When geological sciences graduate student Dustin Williams undertook some field research at Yosemite National Park last year, he had no idea he would do so much discovery, so fast.

Using novel geochemical methods on minerals from igneous rocks, he worked with V ali Memeti, assistant professor of geology, to investigate how ancient magma reservoirs operated and evolved over time. In doing so, he advanced understanding about the style and timing of volcanic eruptions and helped illustrate how our continents grow. Williams presented their preliminary results at two conferences, wrote two grant proposals with his advisor, received an outstanding research proposal award and grant money, and will publish his research in a peer-reviewed journal.

And he did all that in his first year of graduate school.

“I didn’t initially expect the first year to have this many opportunities,” says Williams. “I know people in other graduate programs who didn’t even start their research until after their first year of classes. But here at CSUF, it has been full steam ahead since acceptance.”

At Cal State Fullerton, the College of Natural Sciences & Mathematics (NSM) graduate degree programs are deeply grounded in teaching and learning as well as in development of diverse and creative cohorts of student and faculty thinkers. Less like college and more like a job, the NSM graduate degree programs bring together faculty and students as interactive teams joined by a shared passion for knowledge. It’s a stimulating and challenging environment where research and the application of critical thinking hone specialized expertise.

“One of the things that makes the NSM graduate degree programs so unique is our commitment to teaching,” says Phil Armstrong, chair of the Department of Geological Sciences. “We take pride in the level of our interaction with students...
Having served as dean of the College of Natural Sciences & Mathematics for four months now, I’m pleased to say hello to each of you through this newsletter and equally pleased to tell you how excited I am to be here. From the moment I arrived on campus, I found this college to be a place that encourages intellectual curiosity. I see it every day in our classrooms, labs, library, and study areas. I hear it every time I am privy to discussions around problems and solutions, new ideas and changing perspectives, and reflections on other points of view. It’s part of what creates the energetic environment this college is known for, and I am proud to share news of the remarkable accomplishments of our students, faculty, and alumni.

In this issue, you’ll learn how intellectual curiosity is forwarding several initiatives on campus. There’s a new drug discovery research and education program underway; some wild and exciting education happening at our Tucker Wildlife Sanctuary; and our graduate degree programs have flexibility built in, including full- and part-time options and late afternoon or evening classes. “And some programs, including the master’s degree in statistics, are offered as hybrid online programs,” explains Stephen Goode, chair of the mathematics department.

“All of our statistics courses are carried live via two-way stream,” says Mori Jamshidian, graduate program advisor for statistics. “Students can choose to attend classes in person, online, or a combination of the two.”

In the case of the statistics programs, technology also helps enhance collaboration. “Students can interact regularly with faculty through the two-way stream lectures and office hours. They also interact with members of their cohort by conducting collaborative work online,” says Jamshidian.

In addition, NSM graduate programs at CSUF have flexible topics that can be modified to meet students’ individual goals. New courses are offered in response to student demand, as well.

“Here, there’s a sense of making opportunities rather than waiting for them to happen,” says Williams. “Beginning with my first research trip, I have worked in areas of Yosemite that not many students get to experience.”

CLOSE MENTORING A KEY DIFFERENTIATOR

While the philosophy of the college is rooted in exploration by inquiry and learning through discovery, the graduate degree program goes further to meld a rigorous and contemporary curriculum with close mentoring.

CONTINUED FROM PAGE 1 •

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PROGRAMS THAT APPEAL

Making graduate education accessible is an important component of the program. NSM graduate degree programs have flexibility built in, including full- and part-time options and late afternoon or evening classes. “And some programs, including the master’s degree in statistics, are offered as hybrid online programs,” explains Stephen Goode, chair of the mathematics department.

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8 SPECIALIZED MASTER’S DEGREE PROGRAMS

- MS Biology
- MS Chemistry
- MA Chemistry
- MA Mathematics (applied option)
- MS Statistics
- MS Geology
- MS Physics
- MA Mathematics (teaching options)

NSM ENROLLMENT

197 FALL 2011
229 FALL 2016

NSM GRADUATE DEGREES AWARDED

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“An important distinction is that our graduate students work closely with their mentors and are involved in high-quality research that addresses a range of modern-day problems.”

Zhuangjie Li, graduate program advisor for physical chemistry

Sean Walker
Chair of the Department of Biological Science

Mori Jamshidian
Graduate program advisor for statistics

NSM GRADUATE DEGREES AWARDED

CONTINUED FROM PAGE 2

“Mentors and research advisors in grad school are extremely important,” says Avila-Alvarez.

“Not only are they familiar with the rigors of grad school, but they are also your gateway to other opportunities in your field. Their experience and connections are what can help determine what happens to you after graduation.”

“We work to pair master’s students with individual faculty for independent study projects and research. In turn, faculty encourages students to present this research not only to the department, but also at national and international meetings and conferences,” says Jim Feagin, chair of the physics department.

That careful mentoring helped Avila-Alvarez develop his research on scattering light relating to gravitational wave science. It also boosted his confidence to present that research at an international collaborative meeting in Scotland.

"Here I was, a young Chicano from Paramount, presenting important research at an international meeting,” says Avila-Alvarez. “This would not have been possible if it weren’t for my research mentor, Josh Smith.”

PREPARATION FOR THE WIDER WORLD

NSM graduate students have multiple opportunities to hone their skills in real-world environments. Several programs offer consulting courses, where students collaborate with local industries and serve as consultants to solve problems. Other opportunities include working on projects sponsored by industry partners and academic and service-learning internships.

All that support culminates in the graduation of very marketable professionals. “In many of our programs, students have opportunities to gain experience teaching and receive professional development and training in pedagogy, which helps to prepare them for the classroom,” says Sean Walker, chair of the Department of Biological Science.

NSM graduate students have also successfully transitioned to Ph.D. programs and secured positions in industry and government.

“I know that once I graduate, the research experience I have had and the networking that has helped me make connections will ensure my success,” says Avila-Alvarez. “My experience in the NSM graduate degree program has opened up the world for me.”
ADVANCING DRUG DISCOVERY RESEARCH

Before potentially life-changing drugs make it to pharmacy shelves, there is a long journey through development, clinical trials, and FDA approvals. But this process cannot begin without a crucial first step: drug discovery. That’s the important process in which researchers identify lead candidates by synthesizing compounds that offer a potential therapeutic benefit.

At the College of Natural Sciences & Mathematics (NSM), a new course and sophisticated lab equipment enable students to explore this essential process.

“Through opportunities in drug discovery, students learn concepts and gain lab experience they can apply to many different fields,” says Nicholas Salzameda, associate professor of organic and bioorganic chemistry.

He and Alexandra Orchard, assistant professor of organic and medicinal chemistry, are creating curriculum offerings focused on the drug discovery field. This effort began with the introduction of a medicinal chemistry course.

“Medicinal chemistry has many applications for drug discovery,” says Salzameda. “Our students enjoy this course because it offers real-world relevance, not just theory. Students are learning about every phase of the development process, from screening compounds to identifying hits, and discovering how a drug progresses to clinical trials.”

Building on the success of this class, the professors are now developing a laboratory-based medicinal chemistry capstone course.

“Mentoring individual students takes a lot of time,” says Orchard. “We want this course to provide instruction and hands-on experience in a way that is efficient, so we’re designing it for up to 10 students per class.”

Over the summer, NSM students participated in medicinal chemistry research projects through a $25,000 grant from The Allergan Foundation.

“The Allergan Foundation’s support was very important because it enabled students to receive stipends for their research,” says Orchard. “Many students can’t participate in summer research programs because of financial constraints, but this grant removed that hurdle. Our students contributed greatly.”

Thanks to a $310,000 grant from the United States Department of Defense, the college obtained an array of advanced technology that can benefit much of this research.

“This equipment gives students valuable technical experience, and it also supports the research output of our faculty,” says Salzameda.

The new equipment includes an LC-MS (liquid chromatography-mass spectrometry) system, a plate reader, a liquid handling robot, and CombiFlash® chromatography systems. Orchard says it is rare to find such advanced equipment in an undergraduate setting.

The medicinal chemistry course and recent research opportunities are just the beginning. Salzameda and Orchard are planning a full program to support research and education in the area of drug discovery.

“Our region is home to a number of significant pharmaceutical companies,” explains Salzameda. “By training researchers locally, we can help our region become an increasingly important center of drug discovery.”
GETTING UP CLOSE TO WILD ORANGE COUNTY

On 12 acres of carefully managed native habitat tucked into the Modjeska Canyon, encounters with nature are leaving deep impressions: a photographer thrills at capturing a hummingbird in flight; an elementary school class explores to find out how water shapes land; and a biology student is amazed by a rare glimpse of a California mountain king snake.

For students, faculty, and residents whose interests are a bit on the wild side, there is no better place than the Tucker Wildlife Sanctuary, adjacent to the Cleveland National Forest. Operated by the College of Natural Sciences & Mathematics, the sanctuary serves as a research center for CSUF and other college students and promotes science and environmental education for K–12 schools and area residents.

“Our sanctuary is one of the last little pieces of wild Orange County, and so it’s our job to be ambassadors for this incredibly diverse wilderness,” says Meg Sandquist, director of the Tucker Wildlife Sanctuary.

That wilderness is a big draw to thousands of school students, Scouts, teachers, residents, and area visitors each year. They all come to connect with nature and learn a little more about the environment.

“Research has shown that outdoor and experiential learning can have numerous positive effects on children, including improvements in social skills, independence, confidence, and self-esteem,” says Sandquist.

Outdoor education is especially important for children from underserved areas, but the cost of getting to the sanctuary can be prohibitive for many of them. A recent grant of $20,000 from the Alcoa Foundation has helped bridge that gap. It funds field trips to the sanctuary for underserved local elementary schools and paid for a mobile interpretive cart that moves around the sanctuary.

“The mobile station enhances our educational outreach and allows us to give our visitors access to artifacts, fossils, specimens, skins, and skulls in order to help them learn about the plants and animals of our coastal canyon ecosystem,” says Marcella Gilchrist, site manager.

The center features ponds, a bird observation porch and feeders, sensory and butterfly gardens, and hiking trails, as well as amenities that include a small natural history museum/interpretive center, picnic areas, and a small amphitheater.

“In our view, instilling visitors with an appreciation for natural environments and an understanding of the ecosystem that surrounds them is absolutely critical for informing their understanding and support of environmental issues,” says Sandquist. “The schoolchildren we see in our tours are the decision-makers of tomorrow, and if they don’t appreciate natural places, they won’t protect them.”

—

Kurt Miethke, naturalist and leader of a Tucker outdoor education program.

Student research and citizen-based monitoring are critical components of the success of the Tucker Wildlife Sanctuary. By connecting children, youths, and adults with nature, the sanctuary helps instill a sense of responsibility about preserving and protecting native habitats.
NEW FACULTY

Sean Loyd, assistant professor of geological sciences, researches how microbial communities influenced rock formations in marine environments and the role of these microbes in the natural regulation of greenhouse gas emissions.

Andrew Petit, assistant professor of physical and theoretical chemistry, uses mathematics and computers to investigate how light absorption excites molecules. This research has applications in the development of better dyes, sunscreens, solar cells, and photocatalysts, and it offers insight into how organisms interact with light.

Wylie Ahmed, assistant professor of physics, focuses on biophysical research involving the nonequilibrium mechanics and viscoelastic properties of living cells.

GRANTS

Biological science lecturer Megan Tommerup (center) and elementary and bilingual education lecturer Kim Case received $246,132 from the California Mathematics and Science Partnership for a professional development program benefiting local elementary schools.

Charles Funkhouse of the Department of Mathematics was awarded $98,794 from the National Science Foundation for his project, “Native American-Based Mathematics Materials for Integration into Undergraduate Courses.”

Diane Clemens-Knott, professor of geological sciences, received a $70,000 grant from the American Chemical Society for her project, “Testing Models for the Formation of California’s Great Valley Basin.”

Danielle Zacherl, professor of biological science, received $55,500 from the Southwest Wetlands Interpretive Association for her work to restore the native oyster population in San Diego Bay.

Nicholas Salzameda and Alexandra Orchard, faculty members in the Department of Chemistry & Biochemistry, received $25,000 from The Allergan Foundation to develop a program focused on drug discovery research and education. See the full story on Page 4.

Geoffrey Lovelace, assistant professor of physics, was awarded $45,929 from the National Science Foundation for his research focused on the detection and behavior of gravitational waves.

Studying Local Geology for Tsunami Evidence

Professor Emeritus Brady Rhodes and professor Matthew Kirby of the Department of Geological Sciences studied sedimentary layers in wetlands along the coast of Southern California to look for evidence of prehistoric tsunamis affecting this region. Rhodes says the likelihood of a tsunami striking Southern California is low because the region’s offshore islands and seafloor topography help buffer this area from such waves.
Reconnect with your alma mater through a gift to the College of Natural Sciences & Mathematics. Your generosity helps continue our tradition of innovative research and academic excellence. We are grateful to all of our 2015/2016 donors.
NSM PROFESSOR HONORED FOR RESEARCH ACHIEVEMENTS

President Mildred García (right) congratulates Marcelo E. Tolmasky (left), professor of biological science, who was honored with the 2016 L. Donald Shields Excellence in Scholarship and Creativity Award. Tolmasky’s research focuses on understanding antibiotic-resistant bacteria and developing strategies to improve the effectiveness of antibiotics.