

Internship Experiences

Nathan Pappas on his internship experience

During the summer of 2007, I interned with the National Aeronautics and Space Administration (NASA) at Wallops Flight Facility (WFF) in Wallops Island, VA. I worked in the Systems Software Engineering Branch under the mentorship of Robert Stancil. I was a USRP (Undergraduate Summer Research Program) intern at WFF. The USRP internship gives undergraduate science majors the chance to conduct research and work on projects that are important to NASA missions. I learned about the internship through NASA's website and also from a fellow intern during the summer of 2006 while interning at Oak Ridge National Laboratory.

The project that I worked on was the development of a centralized UAV Control Center on the main base of Wallops Flight Facility. An Unmanned Aerial Vehicle (UAV) is an aircraft that has no onboard pilot. A proof of concept mission was planned to test whether NASA's TDRSS communications system could be used on UAVs. My job was to develop software in LabVIEW to send commands to the UAV in-flight, send flight information to an STK program to map the flight in 3-D real time, download and display image data in real time during the flight, and convert binary flight log files to delimited text files after the flight ends. LabVIEW was chosen for much of the software development due to its ease of use for programming integrated systems and user interfaces.

Although I am a mathematics major and have never taken a course in computer programming, my previous experience with LabVIEW at Oak Ridge National Laboratory and my background in mathematics are the reasons for which I was selected for this internship. Approximately half of all of the Systems Software Engineering Branch at WFF actually held degrees in mathematics, and I was told that NASA highly values degrees in mathematics. This internship gave me the opportunity to work at one of our nation's greatest government agencies. If you think you would like to work at NASA at anytime in your life then I highly suggest applying for an internship, as that is generally the only way of ever getting a job there.

Anthony Rizzie on his internship experience

During the summer of 2007, I had the amazing experience of interning at Oak Ridge National Laboratory (ORNL) in Oak Ridge, TN. ORNL is the largest national laboratory and operates under the U.S. Department of Energy, which was responsible for funding my internship. I first learned about this internship from Dr. Stump and then spoke with senior Nathan Pappas about his experience. I was a part of the Pre-Service Teacher program (PST), which is a 10-week summer program giving students wishing to become teachers the chance to be involved in and gain useful research experience. Like Nathan the previous summer, I worked under Dr. Thomas Watkins in the Materials Science and Technology Division. The main focus of my research dealt with x-ray diffraction and something called a pole figure, which is a visual representation of data useful in displaying the orientation and alignment of cells in a crystalline structure. First, Dr. Watkins showed me how to properly use an x-ray diffractometer (equipment used to conduct x-ray diffraction), and then he gave me the details of my project.

There exist various techniques to “scan” an object using x-rays, the most common of which uses a polar sampling grid. I investigated the uses and efficiency of two alternative grids: a hexagonal grid and a spiral grid. I developed the mathematics necessary to generate each grid and manually programmed them into computers to test my results.

Aside from time spent working on this project, every Wednesday afternoon my group took a tour of different on-site labs (including the Graphite Reactor, Environmental Sciences Lab, and the new Spallation Neutron Source facility) and then we went to a weekly lecture on various topics in science. Speaking to the social aspect, students traveled together on weekends to such places as Dollywood, Gatlinburg, the Smoky Mountains, etc. Overall, this internship is an incredible opportunity to gain experience and networking for any mathematics/science major, since there are other programs available to students besides the PST; I highly recommend applying if you are interested.

Andrea Zentz on her internship experience

During the summer of 2007, I participated in an eight-week Research Experience for Undergraduates (REU) at Illinois State University, along with six other mathematics education majors, four in-service teachers, and Illinois State faculty. Our main focus was research in discrete mathematics, but we also discussed current important issues in education.

Throughout the course of the REU, we were given background information on problems that are presently being researched in the area of discrete math, and we worked on problems that interested us in smaller groups. Some of the topics that we researched included decompositions of complete graphs, the Oberwolfach problem, graph labelings of cycles, trees, three-dimensional grids, and Latin squares and their applications to scheduling problems.

As pre-service teachers, we asked ourselves how we could apply our research this summer to our future classrooms. We felt that discrete mathematics is a subject area that has so many applications and is easily accessible to students; however, there are rarely discrete math classes taught in high school, and these classes are often viewed as the “leftover” classes for students who don’t want to take Calculus or Pre-Calculus. Because there is not a lot of resources for teachers in the area of discrete math, one of our objectives of the summer was to create a discrete mathematics teaching module that could be used in high school or middle school classrooms. Our REU group split up into three different groups, and each group took a discrete math topic and created a clear, concise unit that could be used by teachers who aren’t very familiar with the content. The three units we wrote were based on Latin squares, sparse rulers, and Pythagorean triples, and they are set up in such a way so that they can be broken up into smaller lessons, depending on how much time the teacher intends to spend on the unit. Each group consisted of undergraduate students and at least one in-service teacher, who helped us get a good idea of how students would respond to the unit and how much time each lesson would take.

This summer was a great experience for me, because it helped me build a better understanding of mathematics and how mathematics is learned. A lot of our research was based on using reasoning skills and problem solving techniques, both of which are goals that mathematics teachers want to pass on to their students. Through asking questions, communicating with others, and dealing with my own struggles in mathematics, I feel that I have a better understanding of how my students might feel when I ask them to do challenging tasks. All of my experiences at the REU have made me evaluate myself as both a student of mathematics and a teacher of mathematics, and I would definitely recommend an experience like this to any future teacher.