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Personal Statement

I hope to complete a master's in math at the University of Cambridge (MASt, commonly referred to as Part III), and subsequently complete a Ph. D in Geometric Analysis at the University of Texas, Austin. Beyond this, I plan to complete a post-doc in Geometric Analysis at a well-respected institution. My goal is to continue working with leaders in the field, culminating in a professorship at an esteemed university. I believe I have the required background knowledge and motivation to succeed in this pursuit.

As a high school student in the International Baccalaureate (IB) program, I wrote a math paper on a way to approximate the inverse of $y = x^x$. Amazed by my result, I presented it to a math professor at UF – ultimately, it turned out that this was just a centuries old formula in disguise. However, the process of finding what I thought to be my own method was transfixing. It was this feeling that initially challenged my long-held assumption that I would pursue a career in science.

During my time at UF, I completed the most challenging courses possible. Starting as a math and biochemistry double major, I jumped into accelerated classes. In my first semester, I took Honors Calculus III and an advanced, one semester general chemistry course. As a sophomore, I took the enhanced organic chemistry sequence. As a junior, I elected to skip the undergraduate analysis sequence in favor of the graduate version.

Despite this decision, I initially had reservations about moving directly into graduate analysis. Analysis is regarded as one of the harder fields of math. At this point in my career, I was at a crossroad. While I was strong in biochemistry, I was not very passionate about it; conversely, I was passionate about math, but lacked confidence. At the urging of a former math professor, I decided to take a risk and enroll in graduate analysis. Succeeding in it taught me that I can handle the rigor of graduate coursework. It is because of this newly found confidence that I decided to focus on math rather than biochemistry.

Although I now focus on math, biochemistry served as an important gateway into my research career. The physical chemistry and biochemistry research I started in January 2017 has taught me several valuable lessons. Most importantly, teamwork is essential. Make protein and buffers in excess so everyone can use some. Help someone out when you have time and they do not; they may return the favor later. While my factual chemistry knowledge will not directly help in my pursuit of a Ph.D in Geometric Analysis, these important research skills easily translate to any field. Biochemistry also opened me to my first real teaching experience: I became a TA for the advanced general chemistry course, and it confirmed my love of teaching.

In Fall 2018, I began my first math research project on minimal surfaces. I investigated the catenoid, the only minimal surface of revolution. After finding a simple proof of this property, I discovered another property unique to the catenoid not found in the literature. Then, I extended a formula from normal vector fields to general smooth ones. I enjoyed these topics because they were questions I proposed and was later able to solve, and they provided an important foundation for working with surfaces.

These projects motivated me to complete the graduate analysis sequence, take a special topics course in curves and surfaces, and study from texts by do Carmo and Montiel & Ros on my own. My research experiences led me to be named one of UF's four nominees for the prestigious Goldwater Scholarship in both the 2018 and 2019 cycles. This year, I enrolled in all graduate math courses, most of which are taken by mature graduate students. Furthermore, my undergraduate thesis is supported by $2500 of funding and $500 towards conference travel payment as part of the selective College of Liberal Arts and Sciences Scholars Program. I have recently been named one of UF's two nominees for the Churchill Scholarship.

In June 2019, I attended Princeton University's Summer School in Geometric Analysis. About 30 advanced undergraduates and graduate students were selected to participate in a three-week, 32 lecture program. The lectures focused on several important topics in geometric analysis, greatly enhanced my knowledge in the field, and showed me how deep and active of a research area it is. During the program, several of my peers were confused by one of the lectures. I took it upon myself to prepare notes and give additional talks at night on some of the prerequisite information that I had learned. By doing so, I was able to gain practice as an instructor and they were able to better understand the material.

In the following seven weeks, I participated in a highly competitive Research Experience for Undergraduates (REU) at the University of Chicago. Around 30 non-UChicago students were accepted to work on a personalized topic. I worked with Dr. Andre Neves and one of his graduate students. Dr. Neves and Dr. Fernando Marques (of Princeton University) jointly solved the Willmore Conjecture in 2014 and are major figures in minimal surface theory. While at UChicago, I read through "A Course on Minimal Surfaces" by Colding and Minicozzi and subsequently wrote a 20-page paper. In it, I provide exposition on advanced minimal surface theory and prove an important compactness theorem. This theorem has been instrumental in modern min-max theory, but has never been formally proven. At the end of the program, I gave a 15-minute talk on basic minimal surface and min-max theory.

Being a part of these programs gave me valuable insight into the social dynamic of a research career. I made several valuable friendships at both programs. Throughout UChicago's REU, we all gave each other critical feedback on our work and helped each other with the material we had to read through. Even though I work in a vastly different field from my fellow participants, they all helped at some point. Conversely, I was also able to help them and learned a lot about other areas of math during my time there. Developing such relationships is vital in succeeding as a graduate student.

By attending the programs at Princeton and UChicago, I made many important connections. First, I developed significant relationships with other math students across the country. Drs. Marques and Neves, who act like brothers, have taught me the importance of collaboration. I can confidently say I made many similar relationships with attendees of these programs, and I look forward to working with them in the future. As mentioned, I plan on continuing my work in geometric analysis in graduate school. I am currently interested in surfaces of constant mean curvature, which include minimal surfaces and Delaunay surfaces, but also take great interest in geometric measure theory and calculus of variations. This is well represented at UT Austin, with individuals such as Drs. Francesco Maggi, William Beckner, Salvatore Stuvard and Dan Knopf.

The department's strength in analysis is appealing to a student, like myself, in geometric analysis. Having taken analysis already, I will be able to transition to research early in my graduate career. The department also boasts dedicated geometry and PDE seminars. From the program and faculty, to the students and seminars, I will take advantage of everything UT Austin has to offer.