

Undergraduate Researchers: Career Choices and Biophysics Training

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In this report, two undergraduate researchers with different career goals explain how biophysics relates to choices and summarize their advice to undergraduates interested in biophysics. Kelsey Jackson (Bachelor of Science in Physics and Data Science in 2021) and Molly Myers (Bachelor of Science in Business Administration in Economics with a minor in Mathematics 2020) are at Creighton University in Omaha, Nebraska. Under the guidance of their mentor, Michael Nichols, of the physics department at Creighton University, the students use biophysical optics to develop diagnostic tools to distinguish cancer cells from normal cells metabolically and architecturally.

What is your career goal and its relation to your biophysics research experience?

Molly Myers: “Versatile” summarizes my undergraduate biophysical research training. As someone planning on pursuing further scientific training as an MD and PhD, working in biophysics has provided me not only with a depth of knowledge about my lab but also breadth in techniques I have learned. I use marketable techniques, like computational analysis, programming languages, cell culture, microscopy, and scientific writing. I get to plan my own experiments and research projects. Many mentors in the physics department are models for my further professional development.

I found my research experience meaningful and rewarding because I have the opportunity to explore different kinds of research. It also provides profound solutions to real-world problems. Working on developing a diagnostic tool for skin cancer with Dr Nichols is widely useful. I think that many of the courses I take do not articulate how many different fields and perspectives are needed to solve actual problems. For example, in math classes, all the tools you need to solve a problem come only from math. In research, however, we cannot solely depend on one discipline to solve our problems. Incorporating approaches from multiple fields is what excites me in my biophysics lab.

Kelsey Jackson: I plan to pursue a PhD in physics and a career in academia in the future, so my interest in biophysics stems from my interest in physics, rather than biology or medicine. However, what I find special about biophysics is how it is immediately applicable to the problems of the world around us. Our work can be translated from the lab into real medical tools that can benefit patient outcomes. While all research has its purpose, the immediate benefits of biomedical

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research offer us a uniquely clear vision of its objectives and help us understand why people devote their lives to such research.

For me, research is, above all else, an opportunity. As a researcher, I have been able to do real science and come to understand what it takes to conduct experiments, test hypotheses, and analyze results, rather than just reading about them. I have had many opportunities to present my work to other researchers and share knowledge with them, which advances the efforts of everyone involved. My time in the lab has been a way to see what being an academic is like and to prepare me to join that field with first-hand experience, contacts, and mentors gained along the way.

What is your advice to undergraduates?

Molly Myers: My advice to undergraduates is to find what is interesting and go for it! Finding your passion is the hardest part. It took me two semesters of physics and math for me to realize I want to continue studying those topics. After that, it was a matter of taking the initiative to join a lab. I applied for the Networks for Biomedical Research Excellence program and was lucky enough to get in. Along with that, I gained fantastic research mentors that helped me on my path to become a physician scientist. Biophysics helped me realize how concepts and techniques from math, physics, biology, chemistry, and economics all come together to solve the exciting problems I plan on dedicating myself to as a physician scientist. Biophysicists also get to work with the most interesting techniques and topics! As the old adage goes, “Do what you love, and you’ll never work a day in your life.”

Kelsey Jackson: I wholeheartedly encourage young undergraduates interested in biophysics to get involved in research, especially if they’re uncertain of their interests. Biophysics offers so many skills and techniques to learn and explore. Within our lab, we’ve had physics and engineering students design new microscopes equipped for new optical techniques, math students fit models or use linear algebra to unmix data, programmers develop analytic programs or microscope interfaces, and biochemists design experiments to fluorescently isolate metabolic indicators. All these fields have room to work on biophysical problems and make valuable contributions to such research.

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