

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Learning Through Doing: Teaching Advanced Physics Concepts Through Freshmen Research Immersion** MATTHEW WAHILA, LOUIS PIPER, Dept. of Physics, Binghamton University, JENNIFER AMEY, WAYNE JONES, Dept. of Chemistry, Binghamton University, MEGAN FEGLEY, NANCY STAMP, Freshmen Research Immersion Program, Binghamton University — Often undergraduates have difficulty grasping advanced concepts in physics due to the seemingly abstract and foreign nature of the time and length scales involved. The Smart Energy Freshmen Research Immersion (FRI) program at Binghamton University was created as a way to address this issue and, in turn, improve undergraduate performance and retention in physics and chemistry. Using real-world research problems as a wider context to frame their understanding, we have developed a course sequence providing a more intuitive and comprehensive understanding of core physics and chemistry concepts over the course of the program. Advanced condensed matter topics, such as optical band gaps, crystal and electronic structure, and electron/hole conduction are introduced to students through hands-on, authentic research activities incorporating materials for real-world device applications. I will discuss how employing p-n junctions as a model device can allow for a natural and intuitive progression from basic to advanced physics and chemistry concepts. This approach illustrates how shifting exotic concepts into a more relatable form through the use of analogy is important for fostering a more intuitive understanding of physical phenomena.

Matthew Wahila  
Dept. of Physics, Binghamton University

Date submitted: 01 Dec 2015

Electronic form version 1.4