verification, Compilers, and Software Engineering.

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## References

- [1] Bella Ross, Anne-Marie Chase, Diane Robbie, Grainne Oates, and Yvette Absalom. "Adaptive quizzes to increase motivation, engagement and learning outcomes in a first year accounting unit". In: *International Journal of Educational Technology in Higher Education* 15.1 (2018).
- [2] Graham Russell and Phil Topham. "The Impact of Social Anxiety on Student Learning and Well-being in Higher Education". In: *Journal of Mental Health* 21.4 (2012).