Revamped Applied Physics Degree Debuts

In 1982, the Applied Physics option was created at UW-River Falls as a way to provide a path for students who wanted more of an engineering slant to their physics degree. That option has over the years proven to be very popular with students.

Not surprisingly, the majority of students who earn an Applied Physics degree either take an engineering position immediately after graduation or go on to graduate school in engineering before entering the workforce. Graduates with this degree, like graduates with other physics degrees, tend to do very well in the workplace - helped by the breadth of their background and their combination of science and engineering knowledge.

As part of the Physics Department’s on-going effort to examine our degree offerings to best serve our students, we identified that we needed to modify the Applied Physics degree to make it more distinctive and easier for employers to understand the skills graduates with this degree possess.

After many discussions with the Physics Advisory Board, Diane Bennett led the development of what is now the Applied Physics for Industry and Engineering (APIE) degree. The curriculum for the APIE degree is more flexible than the previous Applied Physics degree, and students are required to specialize in at least one area in order to earn a certificate as part of their degree.

The certificate portion of the APIE degree was added to allow students to customize their degree - and simultaneously indicate to employ-

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Research Takes UWRF Students All Over World

Over the past half year, four UWRF Physics students have taken part in research that has carried them not just out of the friendly confines of River Falls, but far overseas.

Laura Lusardi and Kelsey Kolell, both third-year physics majors, traveled to Germany over the summer to work with members of the IceCube collaboration at Ruhr Universität Bochum, in Bochum Germany. They both worked closely with Ph.D. students in Professor Julia Tjus’ research group during their 10 week stay. Laura and Kelsey were participating in the National Science Foundation (NSF) funded International Research Experiences for Students program awarded to Suruj Seunarine and Jim Madsen of UWRF.

Laura worked with Fabian Bos on the sun and moon shadow analysis, which looks at cosmic ray shadows created by the sun and the moon. The Earth is continually bombarded by a flux of particles from outside the solar system. When the Sun or the Moon...continued on page 3....
...New APIE Degree

The extra courses, often from other departments on campus, required for each APIE certificate are:

**Opto-electronics:**
- Digital Electronics
- Analog Electronics
- Optics
- Electricity & Magnetism

**Biology:**
- General Biology
- Cell and Molecular Biology
- Anatomy & Physiology I
- Stem Cells & Regenerative Medicine

**Entrepreneurship:**
- Info Systems for Bus. Management
- Intro to Marketing Communications
- Accounting
- Industrial & Organizational Psychology
- Communication & Leadership

**Mechanics:**
- Statics
- Dynamics
- Mechanics of Materials
- Machine Design

The new name of the major came out of a desire to better indicate to employers what the focus of the degree is on. One challenge that physics students face when searching for jobs are that some Human Resource systems don’t recognize that Applied Physics graduates are qualified applicants for many engineering positions. By renaming this degree option to include ‘Industry and Engineering’, we hope to somewhat alleviate this problem, while still distinguishing the degree from an Engineering degree.

In addition, APIE students will take two semesters of the Capstone Design course (formerly Senior Seminar). This will allow APIE students to go through two cycles of the design - prototype - test process with presentations required at the end of each stage. We’re hoping that future ‘real-world’ capstone design projects will result from partnerships with local companies.

APIE Certificates

The extra courses, often from other departments on campus, required for each APIE certificate are:

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- Digital Electronics
- Analog Electronics
- Optics
- Electricity & Magnetism

**Biology:**
- General Biology
- Cell and Molecular Biology
- Anatomy & Physiology I
- Stem Cells & Regenerative Medicine

**Entrepreneurship:**
- Info Systems for Bus. Management
- Intro to Marketing Communications
- Accounting
- Industrial & Organizational Psychology
- Communication & Leadership

**Mechanics:**
- Statics
- Dynamics
- Mechanics of Materials
- Machine Design

We Hear That....

Jim Hall (1994) Jim has recently taken the Chief Information Officer position for Ramsey County in Minnesota. Previously, he served as Director of Technology at the University of Minnesota - Morris.

Karsten Grover (2004) Karsten is the Vice President of Engineering at Diverging Approach, a railway system contractor focused on railway signal and crossings.


David Fairchild (2009) David has completed an MBA from Arizona State University and is a Commissioning Engineer at the firm Burns and McDonnell.

David Johnson (2009) David recently switched jobs at 3M and is now a technical service engineer for 3M’s Aluminum Conductor Composite Reinforced (ACCR) lab. The ACCR increases current-carrying capacity in transmission lines while reducing thermal expansion.


Amanda Steck (2012) Amanda was recently hired as an instructor in the physics department at Virginia Commonwealth University. Previously, she obtained a Master’s degree in elementary particle physics from the University of Nebraska - Lincoln.

Denise Nelson (2012) After receiving her dual degrees in Biomedical Engineering from the University of Minnesota and Applied Physics from UWRF, Denise began work at Sunshine Heart, a medical device firm focused on cardiac assist devices, where she is now an Engineering Project Manager.

Wes Barnes (2013) Wes has begun a Masters degree program at Virginia Commonwealth University. His research will be in the field of General Relativity.

Tim Dirks (2015) Previously an intern at Banner Engineering while completing his dual degrees at the University of Minnesota and UWRF, Tim is now an Electrical Design Engineer at Banner.

Nate Shonkwiler (2015) Nate is a product development engineer in 3M’s Electronics and Energy group, based in Austin, Texas.
pass overhead of the IceCube detector, they block cosmic rays from reaching the Earth from that direction - a cosmic ray “shadow.” This information is then used as a calibration tool to improve the angular resolution of the detector and it may even be used for studies of solar physics. Laura’s project looked for a deficit of cosmic rays in the directions of the sun and moon over the number of cosmic rays seen when looking away from the sun and moon.

Kelsey worked with Sebastian Schöneberg to model the path of neutrinos from cosmic ray air showers. They focused on low energy showers which disperse particles over a large area across the surface detector called IceTop. A lot of time was spent working on geometric aspects of shower inclination and particles that could reach IceTop and neutrinos that could reach IceCube.

When they weren’t working, Kelsey and Laura made it to many parts of Germany including Cologne, Bonn, Munich, and Berlin, as well as to several other places around Europe - Amsterdam, Brussels, Venice, and London. Both agreed that while they loved every city and country they visited, Berlin ended up being their favorite German city and Amsterdam their favorite city overall. In each place they frequented museums, visited the cultural and historical sites, enjoyed lots of delicious food, and even bumped into the occasional festival. They learned a lot about programming and astrophysics, but more importantly about collaborating and communicating their work with others while navigating a foreign country.

Laura Parmeter, a post-baccalaureate physics major, took part in the NSF funded UWRf IceCube Research Experience for Undergraduates (REU) site, supported by a different grant also awarded to Professors Seunarine and Madsen, during the summer of 2015. Her project involved creating a Monte Carlo simulation of the UWRf neutron monitors and modeling their response to cosmic rays. Laura worked with Dr. Waraporn “Fhon” Nuntiyakul, a lecturer at Chandrakasem Rajabhat University (CRU) in Thailand, who visited UWRf for the summer to work with Laura and Kyle Lueckfeld (an REU student from Northeast Wisconsin Technical College who has since transferred to UWRf) on neutron monitor research. As a result of her work, Laura was invited to Thailand to present her work at The International Conference on Science and Technology 2015 in November. The work, co-authored with Kyle, was published in the proceedings of the conference.

If that weren’t enough, Laura also got the opportunity to travel to Antarctica with Prof. Madsen and Robert Zill, a student from the College of DuPage in Illinois, who also took part in the REU program at UWRf. The three repaired a malfunctioning neutron monitor near the McMurdo station on the coast of Antarctica, and then travelled to the South Pole where they ran muon taggers (muon detectors which were upgraded at UWRf last summer) and became acquainted with the operation of the South Pole neutron monitors, for which UWRf will assume full responsibility for in coming years.

Senior Angela Ludvigsen was accepted into the University of Michigan’s International REU program entitled “Optics in the City of Light.” The 12 students selected for this program spent two months in Paris working in a variety of research groups at several institutions in the city. Angela worked with Professor Jacques Robert of the Laboratoire Aimé Cotton, Université Paris-Sud 11, who is working to develop a cold Hydrogen beam for use at CERN. During her time there, she constructed a coaxial helical coil and antenna which resonated at 27 MHz and successfully produced H atoms from an RF discharge of H₂ molecules. Using various spectrometers, she verified that the beam of atoms was free of contamination. Taking advantage of already being in Europe at the completion of the program in Paris, Angela then traveled to the University of Bristol in the United Kingdom to spend three weeks working in the lab of Professor Jonathan Reid. Professor Reid is one of the foremost researchers using optical traps to study aerosols, which is the work that Angela has been doing here at UWRF for the past three years. This ‘personal REU’ gave Angela an opportunity to learn more about the techniques used in this research field.

Left: Laura Moon Parmeter working with students at CRU in Thailand. Right: Laura has the opportunity to launch a weather balloon flights at the South Pole. Submitted photos.
While the number of students around the department definitely decreases in between semesters, there are still some around, either taking classes or working on projects. On a recent January day, Talen Rabe (left) and Mitch Ahlswede (right) were both working in the machine shop along with Arriety Lowell, who serves as Machine Shop Manager/Lab Manager/Lecturer in the Physics department.

The sole purpose of this newsletter is to keep everyone in the UWRF Physics community informed about the activities of our members--that’s you! We and your fellow readers want to hear what you’ve been up to recently (or not so recently, as the case may be). Please fill out the form below with your news and mail it in, or call: 715-425-4417, e-mail: Lowell.McCann@uwrf.edu, or fill out the form on the web: www.uwrf.edu/PHYS/AlumniForm.cfm

Name:___________________________________________  Years attended:____________
Address:_________________________________________________________________
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May we share your addresses with your fellow physics alumni? _____ email _____ postal
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Hertting and Bohacek Earn Presidential Teaching Awards

The list of the 2013 Presidential Awards for Excellence in Science Teaching, announced in the summer of 2015, included two science teachers who earned Master’s in Teaching and Science Education from UWRF through the Physics department.

Scott Hertting is a Physics teacher at Neenah High School in Neenah, WI, and an active member of the Phox Valley Share Group, a collection of physics teachers in the Fox Valley area, who gather to share ideas and support each other.

Peter Bohacek teaches Physics at Henry Sibley High School in Mendota Heights, MN. He recently founded and works with UWRF’s Matt Vonk on the Direct Measurement Video project (serc.carleton.edu/dmvideos/index.html).