

# Mentoring Statement for Undergraduate Students

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I have mentored awesome students from Purdue University's research outreach programs. In my mentorship, I aim to bring my students close to real life in my lab and concrete academic projects. As a result, students under my mentorship have universally achieved real research outcomes. For instance, Alejandra Gracia from the *GoBoiler 2024 Internship Program* took part in my latest paper, *Cauchyproofs*, that explores efficient vector commitment design. Meanwhile, Akshat Neerati from the *Future Mentors Program* helped in our recent effort to uncover a vulnerability in *the Tor Network*, the largest anonymity service currently in use.

**The goal of undergraduate research is to provide students with a glimpse into the world of graduate study.** In computer science, there are ample opportunities for students to pursue an internship opportunity, ranging from fresh-new start-ups and flagship big companies. Students can learn all they want about company cultures and critical skills to succeed in industry. However, such is not the case in academia. With a lack of well-structured internship programs, many undergraduates graduate without a clear understanding of whether they want to pursue further academic work. Consequently, some hastily commit to a 5-year graduate program, only to realize months later that research doesn't align with their interests. Others transition directly into industry without ever exploring the exciting possibilities that research offers. Undergraduate research experiences are designed to fill this gap, offering students a relatively low-stakes opportunity to immerse themselves in the workings of a research group for 1–2 semesters. At the end of this period, students can freely choose to either continue exploring research or step back, depending on their level of interest.

**For students to fully benefit from this experience, a structured approach is key.** One recurring challenge in undergraduate research is that students are often left to their own devices for extended periods, tasked with developing a novel idea—a challenge that can often lead to frustration. Recognizing that a lack of clear direction often leaves students feeling unproductive, I have sought to refine my mentoring skills through the *Research Mentorship Development Program* from Purdue's Honors College and the *Mentored Teaching In Engineering* course from Purdue's School of Engineering Education, focusing on planning and communication to ensure the best experience for my mentees. I focus on offering students manageable, bite-sized projects that are achievable within the given timeframe. Alongside this, I work closely with students to establish clear expectations and milestones, ensuring accountability and a sense of progress. This structure not only boosts confidence but also provides a clearer understanding of the research process within a group setting.

**As a mentor, I consider it my responsibility to help students navigate difficulties in research.** Challenges in research are inevitable, and students may experience frustration when they hit roadblocks and are unsure of how to move forward. To prevent prolonged struggles, I emphasize that research is not like traditional homework, and students should reach out as soon as they feel stuck on an issue they can't resolve. I prioritize being available and accessible to my students, committing to respond to all inquiries within two hours during my working hours to ensure they maintain steady progress.

**I adopt elements of the SCRUM framework to facilitate efficient communication.** Regular assessment and feedback are essential for growth, but too much formality can hinder momentum. To strike a balance, I schedule brief, 5-minute status meetings twice a week. These meetings provide an opportunity for quick updates and feedback, while still leaving room for in-depth, hour-long sessions when needed. This method allows me to stay in regular contact with students without bogging down the research process, while still offering the space for deeper technical discussions when the situation calls for it. In the early stages, we often hold up to such sessions per week to establish foundational concepts. As students develop proficiency, they become increasingly independent, relying primarily on check-ins and occasional extended meetings to address critical challenges.

**Finally, the outcome of our research should actively contribute to students' professional development.** Under my mentorship, students learn modern cryptography ideas from recent publications. They also gain first-hand insight on research project planning and management. Part of my role is to guide students in transforming their research into publications that will be shared with the broader community. For students considering graduate studies, I help them craft competitive applications, draft compelling personal statements, and secure opportunities for impactful recommendation letters. In doing so, I ensure that they receive a head start, whether they choose to pursue further studies or transition into industry.

**In sum, my goal is to help undergraduate students make the most of their short research experience.** By setting clear expectations that maximize efficiency and minimize frustration, I aim to support their growth and prepare them for future academic or professional endeavors.