

Alex Sevit

Whitaker Undergraduate Program Final Report

Biography

My name is Alex Sevit and I am a Junior Biomedical Engineer studying for a combined bachelor's and master's degree at Drexel University. My career in biomedical research began at Drexel's Implant Research Center (IRC), where I studied the biodegradation of pacing and implantable cardioverter defibrillator leads. Collaborating with electrophysiologists that implant these devices, we developed a research plan and co-authored posters for Heart Rhythm Society and Society for Biomaterials. My master's thesis research—a collaboration between IRC and Thomas Jefferson University's Department of Orthopedic Research—focuses on prevention of medical device-related infection, a devastating problem often leading to device removal and administration of harmful antibiotics. I am currently developing a novel antibacterial coating that would prevent bacteria from adhering to the surface of orthopedic and spinal implants.

Brief Summary

I came to Denmark Technical University (DTU) to study for a term. My goal was to experience a different perspective by taking biomedical engineering courses at a European institution. I also wanted to immerse myself in Danish culture—learning the language and meeting Danish students.

Technical Findings

I took four classes at DTU, three were related to my field of study and one was more for personal enrichment. I took a Danish language course to better immerse myself in the culture of the country. In a course mainly focused on speaking and listening, I quickly realized there were many subtleties to the spoken language, but I was up to the challenge. While I am by no means fluent, I have acquired what my teacher called “survival Danish”: enough to order food, ask for directions and apologize for my poor Danish.

My Entrepreneurship class was culturally immersive while also relating to biomedical engineering. In the class I wrote a business plan around an antibiotic coating that my lab developed. This proved to be more challenging than I anticipated because, while I knew about the science behind the coating, planning how to market the product required a completely new perspective. Working with the owner of a local business as a coach, I learned about the path by which a research project transforms into a marketable product. The final project for the class was a comprehensive 30-page report detailing the manufacturing costs, marketing strategy and financial goals of a theoretical business.

In History of Technology, I learned about the history of engineering as a profession—a field that marries science and technology. Historically, lone inventor-artisans with little formal training have produced technology. Only recently have large corporate engineering firms emerged with formal training in the basic sciences. Learning about the history of my profession will be valuable as I move forward in my career as an engineer.

Finally, in Systems Biology I learned about the exciting microbiology research that is happening at DTU. In the class we used Cytoscape, a network visualization software, to analyze networks of proteins involved in human disease. One case study that we worked with looked at a developmental defect in the human heart. Comparing the proteome of a

normal heart to that of a diseased heart, we were able to implicate specific proteins involved in the disease. This method of investigation is very powerful in understanding the microbiological source of disease and could aid in developing medications to correct the disorder without surgical intervention.

Academic/ Professional Gains

The bond between DTU and Drexel is very new, with only about ten students having been exchanged between the universities. It is important that the student exchange continues in order to build the bond between the universities. A simple student exchange could evolve into a research collaboration between the universities and a melding of the university's skill sets.

As such, I was very aware of my status as a representative of Drexel. I felt that I had a responsibility to strengthen ties between DTU and my home university in any way that I could. I was thrilled to meet two Danish students who will be coming to Drexel in 2014. Using Google Maps I gave them a virtual tour of Philadelphia, suggesting some places they could live and showing them how to get around on campus and through the city.

On top of developing my ambassador abilities, I was also exposed to a new field of biomedical engineering. I was very excited in my Systems Biology class to integrate my knowledge of microbiology and programming to understand real life cell cycle data. This particular field of research is a specialty of DTU's Systems Biology department thus I gained a unique glimpse into this research that I would not have received at Drexel. Not knowing what field of biomedical engineering I want to specialize in in graduate school, exposure to systems biology has motivated me to look into programs that incorporate this research.

Personal Gains

According to The World Happiness Report, Denmark was rated the happiest country in the world. I believe this is in large part due to their robust infrastructure, which encourages people to function at their best. While living in Denmark, I was immersed in the Danish lifestyle and there were many instances where I thought, "why don't we do that in the United States?"

For example, bicycling is a huge part of Danish culture. The entire infrastructure of society is built to accommodate bicycles. Bike lanes are present on virtually every street—not simply white lines on the pavement—but well defined lanes on the road that keep bicyclists safe from cars. Trains are also built to accommodate bicycles. The last car of every train is a bike car, where one can park their bike. Thus to commute to work, one simply rides their bike to the nearest train station, parks their bike on the train, and rides from the stop to their job. And do not worry about train delays—signs signal the arrival of trains to within a thirty-second precision.

Not only does biking greatly reduce Denmark's carbon emissions, it also builds exercise into each person's day. Thus, a lot of the public health problems, such as obesity and heart disease, are not experienced in the same pandemic proportions in Denmark that they are in the United States. I believe the world has a lot to learn from Denmark, with their ability to solve large-scale problems with simple and elegant solutions. Returning to the United States I will continue to embrace aspects of the Danish lifestyle incorporating lessons learned there into my life in Philadelphia.