

I have been involved in research since more-or-less the start of my college career; from an organic chemistry independent project synthesizing a conductive molecular wire with self-insulating properties, to industrial research on the kinetics of polyurethane chain extension reactions, to my most recent project investigating a protein transport phenomenon in transgenic mushrooms. But it was not until just over a year ago, with a serendipitous discovery at about 4 a.m., that I was able to fully appreciate the joys (and frustrations) that research can bring. Running a set of PCR products on a gel, a phenomenon that had defied explanation for months was suddenly made clear by one piece of data – one missing band where I had expected to see one, but whose absence explained data we had not been able to interpret for months. I remember the rush of clarity I felt as everything fell into place, to be replaced with a sense of excitement at the complexities of nature and the possibilities that had now opened up for further research. It was this ‘high’ that made me realize that no other job would ever be as fulfilling as research and spurred me toward graduate study.

While this realization was the tipping point in deciding to pursue a research career, there were other earlier factors. After my freshman year at ██████████, I decided to gain some industrial experience, and worked over the Summer of 2007 at ██████████ ██████████, conducting experiments to improve the synthesis of a particular API. Over the next year, I had a year-long co-op with ██████████, in a variety of roles from research and development to manufacturing and process improvement. These experiences not only helped solidify my interest in Chemical Engineering, but gave me insight into the specific career paths an engineer can pursue. I found the process of designing experiments, executing research, analyzing data and presenting my conclusions highly motivating, and resolved that my future career would be research-based.

Over the last year-and-a-half, I have spent about as much time in the lab as possible (while still maintaining a high GPA). I conducted research full time during Summer 2010 on a Fellowship provided by a ██████████. The progress I made during this time led to my being invited to present at the annual Industry Conference in June, and to give a seminar in the Plant Pathology Department. More recently, I won first place in the National Student Paper Competition for my research presentation at the ██████████ conference in ██████████. A first-author paper on the subject has also just been submitted to ██████████ ██████████. As I have become more experienced in the lab, I have become more independent, and have assisted in research projects beyond my primary project. In January, I helped to write a successful proposal for an ██████████ Student Design Competition grant. My role in this project has been to lead a team of undergraduate students to meet research goals, training several students in lab techniques and mentoring them through the research progress. These activities have been very rewarding, and have furthered my desire to eventually begin a career as a research professor.

I also enjoy teaching outside of the lab setting. As a sophomore, I started working as a private tutor, helping students with introductory coursework in mathematics, chemistry, physics, biology, and engineering. I quickly came to enjoy seeing the look of sudden

comprehension that appears on a student's face as an elusive concept becomes clear, and this excitement has motivated me to pursue teaching as a career. As an outgrowth of this work, I started leading review sessions for large groups of students. In my junior year, I became a Teaching Assistant for a graduate chemistry course I had taken the year before, working closely with Dr. [REDACTED] to develop lesson plans, problem sets and exams, and to give periodic lectures and review sessions. I have continued this pursuit more recently, assisting in the teaching of an Introductory Biochemical Engineering Course and an Advanced Bioprocess Engineering Course, both administered by Dr. [REDACTED]. In my time at [REDACTED], I have witnessed first-hand the positive effects that a good teacher has on their students, and I believe that my experiences in teaching courses in multiple departments at both the undergraduate and graduate level have laid a solid foundation for the teaching I one day hope to do as a professor.

With this range of experiences, from undergraduate research to industrial internships to teaching, I have had a terrific time at [REDACTED]. But I am ready to take the next step. Over the years, I have had a lot of interaction with graduate students, and this has given me a tantalizing glimpse into the life of a graduate student - and it is a life I want to lead. It is also a life I believe I am ready and able to manage, as evidenced by my success in graduate coursework and commitment to research. I derive motivation from the level of responsibility and independence required of a graduate student, and relish the opportunity to prove myself at this level. My research and coursework so far has been quite interdisciplinary, spanning the border of biology and chemical engineering, and the potential to continue this sort of study is what first attracted me to MIT. Looking at the work of the professors in the Chemical Engineering department, I was excited to see the breadth of research being conducted in Biological Engineering, and immediately identified several professors whose projects particularly interested me. Over the next few weeks, I read many of the papers these professors had recently published, solidifying my interest in [REDACTED], and especially [REDACTED] lab. Each of these professors applies the core components of chemical engineering to biological systems in experimental research, which is exactly what I want to do. Pursuing a degree at MIT, with the department's unmatched diversity of research in Biological Engineering and its strong reputation, will allow me to learn from professors at the top of this new and exciting field.