P.U.R.E. Research Plan Form

Mentee Information
Name: Greg Wajda ___________________________________________ Date: 9/25/14
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Mentor Information
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Faculty Advisor: __________________________________________

Fall 2014 Research Plan
1.) Write a brief outline of your research plan:
It is difficult to imagine a more flexible platform for nanoscale instrumentation design than the modern atomic force microscope (AFM). The basic AFM instrument allows studies of localizing phenomena at the nanoscale using an atomically sharp tip with precise positioning control, an exquisitely sensitive scheme for measuring tiny forces using a flexible cantilever with laser deflection sensing, and a system to record and display measurements during a raster or line scan. Forces of electrical, magnetic, or chemical origin can be detected. Moreover, the tip can be used to transfer forces, fields, or matter to a sample at precise locations. We are developing a technique for sensing the dynamic behavior of semiconductor materials under depletion and inversion conditions using the force sensor of the AFM cantilever. The project involves writing a program that controls two external lock-in amplifiers in WaveMetrics IGOR Pro technical graphing, tool automation, and data analysis software in C/C++ language. The lock-ins will interface with IGOR via GPIB-to-USB adapters. The Kelvin Probe Force Microscopy experimental, in which a dc-bias is applied between the tip and sample and lock-in amplifiers monitor the tip oscillation at frequency 1, will be modified so that external lock-ins are used instead of internal lock-ins.

2.) What do you hope to learn and achieve by the end of the semester?
I hope to achieve hands on experience with research and to explore different opportunities so that I may one day figure out if this might be something I will want to do the rest of my life.

Mentee Signature: _Greg Wajda_________________________ Date: 9/25/14__________
Mentor Signature: Yemaya Bordain________________________ Date: 9/25/14__________