

Undergraduate Research...Paid Forward

Undergraduate research has long played an important role in shaping the careers of our students. Through the rubric of inquiry, observation, hypothesis testing, analysis and synthesis, the UD biology student not only energizes their field of study, but also lays the groundwork for lifelong learning and fulfillment in any number of careers. Our alumni have often attributed their career achievements

to the educational rigor of our course of study, the integral role played by faculty and advisors and the opportunities to conduct important and acclaimed lab and field research. In turn, these alumni have shown their gratitude for their UD experience by generously sharing their time and energy and resources to make the next generation of UD biology students as successful as possible.

Lancaster-McDougall Undergraduate Biological Research Award Fosters Undergraduate Research

Dr. Wayne Lancaster, a UD alumnus, and his wife, Dr. Lucy Grégoire, recently established a grant fund to support undergraduate biological research at the University of Dayton.

The Lancaster-McDougall Undergraduate Biological Research Award was developed in early 2010 to award academically talented students in the biology program with summer research grants. Two grants will be given annually through a competitive award process. The award program is funded by Dr. Wayne Lancaster, who graduated from UD in 1969 with a Master of Science in biology, and his wife, Dr. Lucy Grégoire. The award is also named after the late Dr. Kenneth McDougall, Lancaster's masters' thesis advisor and mentor in the biology department.

During Lancaster's time at UD, Dr. McDougall inspired Lancaster to further his career and research in the field of biology. After receiving a Ph.D., Lancaster made significant contributions to the discovery that the human papillomavirus (HPV) causes cancer. This research led to seven patents, HPV diagnostics, and laid the groundwork for development



Jane Neiheisel



Michaela Minichello

of the world's first cancer vaccine. Lancaster and Grégoire established the award to provide research opportunities for students and to motivate current undergraduates the way McDougall inspired Lancaster.

For the first recipients of the grant, Jane Neiheisel and Michaela Minichello, the funding allowed them to stay in

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The "two R's" of the UD biology experience: Research and Relationships

Each year, stories about successful professionals make their way back to our classrooms and labs: stories that highlight the rich tradition of research in our department and stories of the rich relationships these professionals—then students—formed and enjoyed with faculty and other students in their time here on campus. These are a handful of these great stories.

Ben Kolber, Ph.D.

Since graduating from UD in 2003 with bachelors' degrees in biology and psychology, Ben Kolber earned a doctorate in neuroscience from Washington University in St. Louis. He



Ben Kolber, Ph.D.

is now a post-doctoral research fellow at Washington University. Though Kolber has moved on from Dayton, he considers UD an integral part of his career formation. Both in and out of the classroom, Kolber found the biology department to be influential in his life experiences.

"I found all of the biology professors at UD to be incredibly accessible. Whether it was in-class questions or out of class problems, I was never turned away by anyone in the department," he said. "Kelly Williams was always interested in my experiences and offered honest and thoughtful advice when I began thinking about a career in the biomedical sciences. Carissa Krane provided me with an incredible opportunity to learn both the basic and advanced laboratory skills that I would later need to be successful in a

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Biology undergraduates present research at national undergraduate event

Two biology students made history last April when they presented their research at the Posters on the Hill, the first time UD has been represented at this prestigious event, hosted by the Council on Undergraduate Research (CUR).

Then-senior Elizabeth Gazdick and sophomore Allison Gansel were two of the 75 undergraduates chosen to attend Posters on the Hill, a annual event in Washington, D.C. where students present research at poster sessions to prominent members of the community. The event, held by the CUR, aims to promote outstanding work by students that also shows a collaborative effort with their faculty adviser and importance to society.

Gazdick and Gansel worked with biology professor Dr. Eric Benbow on ecological research about Buruli ulcer, a disease contracted in at least 33 countries and that creates debilitating lesions and ulcers of the skin of its victims. Gazdick and Benbow traveled to Ghana, Africa for research in the summer of 2009, and Gansel joined them in their studies at the beginning of the 2009-10 school year. Benbow heard about Posters on the Hill early in 2010 and encouraged the pair to apply. They submitted an abstract application and found out soon after that they were accepted.

"It was a pretty competitive process," Gansel said. "We were really excited that we got chosen."

At the poster session in April, the students were able to meet and present to important members of the federal government, such as Ohio Sen. George Voinovich and Rep. Dennis Kucinich, and the director of the National Science Foundation. Gansel doesn't think any of this could have happened without the undergraduate opportunities she was given at UD.

"Dayton is perfect in the opportunity to do undergraduate



Allison Gansel and Elizabeth Gazdick in front of the White House

research," Gansel said. "In addition to the classroom setting, being able to go into the lab is a whole different level of research and hands-on [activity]. It's awesome because nowadays you need this experience to get into grad school."

Benbow believes that Gazdick and Gansel's research will give them an edge as they further their careers. Gazdick is now working as a microbiologist and is earning a master's in global health and international affairs at Case Western University.

"They get skills and interactions with faculty and graduate students that they can't just get in the classroom," Benbow said. "Experiential learning is the bottom line ... and it will align students well for experiences like this."

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Dayton over the summer to further their research.

"I originally wasn't getting paid for this research," Neiheisel, a pre-medicine major, said. "It really helped me devote my time."

Neiheisel is working in Dr. Madhuri Kango-Singh's lab, studying molecular genetics and cancer development. She began her research last February and expected it to continue throughout the fall 2010 semester. Minichello, a biology major, has worked in Dr. Amit Singh's lab since November 2009. She planned to conclude her research on eye development with fruit flies by the end of 2010.

Neiheisel and Minichello's work will be published in individual theses for the UD Honors Program and in peer-reviewed journals. They will both also present their research at the UD Stander Symposium and the Honors Symposium. Minichello was also granted a Learn, Lead, and Serve award and a Fight for Sight Summer Student Fellowship.

Both Neiheisel and Minichello's research advisees nominated them for the award, and the students were notified during

early summer that they had been chosen to receive grants.

"I was very excited and relieved," Minichello said. "I had a lot of work to get done and was very excited to be able to focus on that."

Thank you for your gifts!

Many of the experiences we are able to offer our students are possible only because of the generosity of those who have made donations designated to the Department of Biology. If you would like to designate your future donations to the University directly to the biology department, you may donate online at the University's alumni site (<http://www.udayton.edu/Alumni/>). Select "a special designation" in the designation box and type in "Donation to the Biology Department" in the comments section and your gift will reach us.

The “two R’s” of the UD biology experience continued from page 1

research career. Her passion for undergraduate research has continued to influence me today as I have had the opportunity to mentor undergraduates.”

During his time in St. Louis, Kolber’s work has focused on the endocrine system, stress and psychiatric illness. Kolber and his colleagues have published their work in a variety of research journals. He hopes to continue his biomedical research after completing his post doctoral-work and teach at a small university, specializing in endocrinology, stress and neuroscience.

“UD was an incredible place to learn and grow up,” Kolber said. “One of the most important aspects to this experience that has continued to resonate with me is the breadth of knowledge that I was exposed to at UD. Whether it involved non-science classes in the humanities, service in the community or immersion trips abroad, the broad range of experiences and areas that I encountered at UD has allowed me to maintain a balanced perspective on my own work and the world around me.”

Chelsea Korfel

While at UD, Chelsea Korfel caught the Marianist spirit and has integrated it into her life ever since.

Since graduating in 2006 with bachelors’ degrees in environmental biology and environmental geology, Korfel has moved on to The Ohio State University. She received a master’s from OSU in natural resources in 2007 and is now working on a doctorate in evolution, ecology and organismal biology. Though she has physically left UD, she strives to embody the character she found during her undergraduate years.



Chelsea Korfel

“I saw the Marianist spirit as an influence in the way my professors taught and interacted with students,” Korfel said. “Since I left UD, I’ve realized that the biology department there has a really unique and amazing group of scientists who aren’t afraid to let their religion guide them in the classroom. I am grateful for the balance of nurture and pushing me to my limits that these professors provided, and wouldn’t be in graduate school today without it.”

Korfel became a lay Marianist before leaving UD and hopes that commitment will continue to guide her in the future. At OSU, she is currently researching a critically endangered species of harlequin frog and the high altitude dynamics of *chytridiomycosis*, a fungal disease that is suspected to have impacted amphibian populations worldwide. Some of Korfel’s research has been done in Ecuador, where she worked with Marianist brother Giovanni Onore. Korfel met Onore through Dr. Kelly Williams, a UD biology department professor. Korfel also joined Williams in March 2010 to lead a Spring Breakout trip, which provides UD students an opportunity to engage in community service.

“I met up with the group, and enjoyed a day of interacting with the students,” she said. “I think it is amazing, and unique to UD, that a professor would continue to take interest in me and be willing to help my research project succeed even after I have graduated.”

Kaitlin Moredock

A current student at the University of Notre Dame Law School, Kaitlin Moredock thinks her scientific background has helped her succeed in her postgraduate career. Moredock graduated from the University of Dayton in 2008 with Bachelor of Science degrees in biology and psychology.



Kaitlin Moredock

Some of the lessons she learned at UD were instrumental in guiding her choice to go on to law school.

“My research in the biology department required that I think about a number of possible outcomes and test my hypotheses in a systematic way,” Moredock said. “The idea that permeated UD that your career is your vocation rather than just a job has resonated with me and guided my career choices.”

While at Notre Dame, she has been named Executive Managing Editor of the Notre Dame Law Review, and has been published in the review. She also worked as an associate at a Cincinnati law firm last summer.

Moredock said that her undergraduate studies in the science field have helped her in criminal cases to understand evidence, such as autopsy reports. She also gives credit for her success to professors in the biology department. Moredock completed her honors thesis under the direction of Dr. Carissa Krane.

“So many of the biology [faculty] made my time at UD enjoyable and helped me figure out what I was called to do,” she said. “It was evident that these professors cared about the students as people and wanted us to succeed. That type of learning environment was so beneficial and gave me the confidence that I needed in order to achieve my goals.”

Shannon Mueller

The field of biology is one that offers many different career paths, including a few that many people would not expect. For Shannon (Stewart) Mueller, a 2007 UD graduate, her success at a Dayton-area engineering firm has proven how diverse careers are available to biologists.



Shannon Mueller

Mueller graduated with a bachelor’s in biology with a concentration in environmental biology. Since then, she has worked at LJB, Inc., a Kettering, OH-based engineering and environmental consulting firm. There, she is one of two biologists employed and some of her responsibilities include stream monitoring, wetland delineations, stream and wetland mitigations and Ohio Department of Transportation ecological surveys.

“I find my job challenging and a good balance between helping to educate my clients and the public about the importance of natural resources, particularly wetlands and streams,” Mueller said.

Mueller first discovered her love for ecology at UD, working with professors in the biology department. While an undergraduate, she worked in the field with Bro. Don Geiger at Greene County Park District to create a habitat management

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The “two R’s” of the UD biology experience

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and restoration plan, which encouraged her to continue to pursue a career path in the ecology field. Dr. Kelly Williams inspired Mueller through his passion for the subject of ecology.

“Dr. Geiger and Dr. Williams really taught me how to apply the things learned in the classroom to the field,” she said. “It is incredibly interesting to me to try to understand the study of the relationships between living organisms and their interactions with their natural and developing environment.”

Mark Rastetter, M.D.

For alumnus Dr. Mark Rastetter, UD’s mantra of “Learn, Lead, Serve” has followed him beyond the university and has become an integral part of his life.



Mark Rastetter, M.D.

Rastetter, who graduated from UD in 2002 with dual degrees in biology and religious studies, received his medical degree from Loyola University Chicago in 2006. While in medical school, he became involved with Physicians for Human Rights and began clinical work with underserved populations. Since finishing his residency in Family Medicine in 2009, Rastetter is now completing a fellowship that combines additional training in obstetrics and pediatric care. This fellowship allows Rastetter to continue to help the marginalized and poor, something he found a desire to do while still in Dayton.

“As a student at UD and then at Loyola University Chicago Stritch School of Medicine, I sought the type of education that would allow me to lead and serve effectively. The education model that I experienced as a biology and religious studies major at UD, I feel pushes students to work hard and focus, but allows it to happen within a supportive community of students, faculty and staff,” he said.

Rastetter has also dedicated his time and skills through medical relief work in communities in Africa, South and Central America and the Caribbean. Most recently, he worked in Malawi, Africa in March 2010 to help serve the mother and child population of the area. In January 2010 he traveled to Haiti, to assist victims of the 2009 earthquake.

Rastetter still considers the experiences he had at UD as an undergraduate to be defining moments in his career, and named Carissa Krane as a key mentor.

“I remember not only extensive discussions about my research projects, but also about ethics, human rights and becoming a physician,” he said. Besides undertaking his fellowship and work abroad, Rastetter is also a clinical instructor in the family medicine department at Northwestern University, a position that also furthers his vocation to assist the impoverished.

Read more about these alumni in the Alumni section at <http://biology.udayton.edu>.

Biology department lecturer wears many hats at UD

Dr. Jeff Kavanaugh has been interested in biology and ecology ever since he was a kid. Now, as a member of the leadership team for the Rivers Institute, the University of Dayton’s Vivarium director and a lecturer and researcher in the biology department, he seems to be living his childhood dream.

Kavanaugh, who earned his Ph.D. in biology from Virginia Tech, has taught eight different lectures and laboratories since arriving at UD in 2000, ranging from Ecology and Comparative Anatomy to entry-level biology for both majors and non-majors.

While not in the classroom, Kavanaugh can often be found in the field with his student teams monitoring the quality of local streams and wetlands and testing restoration methods for industry and park district clients. His broad experience has helped him collaborate with faculty and students on up-and-coming projects at UD.

Last summer, Kavanaugh helped put the finishing touches on an innovative new course at UD that helps students understand the environmental impacts of today’s society in the Dayton area. He began developing the course, which is comprehensive and will take three semesters to complete, in



Jeff Kavanaugh, Ph.D.

fall 2009 with other Rivers Institute leadership team members. The team is comprised of other faculty members, community partners and student River Stewards. The class was offered for the first time during the fall 2010 semester, and can be taken as credits toward the SEE (Sustainability, Energy, Environment) minor.

“The purpose of the course is to give students an understanding of issues that relate to the Great Miami River and its watershed, including the communities that live inside that area,” Kavanaugh said. “We look at the whole system from a multi-disciplinary approach.”

Kavanaugh also serves as the director of UD’s Vivarium, an animal research facility that he and other faculty and staff are working to enhance.

“We are trying to develop the quality of the facility,” he said. “We want to bring it up to the standards of a high-level research institute.”

Though Kavanaugh has many titles and jobs at UD, he says the most rewarding aspect is working with students.

“UD gives you a lot of freedom to pursue your interests and the things you feel are important and by doing that you feel like you’re making a difference,” he said. “The students that you get to work with are really into this stuff, and it’s great to work with students who are as excited about these things as I am. It’s a good place to work.”

University of Dayton named an Ohio Center of Excellence in the field of biomedicine and health care

The state of Ohio has named the University of Dayton as an Ohio Center of Excellence in the field of biomedicine and health care.

The University's Center for Tissue Regeneration and Engineering at Dayton (TREND) received the designation for its focus on understanding how damaged tissues and organs regenerate and how to harness this phenomenon to engineer or regrow new tissues.

"This prestigious honor will make us more visible within the University, around the Dayton region and throughout the state," said Dr. Panagiotis Tsonis, TREND Center director. "It will also provide us more opportunities to collaborate with others."

Established in 2006, the TREND Center currently has more than 20 researchers participating from six academic departments and the University of Dayton Research Institute. Center investigators maintain over \$4.5 million in research contracts and grants, and have compiled more than 500 peer-reviewed articles. Engaging students is a top priority among TREND faculty, with more than 40 students working on the center's research projects during the 2009-2010 academic year.

TREND also cultivates interactions with prominent scientists in the field and has external partners from several other academic institutions, government laboratories, nonprofit organizations, industry and clinical practice. The Ohio Board of Regents identifies TREND as an important economic asset because of its industry and clinical connections, which include hospitals, tissue bank, and medical device manufacturers.

TREND research is driven by available expertise, the current needs of sponsors, and the future needs of society. For example, lens and limb regeneration research is being

conducted by TREND Center Director Dr. Panagiotis Tsonis who has made significant strides through many years of research funded by the National Institutes of Health. Tsonis and his research team were the first to manipulate key genes in the ventral iris of a salamander to regenerate a new lens, which could dramatically reduce the need for cataract procedures. Dr. Amit Singh was also recently funded by the National Institutes of Health for his research on the genetic basis for pediatric blindness, retinal diseases and other eye defects.

In addition to traditional biomedical research, the TREND has adopted a novel approach to challenges by embracing bioengineering team research. By blurring the lines between disciplines and departments, team research has enabled significant advances. For example, Dr. Tsonis has teamed with UD's Wright Brothers Institute Endowed Chair in Nanomaterials Khalid Lafdi to examine the suitability of several novel synthetic materials for bone, tendon and cartilage replacement and their impact on tissue repair.

Another TREND interdisciplinary team is led by Dr. Carissa Krane and includes several undergraduates from the disciplines of engineering and mathematics. This research is providing critical information to an industry partner for surgical device development. This team is also addressing central questions in cardiovascular systems research.

Professor John Rowe has assembled a team of experts from several fields to examine the effects of synthetic nanomaterials on human health and the environment. Funded by the National Science Foundation and partnering with the U.S. Air Force Research Laboratory and the U.S. Environmental Protection Agency, Rowe's team has developed screening assays that are faster, less expensive, and more comprehensive than the evaluation methods currently in use.

TREND's world class talent, a strong network of regional partners, extensive resources and student engagement have all combined to attract the attention of the state of Ohio and led to this Center of Excellence designation. UD looks forward to continued success and more exciting research breakthroughs as TREND continues to grow.

New master's in bioengineering now offered

A new Master of Science in Bioengineering is now being offered at UD, helping to fill the need for bioengineers that can approach technical problems from both science and engineering disciplines.

The Bioengineering Program is housed within the Department of Chemical and Materials Engineering, but is a cooperative effort between the School of Engineering and the College of Arts and Sciences.

The idea of a master's degree in bioengineering was first brought up by Dr. Tony Saliba, Dean of the School of Engineering. Dr. Robert Wilkens, a chemical engineering professor and director of the program, and Dr. Carissa Krane of the biology department worked off that idea to produce courses that would establish a well-rounded curriculum. Dr. Don Comfort, of the chemical engineering department, also

helped review the program's proposal in order to get it off the ground.

"The intersection of biology and engineering represents an area rich with possibilities," said Dr. Jayne Robinson, Chair of the Department of Biology. "Students who complete the program will be able to address important needs such as development of better prostheses or scaffolds for tissue regeneration."

The program, which takes 30 credit hours to complete, began during the fall 2010 semester. Students choose one of four concentrations for their degree based on their specific interests: biomaterials and biomechanics, bioprocess, biosystems or biosignal processing. All students must take four core courses in addition to electives, which are decided based on their concentration.

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There are currently eight students enrolled in the program and they entered UD's graduate school with a variety of undergraduate degrees, ranging from chemical engineering to biomedicine.

"There's a mix of backgrounds," Dr. Wilkens said. "Our hope is to meet the needs of students with varied educational experiences."

The program aims to help students create coursework based on knowledge developed in their undergraduate years. For example, students coming in with only biology experience will take classes that will focus more on engineering in order to give them a well-rounded education.

Joelle Baddour, one of the first students in the bioengineering program, graduated from UD last May with a bachelor's degree in chemical engineering. She is now studying in the lab of Dr. Panagiotis Tsonis, the director of the TREND (Center for Tissue Regeneration and Engineering at Dayton) and combining her love for both engineering and biology in one degree.

"One of the main points I was interested in was taking the principles I learned in chemical engineering and applying them to biological systems," Baddour said.

Wilkens hopes that in the near future, the program will continue to expand and bring in a diverse group of students.

"My hope is that employers come to appreciate students that have been through this program and all the skills they bring with them," Wilkens said. "And that the program keeps attracting good quality students."

For students who would like to learn more about UD's bioengineering program, contact Dr. Wilkens at wilkens@udayton.edu.

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Faculty and Staff Highlights

- Dr. Eric Benbow and collaborators received an award from the National Institute of Justice to examine the development and validation of standard operating procedures for measuring microbial populations for estimating a postmortem interval. Benbow was also awarded funding from the City of Dayton to conduct storm water monitoring. Additionally, the Hamilton County Park District provided funding to Benbow and collaborators to perform a temporal assessment of invertebrate structure and function within vernal pools of Southwestern Ohio.
- Dr. Madhuri Kango-Singh's Advance Workshop: Success in the Tenure-Track and work-life balance was funded by a Leader Consortium/ NSF Advance grant.
- Dr. Carissa Krane (BIO) and Dr. Margaret Pinnell (MAE) were awarded a contract from Ethicon-Endosurgery to assess the effect of device geometry and load. Temptime Corporation funded Krane and Dr. Doug Hansen (CME, UDRI) to study ice nucleating protein isolation and characterization. Additionally, Krane, Pinnell and Dr. Diestelkamp (MTH) received a grant from the LEADER Consortium/NSF ADVANCE Program to assess the viscoelastic properties of porcine arteries.
- Dr. John Rowe received funding from the Air Force Research Laboratory to examine biological interactions of manufactured nanomaterials.
- Dr. Amit Singh was awarded funding from the NIH to study the genetic control of axial patterning in *Drosophila* eye. He also received a grant from the Ohio Cancer Research Associates to examine the role of the Notch ligand Serrate (Jagged-1) in growth and cancer using a *Drosophila* model.

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