Mentoring Philosophy

Doctoral students in disciplines like chemistry must navigate the challenging graduate-level coursework and cutting-edge research, manage the highs and lows of discovery, and prepare for a future that may lead them into academia, industry, or other professional pathways. This diverse set of challenges necessitates effective mentorship that involves guidance in several aspects. Reflecting on my journey as a graduate student at the University of California, Davis, and later serving as a professor and mentor at the University of Texas at Arlington, a well-structured mentoring philosophy can effectively influence the development of future scientists. I also strive to serve as a good mentor and positive role model, offering continuous support throughout their graduate experience and beyond.

Orientation and Setting Expectations

A strong mentor-mentee relationship begins with a foundation of mutual trust and open communication. In our initial meetings, I prioritize understanding each student's career aspirations, research interests, and personal motivations. I introduce our research objectives, group culture, and expectations while fostering a welcoming environment. To ensure a smooth transition, I assign a senior graduate student as a peer mentor to offer guidance on lab safety and advanced research techniques and instrumentation, share experiences, and help new students integrate easily into the lab setting. I emphasize the importance of open dialogue from the outset, encouraging students to voice their challenges, seek advice, and collaborate with peers. By setting transparent expectations regarding safety practices, research progress, publication goals, and personal development milestones, I ensure that students are ready to navigate the demands of graduate studies while feeling empowered to take ownership of their academic journey.

Academic Excellence, Scientific Discovery, and Development of Technical Skills

Excelling in research requires a solid knowledge of the subject matter and the ability to think critically, solve problems creatively, and communicate effectively. To enhance students' knowledge of fundamental chemistry and the research project, I advise them to enroll in key graduate courses, master library usage, and literature search. The graduate-level course I teach on Inorganic Chemistry (which they will take) incorporates these elements and also includes presentations by students. They are gradually introduced to advanced research by teaming up with a senior graduate student or a postdoctoral fellow by asking them to first work on a project jointly and then independently. Students are trained on advanced instrumentation with the help of peers, specialized technical staff, and workshops. I often assign two different projects to a student after his/her initial training to increase productivity, broaden their knowledge, and minimize frustrations associated with unsuccessful experiments. This approach has indeed been quite successful. I encourage independent thinking and support their efforts to formulate research questions, design experiments, and interpret results rigorously. Recognizing that scientific communication is integral to success, I provide coaching on writing lab reports and

research papers and delivering compelling presentations. Lab members regularly present their findings in group meetings, which not only improves their public speaking abilities and self-confidence but also fosters a culture of constructive critique and shared learning. Once a year, each lab member also gives a 15-minute presentation about themselves in addition to the research update. They cover topics such as their hobbies, culture, favorite food, and home city or country to foster a relaxed setting and a deeper understanding among teammates. Beyond research, I encourage students to take on leadership roles in laboratory management, budget planning, and safety compliance. These responsibilities instill a sense of accountability and project ownership, which are critical for career advancement.

Career Development and Professional Networking

The career landscape for STEM PhD graduates is increasingly diverse, with opportunities spanning academia, industry, and entrepreneurship. I emphasize the importance of developing teaching and leadership abilities. All my PhD students gain experience as teaching assistants in undergraduate laboratories, sharpening their instructional skills. I also encourage them to mentor undergraduate researchers and junior lab members, fostering a collaborative and supportive research environment. My laboratory provides a perfect setting for these interactions and teamwork. I often have a diverse pool of group members ranging from postdoctoral fellows and sometimes visiting professors to undergraduates throughout the year and also high school students during the summer months. I host dinner parties or lunch meetings and celebrate student achievements to create an environment of team building and engagement. We also have several active collaborations with national laboratory scientists, industrial partners, and research groups in several parts of the world, spanning multiple continents. Team members learn from each other as each team has unique expertise and rich and diverse educational and cultural backgrounds to share. These experiences cultivate confidence, teamwork, and interpersonal skills that are valuable in any professional setting.

I also ensure that students attend weekly departmental seminars, strengthening their foundational knowledge and learning cutting-edge research in other areas and presentation methods from leading academic professionals. I facilitate networking opportunities by introducing them to distinguished professionals, encouraging conference participation such as ACS regional and national meetings, and guiding them toward professional development workshops. Students in their final years complete an industrial internship, preparing them for real-world challenges and experience. Often, my students get job offers from these companies even before they graduate. Exposure to these opportunities not only broadens their career perspectives but also enhances their ability to secure competitive positions upon graduation.

Evaluation, Feedback, and Personal Growth

A successful mentoring relationship is built on continuous evaluation and constructive feedback. I conduct regular one-on-one meetings with each student to assess their progress, address concerns, and refine research objectives. My typical group includes 3 to 5 doctoral students, allowing me to assign impactful research projects, engage regularly, closely monitor their

progress, provide maximum financial support and facilities, and mentor them effectively. Annual reviews and research reports provide a structured opportunity to reflect on accomplishments and identify areas for improvement. At certain times, I ask them to write their own recommendation letters, which force them to rethink priorities, qualities someone would value, areas to improve, and skills to master. This activity often serves as an indirect motivational tool.

Transparency and flexibility are key components of my feedback approach. I tailor my mentoring style to accommodate diverse learning styles, cultural backgrounds, and personal aspirations, ensuring that each student receives guidance suited to their unique needs. Just as I hold students to high academic and professional standards, I also recognize that setbacks and challenges are an inherent part of the scientific process. I emphasize that perseverance and hard work are fundamental to success, and I actively help students view setbacks as learning opportunities rather than deterrents. Having more than one project to work on often helps in this situation and minimizes frustrations and stagnation. I strive to maintain an open-door policy where students feel comfortable discussing difficulties without fear of judgment. By fostering mental strength and adaptability, I help them develop the confidence to deal with obstacles effectively.

Proven Success and Impact

Throughout my career, I have had the privilege of mentoring over thirty brilliant and exceptionally talented graduate students, seventeen of whom have earned PhDs. Eleven of these students have received the award for Best Ph.D. in Chemistry and Biochemistry, which is a remarkable accomplishment! My students have co-authored over 150 publications and contributed to four issued patents, exemplifying their success, productivity, and research impact. Many graduated with impressive collections of publications and patents to their credit. Graduates from my group are very successful and have gone on to make meaningful contributions in academia, industry, and entrepreneurial ventures—two establishing their own chemical companies. I should also note that many of them contribute to subjects and areas quite different from their original research focus. Additionally, I have guided eleven students to master's degrees so far and mentored numerous postdoctoral fellows, early-career scientists, undergraduates, high school students, and several high school teachers. These achievements underscore my dedication to mentoring, advancing scientific knowledge, and nurturing the next generation of scholars.

Conclusion

My mentoring philosophy is rooted in fostering an environment of support, growth, and success. I strive to equip my students with the knowledge, skills, confidence, and networks necessary for long-term success by prioritizing open communication, academic excellence, career development, and personal support. My goal is not only to guide them through their doctoral studies and prepare them for future challenges, but also to empower them to become independent, innovative, and meaningful contributors to the scientific community and society at large. My track record and student success demonstrate that I am achieving something right!