Look !

Duquesne's Biomedical Engineering Lab

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Since last summer, I've been participating in an amazing opportunity: being affiliated with Duquesne's new Biomedical Engineering lab, part of the university's new BME Program, thanks to the recommendation of Central Catholic biology teacher Mark Krotec. When I talked to him about science-learning options for me during this past summer, he recommended that I apply to do a project in the lab. The lab will accept applications from all interested students, consider them on a case-by-case basis, and admit students based on whether there are appropriate projects available for them to work on. I highly recommend the experience; in my time at the lab, I have learned a lot, been exposed to fascinating inventions and concepts, and made minuscule but definite contributions to solutions of real-world problems.

Located in Duquesne University's Libermann Hall, the lab spans multiple rooms on the 4th floor and is filled with state-of-the-art biological, chemical, and engineering technology, including an innovative tunable wavelength laser. Biomedical Engineering graduate students often come to the lab to do research, and it is the center of a new five-year combined degree in BME and Nursing.

The lab was created and is directed by Dr. John Viator and his Business Manager, Mrs. Mary Jo Babinsack. An award-winning educator, Viator holds several US and international patents and has been awarded almost $3.5 million in grants during his career from organizations including the National Institutes of Health's National Cancer Institute, the Missouri Life Sciences Trust Fund and the American Society for Laser Medicine and Surgery. He is founder and president of Acousys Biodevices Inc. and founder and Chief Executive Officer of Avapulse Research, LLC. Dr. Viator recently moved to Pittsburgh with his family, taking the University of Missouri's BME program with him to Duquesne. Dr. Viator has been very welcoming and encouraging throughout my time at the lab.

Having spent many Wednesday afternoons at the lab, I've learned about the theoretical and practical bases of a cancer-detection system on which Dr. Viator and his team are working. It works in the following way.

First, a blood sample is taken from a patient and centrifuged. White blood cells (and floating melanoma cells, if present) are extracted. They are mixed with special antibodies that bond to melanoma cell proteins and that have pigmented spheres attached to them. They are then combined with mineral oil. Once they enter the machine, it uses the tunable wavelength laser mentioned above to irradiate the samples. If cancer cells are present, their pigmented antibodies heat up and create acoustic signals when irradiated. A piezoelectric transducer detects these signals, indicating that the sample contains melanoma, and the sample is isolated in a well. In this way, the machine both detects circulating melanoma and provides previously hard-to-find samples of it for research.

As for me, I have been mentored by Dr. Viator and three of his graduate students in turn. I have learned about a range of fascinating topics, from laser-based burn imaging to interferometry to circuit-building to programming. I look forward to continuing my association with the lab.