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Summer Experience Gives Students a Chance to Research Along With Faculty

Winthrop University

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Quick Facts

- Students in this year's Summer Undergraduate Research Experience worked on numerous projects, including helping to cure Alzheimer's disease, learning about human heart development through interaction with sea squirts, working with chicken embryos to help understand human retinal eye development and testing enzymes in plants to help create biofuels.
- Professors say Winthrop has developed a culture where undergraduate research is a fundamental part of students' academic and professional development."

Mariam Salib is working this summer in the lab of chemistry faculty member Jason Hurlbert to find enzymes that can break down plant material to use as a fuel product.

Egg embryos are used for research in biology faculty member Eric Birgbauer's lab.

ROCK HILL, S.C. – Winthrop University's science majors poked and prodded, measured and calculated their way through a summer that for many will become the hallmark of their college experience.

These summer experiences can pay off handsomely as it did for chemistry majors **Erin White Wilson** and **Matt Wilson**, who as graduate students at Notre Dame were selected this summer to meet in Germany with Nobel Laureates. And for biology major and soccer player Matt Horn, who won one of two coveted NCAA postgraduate scholarships to attend **University of North Carolina's medical school** for a second year.

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Here's what happened, by the numbers:

• More than 40 students worked with 10 chemistry faculty members, four biology and one math professor for up to 10 weeks.
• More than 10 university, state and national grants funded the research, from prestigious agencies such as the National Institutes of Health and the National Science Foundation.
• In the past several years alone, more than $2 million in research instrumentation and instructional equipment has been provided

Seven math students are developing mathematical models of cancer or studying phylogenetics.

thanks to university support and **Winthrop Research Council grants**.

Robin Lammi, associate professor of chemistry and coordinator of the summer program, said Winthrop has had tremendous success in creating an emphasis on undergraduate research. “The best way to learn science is through hands-on experiences,” she said.

Other universities don’t offer the same caliber of opportunities as quickly for science majors as Winthrop does. “Students start as early as the summer after freshman year working in a lab,” Lammi said. “Winthrop engages students in research in longer periods of time, as much as four years, and they gain a depth of understanding greater than their peers at other institutions.”

The goal is for each student to work toward becoming more of an independent scientist, to develop critical thinking skills and to become less of a follower, Lammi said.

What are the results?

The results speak for themselves.

• Since fall 2006, 48 Winthrop students have entered Ph.D. programs, meaning more Ph.D.s have been earned in chemistry and biochemistry in the last decade than in all of the years before, between 1920-2000. Another 22 students were accepted in a professional school such as medical, dental, pharmacy or veterinary program.
• Another 20 former Winthrop Summer Undergraduate Students have completed master's degrees in chemistry, biology, public health, forensics, computer science, genetics or biomedical science.
• Another 25 former SURE students work in industry at positions, such as working as a production engineer with Facebook, a science blog writer for Scientific American and as an environmental specialist with Daimer Industries.
• Another 15 former SURE work in government or university research positions. One graduate works for the Center for Disease Control Center for Environmental Health, while others work as a forensic specialist, biotech research associate, research technician, high school chemistry teachers or as a sickle cell lab technician.

What about math, an emerging and rapidly growing academic area?

Since 2010, Winthrop math professors also have inspired their majors to spend summers on campus at an internally supported summer **"Research Experience in Mathematics" program**. A total of 25 students have participated to date.

Among them was **Patrick Dukes**, now a Ph.D. student at Clemson, who was on a two-man team that placed second in Microsoft’s international “Imagine Cup” for developing a stroke rehabilitation application that works using gestures and spoken commands.

This summer, all seven students doing research in the math department were supported by federal funding. They worked on:

• Four participated in the Winthrop's **National Research Experience in Mathematics Program**, whose aim is to increase the number of underrepresented minority students seeking graduate degrees. They developed **mathematical models of cancer** to help explain how certain types of cancer respond to various therapies. All four students focused on types of cancer that are slow growing, and they each chose a different treatment option. If additional steps were taken to calibrate their models to a particular drug and patient, the models could help predict which dosage of the drug would be most beneficial.
• Three other mathematics students developed cancer models and studied **phylogenetics**, or the science of understanding relationships among different species. This can be important when trying to understand the history of life on earth, or to monitor rapidly developing organisms such as HIV. The students this summer were developing techniques which would speed up the process of reconstructing these relationships, and make the relationships predicted more reliable.

Says Joe Rusinko, associate professor of mathematics and the math department organizer for the summer program: “Winthrop has developed a culture where undergraduate research is a fundamental part of students' academic and professional development.”

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