# Short Essays

## What are your career goals and professional aspirations? Indicate which area(s) of mathematics, science, or engineering you are considering pursuing in your research career and specify how your current academic program and your overall educational plans will assist you in achieving your career goals and professional aspirations

The question of justice is one which has perpetually troubled humanity. Stories about fairness and how to achieve it within a society have created significant legal, political, and practical challenges. After all, possession is nine-tenths of the law. It is thus almost surpising how recent fair division, especially discrete fair division, has been studied. Theoretical computer science has, in this time, given useful tools for computing fairness.

These interests motivate my career goal of making the world fairer and more equitable through fair division and social choice algorithms.

Although these subjects have some background, the research is in many ways still in its infancy, as the existence of some fundamental notions of fairness have not yet been shown to exist. Studying computer science as a student has helped me immensely in developing the theoretical foundations for this work. I have been able to participate in theoretical computer science clubs on campus, like the competitive programming club, and leading the Computation and Economics Club have helped me collaborate with other interested students and develop my algorithmic thinking skills.

Outside of my extracurricular activities, I am currently advised by Professor Emily Fox, and been able to learn about and research computational geometry. Previously, I was a part of the Multimodal Interaction lab, where I was able to co-author two papers. These further research projects and learning experience beyond credit hours have helped me deepen my knowledge in my specific field of interest.

Although my undergraduate coursework has helped me develop fundamentals, what I have really gained is the freedom beyond coursework to research and learn. I hope that pursuing a Ph.D will afford me the same opportunity to make an impact as a fair division and social choice researcher, and that pursuing academia allows me to make a impact in research and in my community.

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## Describe an activity or experience that has been important in helping shape or reinforce your desire to pursue a research career in science, mathematics, or engineering

The first time I attempted a research project as an undergraduate student, I felt like I was in over my head.

I had been interested in text entry for a few months, and, under the guidance of Professor Kim, had delved into the literature. but was unprepared for the difficulty actually associated with research. We were attempting to improve virtual reality text entry in the near field, but I had not anticipated the difficulty of actually doing research.

But, unwilling to quit, I pushed myself to read the literature, conduct studies, and spend more and more time at the lab. The weeks preceeding my first conference submission were the most difficult. In the several 50-hour weeks at the lab (on top of school and extracurricular activities) in this time, I was internally debating if I could continue in research.

It was only in reflecting after the submission that I decided that I wanted to continue. By no means was the work easy, but it was meaningful. The research contribution of the paper was potentially impactful for the world at large, and let me leave my mark. Additionally, it was exciting, and although difficult, was interesting.

It is the same desire for contributing to society that helped me decide to pursue research.

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### Goldwater Scholars will be representative of the diverse economic, ethnic, and occupational backgrounds of families in the United States. Describe any social and/or economic impacts you have encountered that influenced your education - either positively or negatively - and how you have dealt with them or incorporated them in your work to reach your career goals

Although from an unremarkable, middle-class family, I was always given encouraged to seek knowledge. My family is highly educated, and so from a young age, they instilled me with a high regard for teaching. As I have learned, I have come to believe as a result that, in the long run, it is a panacea of the worlds greatest problems.

As a child, I was quite an avid reader. At their expense, my parents were always able provide me with resources to find new material and to learn the next 'big' thing. This came to a head in middle and early high school, when my neighbor noticed my curiosity, and offered to teach me programming. At first, I was not a fan. As curious as I was, I was impatient with learning. But I also saw how useful it was in solving real problems, and stuck with it.

This was my first mentorship experience, and it stuck with me. I continued to slowly, incrementally learn, and take classes, start clubs, and attempt project within computer science. My teachers in high school guided me through this, and supported me in starting the Game Development club, and teaching other students computer science. Eventually, they offered me mentorship and taught me additional content beyond the curriculum. Especially in my undergraduate program, my faculty have mentored me to become a better researcher and computer scientist.

Through my research experiences, but been able to work on solving concrete and impactful issues. My eventual love of computer science and mathematics and the challenges which it can present were in many ways shaped by my education and mentorship. I want to become an academic to work on impactful issues, and to share the same gift of mentorship with others.

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## Research Essay

1. The Research Essay provides the Foundation with particularly important insights into your motivation, background, experience, skills, and interest in pursuing a research career. This does not mean that you should simply state that you have these characteristics but that you demonstrate them through your work.
2. Whether your essay is based on prior research or is a proposal, it is important that your essay clearly describes:
   - Your intellectual contribution or expected contribution to the work.
   - The skills you brought to the work from prior research or course experiences.
   - The skills you have or expect to obtain from participation in the project.

3. As such, your research essay needs to be more than just a technical paper. Do not repurpose a "slightly expanded" abstract as your Research Essay. While your Research Essay might come from an abstract you have written earlier, the Research Essay needs to be much more.

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