The biology department is stronger than ever with the hiring of three new tenure track faculty and a new program coordinator. Through the generous support of Paul Benson, Dean of the College of Arts and Sciences, and the university, two of the new faculty are housed in a recently renovated research laboratory. These additions have led to new courses, increased research collaborations and grant productivity and a revitalization of undergraduate and graduate programs.

**Hansen: From researcher to professor**

Although Dr. Karolyn Hansen may seem like a new face to the University of Dayton, she has worked at the University of Dayton Research Institute (UDRI) for several years and has now decided to move her biosensor research to the biology department.

Hansen, who received her Ph.D. in marine biology and chemistry, first began working at UD after her husband was hired as a research scientist at UDRI. Initially Hansen wrote proposals to fund biomaterials research at UDRI, and then was hired as a senior research scientist, where she studied biomaterials and continued biosensor development, the focus of her previous position at Oak Ridge National Lab. After meeting and interacting with the biology department faculty, Hansen began to think there may be another place on the UD campus for which she would be better suited.

“There are very few biologists in UDRI,” Hansen said. “In the biology department, there is more interaction with faculty and students...and teaching is something I’ve always wanted to do.”

Hansen has now joined the biology faculty as an assistant professor, and is teaching introductory biology for science majors. She plans to develop advanced classes incorporating biosensor design concepts.

One research area Hansen is currently studying is using biosensors to examine exhaled breath.

“Breath sensing is a big frontier with a variety of potential applications,” Hansen said. “It has application in the areas of, for example, homeland security and medical diagnoses.”

Hansen added that breath sensing could also be used to evaluate physiological status, such as fatigue or stress levels.

Although Hansen’s new career is very similar to her former job at UDRI, the addition of the teaching aspect has made the switch well worth it.

“My ideal job has always been to teach at a small college and still be able to do my research,” Hansen said. “I’m very interested in working with students in the lab – that’s the...”

**Biology student works to further research in Africa**

UD’s Lead, Learn, Serve grant is awarded to students who want to pursue research related to their academic field that will also benefit the community around them. But no one had ever taken the idea of “community” as far as Elizabeth Gazdick did.

Gazdick spent two weeks of August in Ghana, testing the water in different areas of the country to see how certain disease pathogens are spread. She was awarded the first international Lead, Learn, Serve grant from UD, which helped fund her research.

“I was really apprehensive to go to Africa because of how radically different everything is there,” Gazdick said. “But it was enjoyable being immersed in such a culture and learning more about the way of life.”

Gazdick’s study focused on how humans contract the disease Buruli ulcer. This infectious disease, which is prominent in Ghana and affects mostly children, causes lesions and eventually ulcers on the skin. It is rarely fatal, but leaves the victim with deforming scars and impaired mobility. The disease is caused by a bacterium and while the route of transmission is still unknown, it is supposed that the...
Krane’s unique educating style garners her teaching award

Carissa Krane is unconventional. As an associate professor of biology, she likes to demonstrate biological events with her body, or by using different voice inflections – anything to pique the interest of her students and engage them in the class’s subject matter.

“It has to be fun,” she said. “Something to get them actually involved… content is important, but it’s only 50 percent of the equation. They have to think about the questions and know more than just the content.”

Although Krane ensures her physiology students have enough subject matter to prepare them for their future jobs or education after graduation, she likes to make her classes as interactive and dynamic as possible. She encourages students to ask questions to the entire class and to work together to find the answer.

“I try to know something about all my students,” Krane said. “I can tailor physiological examples, analogies and real life scenarios to their interests.”

Krane’s unique teaching skills helped her win the College of Arts and Sciences’ 2008 Faculty Award for Outstanding Teaching. In her eight year career at UD, “Dr. Krane has distinguished herself as an exceptional communicator, a gifted teacher, and a wonderful role model for both undergraduate and graduate students,” stated the award citation.

Krane dedicates herself to teaching students not only in the classroom but also in the research laboratory, where she has served as a research advisor to over 25 undergraduates since 2001.

“In science,” Krane said, “mentoring undergraduate students in a laboratory setting is like an apprenticeship. The lab is where you’re working elbow-to-elbow with students training them in their discipline. It goes far beyond prescribed textbook examples, and gives students an opportunity to develop their analytical and critical thinking skills.”

“I want students to learn to think about solving problems, not just memorizing them,” Krane said. “Now that they understand, can they apply it? That’s what is important.”

New tree trail provides opportunity to experience nature at UD

You don’t have to go too far to experience nature on the UD campus.

Over the past year, a tree trail has been developed around campus to let students, faculty and other community members experience the natural beauty of UD and to educate them on their surroundings.

Nolan Nicaise, a junior biology major, began brainstorming with Dr. Ryan McEwan at the beginning of last school year about a community service project they could undertake. They came up with several ideas, including a community garden, before deciding on a tree trail.

“I proposed several things for Nolan to work on, when we started discussing the nice collection of trees on campus,” McEwan said. “It was a meeting of minds.”

Nicaise and McEwan’s project was funded through a Learn, Lead, Serve grant from the College of Arts and Sciences. This award is given to students who undertake service projects that enhance the student’s academic education and help the community. The award helped to finance the identification cards placed in front of the trees and the printing of brochures and maps.

Nicaise decided to form the tree trail in an easily navigable loop around campus, and utilized trees that were already planted, as opposed to planting new ones.

Nicaise walked around campus with Roger Banks, the associate director of grounds for UD, who helped Nicaise to identify many of the trees. There are 20 total trees on the trail, with 19 different tree species.

An inaugural tour was given April 24, Arbor Day. Although this was the only official tour given, UD community members can take a self-guided tour around the campus, and the tree tour map is easily obtainable.

“As of July, when you print off an official UD map [off the UD website], a tree trail map downloads with it,” Nicaise said. “That’s been one of the most exciting things.”
payback...I’ve had wonderful mentors in my career and the investment in training students is worth it in the long run.”

**Kango-Singh brings world experience to UD**

Both literally and figuratively, Dr. Madhuri Kango-Singh has come a long way from her native home of India to her position as an assistant professor in the biology department at the University of Dayton.

Kango-Singh is from Ujjain, a small town in central India and always had a strong interest in biology. After receiving her Ph.D. in molecular genetics, Kango-Singh decided to look outside of India to do her postdoctoral research, and began work at the Institute of Molecular Biology in Taipei, Taiwan.

At the Institute of Molecular Biology, Kango-Singh began research on growth rates and the developmental signaling in flies to understand normally how cells respond to extracellular signals, as these changes are linked to the development and spread of cancer. After three years, she traded Taiwan for Texas, and worked at the University of Texas MD Anderson Cancer Center in Houston. There, she continued working with flies, researching the advancement of cancerous tumors.

Kango-Singh first became an instructor at the University of Texas, and also taught at Mercer University in Macon, Ga. before joining the faculty at UD.

Kango-Singh’s husband, Amit Singh, is also a biology professor at UD, which was one reason for her to join the staff. She also likes the characteristics of the university and how the department is run.

“It’s a mid-size university very close to the greater Dayton community, it has a top-notch research institute and in addition has graduate and undergraduate researchers,” Kango-Singh said.

Kango-Singh currently teaches General Genetics, and plans to develop several upper-level courses, particularly ones centered on cancer biology and genetics.

While at UD, Kango-Singh continues the work she began abroad and has worked on since her move to the United States.

“‘We are working on understanding how cancer spreads and the reasons why tumors metastasize,” Kango-Singh said. “That is our long-term goal.’

**Undergraduate research experience leads to scientific career**

As an undergraduate student at Eastern Michigan University, Dr. Thomas Williams was not planning to enter the research field. But after conducting his first laboratory experiment Williams knew he had to reconsider.

“After the completion of my first experiment, I knew it was time to change career paths,” Williams said. “I could not get over the realization that I now knew something that I did not know before the experiment was performed. At that moment there was no turning back for me.”

Williams then exchanged plans to attend medical school for graduate school. He earned his M.S. and Ph.D. at University of Michigan, where his research examined the role of genes in animal development. Upon graduation, the Michigan native left the state to take a post-doctoral research position in the lab of Dr. Sean Carroll at the University of Wisconsin in Madison. There his research focus shifted to study the evolution of animal development for four and a half years before being offered a position as assistant professor of biology by the University of Dayton.

“I took the job at UD because I was impressed by the commitment to both academics and research,” Williams said.

His research at UD focuses on animal genetics, specifically understanding how genetic differences cause individuals of the same and different species to differ from each other. Williams is currently using fruit fly species as genetic, developmental, and evolutionary model organisms.

In addition to getting acclimated to his new surroundings and research, Williams has something else to adapt to: being a first-time professor.

He is teaching General Genetics and plans to expand his teaching opportunities in the upcoming semesters.

“It’s a challenging course, but it’s going well,” Williams said. “It’s definitely a trial by fire.”

**Biology student works to further research in Africa**

pathogen is spread through water. Gazdick’s research focused on identifying the conditions in which the bacterium thrives.

“Her goal was to not only employ her research, but to educate locals about the disease and how important water reservoirs were to understanding the disease,” said Dr. Eric Benbow, UD biology professor and Gazdick’s research advisor, who also traveled to Ghana with Gazdick and five colleagues.

Benbow’s Sustainability, Energy, and the Environment Seed Grant helped fund Gazdick’s studies in his lab, where she examined water reservoirs in the Dayton area to see how they flood and dry out, and how frequently this occurs. Unstable and flood-prone water bodies are suspected to be associated with Buruli ulcer outbreaks in Africa, so Gazdick used methods employed in her research in Dayton to study the ecological conditions important to the disease in Ghana.

Although the analysis of Gazdick’s project is still ongoing, Benbow is optimistic that research will yield promising results. Gazdick will present her research findings at the Ohio Academy of Science in the spring.

“No one really understands how this disease is spread to humans and why outbreaks occur in certain areas,” Benbow said. “Hopefully we can soon better understand how humans get this disease.”
Science class shares knowledge with local children

On Oct. 23 and 24, 2009, SCI 230 students donned animal costumes and picked up lanterns to lead groups of school-age children through the woods on an educational adventure.

Education majors and other non-science majors from Mary Ellen Dillon’s Integrated Natural Science Sequence biology classes completed a service-learning project by volunteering as tour guides at Aullwood Farm’s Enchanted Forest. While some students led groups through the Enchanted Forest, others dressed in full animal costumes and gave presentations on the creatures’ lives to the children and their families as they made their way through the woods.

“With Aullwood, the students get to work with kids and outdoor education,” Dillon said. “It’s important because children don’t have the exposure to nature they used to.”

In an era of television and video games, Aullwood’s Enchanted Forest lets children explore the great outdoors in a unique way. An alternative to “scary Halloween activities,” kids are taken on a trail lit by luminaries, where they meet animals, such as bats, coyotes and snakes. The students who play these animals entertain the children with fun facts and stories about the creatures. Some animals interact with each other, representing predator and prey, such as the monarch butterfly and wolf spider.

“They tell the truth about what is happening between these animals,” Dillon said. “It’s not sugar-coated, but very educational...hundreds of people come out for this, and it’s a great service to the community for our students to be involved in.”

Brother Dan Klco, a Marianist and a science teacher

Brother Daniel Klco has a unique perspective. As a Marianist brother teaching in the biology department, Klco works to portray religion as a partner with science in his courses, not as an enemy.

“In history, science and religion are seen as being in battle,” Klco said. “But you need both. They are different perspectives on the same thing and need to work hand in hand.”

Religion offers meaning that is not included in the realm of science, Klco said. Klco believes aspects of science, such as evolution, cannot be proved or disproved to be the work of a higher power. Although he does not mention religion often in his classes, Klco offers this perspective to show his students that religion does not have to work in opposition to the sciences, and encourages them to think in the same way.

Klco, who has been at UD since 1981 and a lecturer in the biology department since 2001, currently teaches three biology classes for non-science majors and a mini-course on stargazing. But with about a total of 175 students on his roster this semester, he still finds time to add a personal touch to his classes. On the first day of the school year, Klco takes a photo of each of his students in order to connect an image to their name.

“It’s important for me to know them as people,” Klco said. “I can’t imagine my students as just faces.”

About 40 of Dillon’s students participated in the event, and will use the experience to write a service learning paper that will focus on biophilia. Biophilia is the hypothesis that human beings have a predisposition to bond with nature.

“There is an inherent connection between nature and children,” Dillon said. “It’s important for children to bond with nature, and unfortunately this is less and less the norm, and this bond is what we want to foster.”

Brother Dan Klco, S.M.
Lecture presents an integration of science and Marianist mission

As a professor specializing in microbiology, Jayne Robinson may not be a person you would expect to deliver the College of Arts and Science’s Catholic Marianist Education Lecture.

Robinson, chair of the biology department, connected her research to the Marianist mission of the university, discussing her work on bacteria and disease and the impacts they have on the community in a lecture given last April, titled “Passionate Inquiry: The Power of the Good, the Bad and the Infectious.”

Robinson was chosen to present the fifth annual address by Paul Benson, the dean of the College of Arts and Sciences.

“No faculty member from the natural sciences had given the college’s Catholic and Marianist Education Lecture before, so I was looking for a scientist on the faculty who could draw clear and interesting connections between her own research interests and the broader mission of the university,” Benson said. “[Dr. Robinson] has deep interests in her own research as well as wide-ranging interest in the university as a whole.”

As part of her talk Robinson drew parallels between the current swine flu outbreak and previous flu epidemics. She believed the timeliness of her lecture drew an encouraging response.

“I had a very positive reaction from people outside the sciences, which is what I was hoping for,” Robinson said. “I wanted to speak to those who don’t think about the sciences in their everyday life.”

Benson also felt her address interested diverse members of the college.

“She is a clear and creative thinker, so I thought that she would be able to craft a lecture that would engage many of the faculty members in the college,” Benson said. “And she did precisely that.”

New biology courses offered at UD

The Department of Biology has introduced three new courses for the 2009-2010 school year.

Plant Diversity and Ecology was offered in the fall 2009 semester, and was developed and taught by Dr. Ryan McEwan. The class builds on the foundation of the ecology course the department offers, furthering students’ knowledge of environmental biology. In the course’s optional lab, undergraduates learn to identify about 50 native tree species, interact with natural areas managers and learn plant community ecology techniques.

“It’s the only course actively taught that focuses on plants,” McEwan said. “The goal is for students to advance their understanding of ecological concepts, read the landscape and understand plant communities.”

Shirley Wright’s Human Anatomy lecture course will be offered for the first time in spring 2010. It will explore the structure of the human body and prepare students for health professions. After many students voiced concerns about not having an undergraduate human anatomy course offered in the College of Arts and Sciences, Wright contacted several health professional degree programs for input in developing lecture and laboratory courses that would satisfy the human anatomy prerequisite. All programs contacted agreed the courses will be rigorous, so that students are well prepared in professional school.

Wright is developing a non-cadaver based lab for next year where students will work with detailed virtual and anatomical models.

“Adding models to the curriculum will enable students to use their senses, especially tactile and visual, to learn spatial relationships in anatomy,” said Wright. “Allowing students to ‘practice by doing’ results in higher learning and retention rates because learning anatomy is like learning another language.”

Another course offered in the spring, Disease Ecology, is taught by Dr. Eric Benbow and focuses on how and why human diseases emerge from the environment and how humans may be playing a role.

“We will explore the ecological mechanisms that allow for this to happen,” Benbow said, “and how human interaction with the environment affects how these diseases remain or emerge from nature.”

Benbow will provide a conceptual framework for students, who will then explore specific diseases in research papers and share their findings with the class.

“Students should walk away with an understanding of how diseases impact human society, as well as a good diversity of diseases,” Benbow said.

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.

Acknowledgements

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Trainum offers new perspective as biology programs coordinator

The newest biology department support staff member, Sue Trainum is experiencing a big change of pace from her previous job.

Trainum grew up in New York state, majored in math at the State University of New York at Albany and then later relocated to Beavercreek, Ohio.

Before coming to UD, Trainum worked for Electronic Data Systems (EDS), an IT company, for nearly 14 years as a project manager/project analyst and achieved Project Manager Professional certification.

Trainum had wanted to work at a college or university, so she decided to leave the corporate world and began to search for work in higher education. Trainum looked for job openings as far away as Columbus and Cincinnati, but found a new career close to home and has not looked back.

“I really like the family atmosphere,” she said about UD. “I heard people say that once you get here, you don’t leave, and I find that to be true. It’s normal for someone to stay here for 30 years.”

As Biology Programs Coordinator, Trainum performs a wide variety of tasks to support the undergraduate and graduate programs for the department. She helps plan all course schedules, manages biology seminars, processes all personnel contracts, and assists undergraduate and graduate students with advisors, registration issues and orientation to UD, among many other duties.

“I love working with the students,” Trainum said. “It’s totally different from my past job, and it’s rewarding and fulfilling.”

Chair Jayne Robinson agrees that Trainum has been an asset to the department.

“Sue has brought great energy and skill to this very important position,” Robinson said. “We are thrilled to have her in the department.”

Faculty and Staff Highlights

- Karen Bahr was promoted to Senior Administrative Assistant.
- Dr. Karolyn Hansen was awarded a contract with UES, Inc. to focus on the design of a hybrid sensor device for detection of volatile organic compounds in air/vapor samples. Applications include sensing compounds of interest to EPA, DoD, Homeland Security, and in medical diagnostics.
- Dr. Madhuri Kango-Singh received an award from The Knights Templar Eye Foundation Inc, to study Microphthalmia, a genetic disorder in which children are born with small eyes. Kango-Singh will study the fruit fly eye as a model to help shed light on how the generation of adequate number of cells early in development may have a bearing on the proper regulation of size.
- Dr. Bob Kearns was awarded an extension of his research contract with the Iams Co.
- Drs. John Rowe (BIO), James Joo (P.I. - UDRI), Andrew Sarangan (EOP), and Donald Comfort (CME) were awarded an Air Force Research Laboratory contract to develop energy systems for miniature unmanned air vehicles for national defense applications. These systems will face severe size and weight restrictions and likely need to harvest ambient energy (e.g., light, organic matter). This effort will identify potential sustainable energy sources and harvest systems, determine feasibility, and explore the integration of traditional energy systems, new engineered systems and biological-based energy production.
- Dr. Amit Singh was selected for a National Science Foundation project to improve the teaching of genetics in high schools and colleges. Singh will work with Centerville High School biology teacher Stanley M. Hughes to develop a high school genetics curriculum and contribute to a national resource on genetics content and pedagogy.
- Dr. Panagiotis Tsonis received a five-year grant from the NIH to continue his study of the molecular mechanisms of lens regeneration and induction.