

STUDENTS

UNDERGRADUATE STUDENT RESEARCH

A Marquette education challenges students to explore and innovate. And that means that undergraduates don't just read about research in the library — they jump into labs and get their hands dirty. Working side by side with faculty mentors, they advance their fields while getting critical experience. Then they take that knowledge into the world, presenting on campus and at professional and academic conferences across the nation.

Brian Kaster has conducted so much research over the past four years he can hardly keep it straight.

First there was the radio astronomy study. Next came the high-altitude balloon project, the functional magnetic resonance imaging study, the magnetic nanowire research. In between, there were conferences and poster sessions.

Such is the life of a 22-year-old senior physics major at Marquette. But even at a university ripe with research opportunities for undergraduates, Kaster's story is a little unusual. He started participating in research as a freshman, working under Christopher Stockdale, Ph.D., an associate professor of physics.

"What we were doing was looking at the supernova, the death of a massive star, and seeing how it progressed through time," says Kaster, who got a grant from the Wisconsin Space Grant Consortium for the project. "Then we used the information about how the signals change over time to get an idea of what the star looked like and what it was made up of before it exploded."

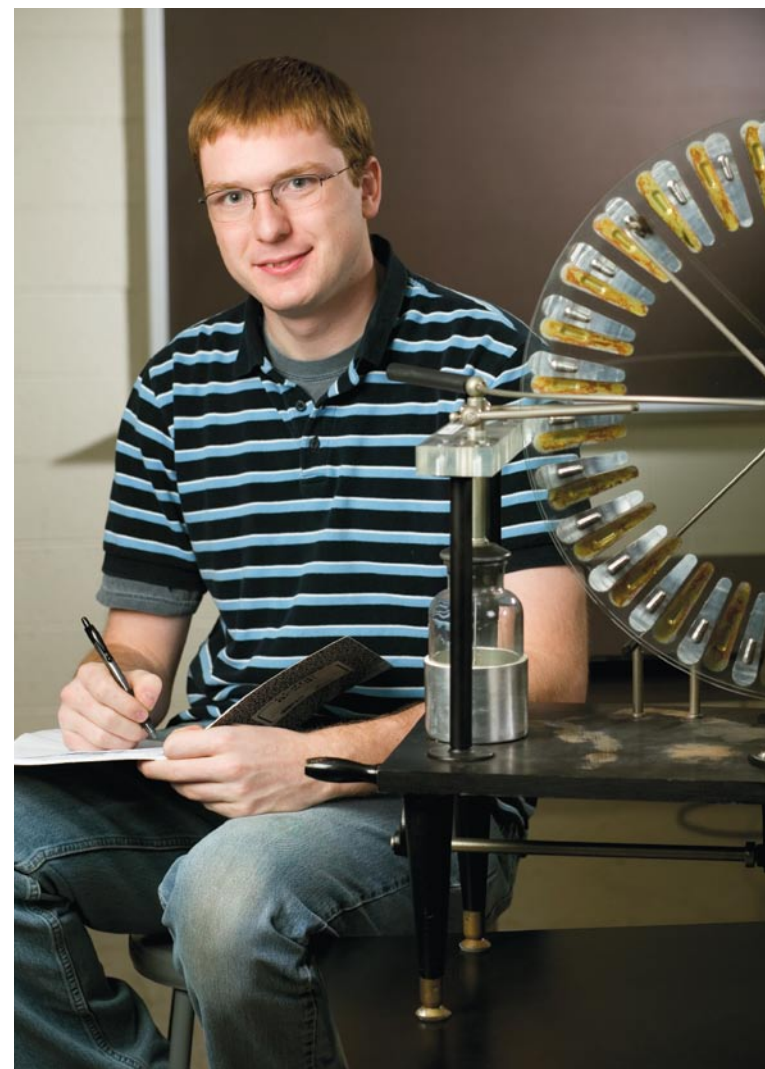
Using radio wave information from giant satellite dishes in New Mexico, Kaster converted the raw data into computer images.

He later spent a summer at the Medical College of Wisconsin, where he wrote and ran computer simulations of neurons in the brain, a project he's continuing. That study's goal is to glean more useful information from fMRIs. MRIs give two pieces of information: How strong the magnetic field is, and what direction the magnetic field is pointing. Doctors usually only pay attention to the field's strength, which is much more precise, he says.

"What I'm trying to do is take that other data and get some sort of information out of it," Kaster says. "Because the majority of people just ignore that part of the data, there's a lot of room for growth."

He hopes his research experience gives him a head start in graduate school.

"It's taught me a lot," says Kaster, an aspiring professor. "You can get a lot from class, but with research, you learn from experience, you run into roadblocks and learn how to overcome them."



Heather Seubert knows the power of music.

As a sophomore, she started working with Jill Winters, Ph.D., R.N., associate professor of nursing, on a three-year study that examined how music affects heart rate after a heart attack. The experience inspired her to pursue a career as an advanced nurse practitioner.

"Research planted the seed of curiosity," she says.

Working in four different hospitals, the research team played low-rhythm music for patients recently treated for coronary thrombosis and then monitored the patients' heart rates. Seubert helped analyze the data, looking for patterns.

"Everyone knows that nurses provide care," says Seubert, "but the research helped me understand why we perform certain practices over others."

In the ever-changing medical field, there is a growing emphasis on evidence-based nursing practice. Seubert incorporates her research findings into her everyday work in the cardiac unit at Waukesha Memorial Hospital and the intensive care unit at St. Joseph's Hospital in Milwaukee.

When patients are anxious and tense, Seubert will limit activity in the room to reduce a rapid heart rate.

"I close the door, dim the lights, and offer to play music," she says. "The results are definitely there."

For a second study, Seubert worked with patients suffering from congestive heart failure who were treated with exercise therapy. Many of the subjects could not lift a basket of laundry or push a vacuum cleaner. After an increased exercise routine, patients could do more.

Working with patients' exercise habits stresses the education component in nursing. Seubert helps patients assess how to make individual lifestyle changes in order to stay healthy. This includes meeting the social, psychological and physical needs of each patient.

"Nursing is care for the whole patient, not just the disease," she says. "As a nurse, you have to take time out to make that one-on-one connection."



Anthropology major **Andrew Ozga** spent his senior year in the basement of Lalumiere Hall, sorting through boxes of human skeletal remains and looking for clues to the past. Who were these people? How did they live? How did they die?

It started when he took a class from Norman Sullivan, Ph.D., an anthropology professor. For years, Sullivan has studied the remains of a 19th-century Milwaukee County almshouse cemetery, which is the largest skeletal collection ever exhumed in North America.

"That really sparked my interest," Ozga says. "I worked in the bone lab, and it just clicked right away. I could see myself going on and doing something in this field for the first time."

As part of class, students studied the bones, taking measurements and noting other features such as sutures, gun shot wounds and broken bones that never healed.

Ozga got so into it that he started coming in outside of class. Classmates Ben White and Tara Cepon joined him. The trio already co-authored a paper for a bioarcheology conference, and they'll present at three more conferences this year. Ozga and White are also organizing a symposium on demography for the Central States Anthropology Society conference.

Next, they'll do an inventory of all the grave goods found in the collection. Artifacts include engraved rings, rosaries, buttons and shoes.

"Seeing those kind of puts a face with the bones," Ozga says. "It's kind of like traveling back in time."

The almshouse collection also inspired his senior thesis. He's focusing on a condition called diffuse idiopathic skeletal hyperostosis, which is a form of arthritis.

"It's an ossification of some of the ligaments in the spine, and it causes, at times, four or five vertebrae to fuse together," he explains. "It's really present in this population because of all the manual labor that people did."

Ozga is grateful for the research experience, especially since he's bound for graduate school.

"Working under Dr. Sullivan made me like this field even more," he says. "And the research aspect of it has made grad school that much more accessible."