Important lessons learned outside the classroom

Massachusetts Institute of Technology

Some of the most important lessons a student can learn are not taught in a classroom. That's what Jean Sack, a senior majoring in mechanical engineering, discovered last summer thanks to her experience with the Undergraduate Research Opportunities Program (UROP), funded by the MIT Energy Initiative and BP.

"Research is a completely different side of academia, and gives you a chance to connect concepts you learned in classes to the real world," Sack says. "This was a liberating experience for me and it gave me the confidence to move forward."

This wasn't Sack's first experience as a UROP, however. As an eager — perhaps too eager — freshman she did a UROP during the Independent Activities Period. But Sack found that she had not yet sufficiently developed skills or enough knowledge to contribute, especially considering the short time span she had on the project. But by the time she was a junior, Sack decided to give UROP another shot. She went through a list of mechanical engineering professors conducting energy research and decided to contact those who were running the most interesting projects.

Associate Professor Evelyn Wang saw Sack's potential and put her on two main projects: improving heat transfer of condensation, and working on and with a prototype of a solar thermophotovoltaic (STPV) system.

Sack's work with condensation, which she performed with PhD candidate Nenad Miljkovic, involved conducting several runs on a variety of surfaces to characterize the heat transfer effectiveness of different types of condensation enabled by different surfaces. Additionally, her work on a prototype of a STPV system, performed with PhD candidate Andrej Lenert, involved concentrating the light from the solar simulator in order to reach higher temperatures to find when the most energy can be obtained from the PV cell.

Sack found this work especially interesting because "STPV has the potential to revolutionize solar energy, since it uses the entire solar spectrum and thus has much greater energy potential."

One of Sack's favorite parts about her UROP experience was the people.

"Andrej and Nenad were incredible to work with, and were patient and really fun to be around," Sack says. "It was wonderful to be in an atmosphere where brilliant people asked for and appreciated my thoughts on projects, as well as asked what my plans were for graduate school, and provided an endless resource of experience and advice."

In addition, Sack says Wang was an excellent role model from whom she learned much. For example, after seeing how Wang ran group meetings, Sack followed suit as a student manager for a class during the fall semester.

As with so many of the best learning opportunities, Sack's UROP experience taught her how much she didn't know, and needed to.

"I discovered that I know very little about solar cells, but realized that much of graduate study seems to be independent research on topics that are of interest," Sack says.

This realization led her to decide to pursue a master's degree next year at MIT focused on thermophotovoltaics. After that, what could come next? PhD? Industry? A national laboratory? Sack plans to take her future one step at a time. With a widened understanding of energy projects thanks to her UROP experience, she takes comfort in now knowing that there are far more directions she can take her career than she ever imagined.

Want to have a similar experience? Applications [1] for the summer energy UROP are due March 8.

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