

Ahead of the pack: Master's students learn to run zoos, aquariums, shelters



Some of the first graduates from the CSU Professional Science Master's program combine love of animals with solid business skills (clockwise from top left): Ashlea King operates Ruff Start Training and Rescue; Annie Wallin hopes to work in outreach and education for a zoo or another animal-related organization; Cassi Camara leaves later this year for Russia to work at a sanctuary for wolves and large carnivores; Cindy Hoang holds a Great Horned owl at the Rocky Mountain Raptor Center, where she has helped train volunteers.

Meet more of the program's May graduates

Cassi Camara spent her childhood summers with her grandfather, tracking red wolves that were part of a reintroduction program he managed on the East Coast.

As an undergraduate, Camara considered majoring in a wildlife field but shied from the required science courses. She later moved to Fort Collins and began working at the Wolves Offered Life and Friendship sanctuary. During the 2012 wildfires, she helped move the animals to safety.

"That was the moment when I decided I wanted to work with wolves," Camara said. "I heard about CSU's program and applied."

She leaves for Russia later this year to work at a sanctuary that is studying wolves and other large carnivores. "As wildlands go away and the percent of wild animals living in captivity grows, there's a need for this research," Camara said.

Cindy Hoang knew she wanted to

work with animals and wildlife from a very young age.

She majored in biological science as an undergraduate and considered pursuing veterinary medicine.

Instead, she enrolled in the PSM program at CSU.

"I focused on vet school because it was the only career choice I was exposed to," she said. "But since I started this program, I've realized there's a lot more out there."

Hoang's focus has shifted to wildlife conservation and the impact of humans. She would like to work at a nonprofit in outreach and education, much like she's done at the Rocky Mountain Raptor Program in Fort Collins. She's helped the nonprofit develop a training program for volunteers, assisted with fundraisers and more.

Each month, **Ashlea King** drives to the Pine Ridge and Cheyenne River reservations in South Dakota

to rescue abandoned or stray dogs.

She brings the dogs back to Fort Collins, where a local veterinarian vaccinates the animals, spays or neuters them and implants an ID chip. King nurses the dogs back to health and places them in foster homes until they are adopted. All of this is done through Ruff Start Rescue and Training, an organization she started after interning with animal rescue groups in South Dakota.

"It just grew out of my internship," she said. "I started bringing dogs back over the summer. We make sure they get healthy and can be adopted."

King started volunteering with her local humane society when she was 11 and has worked with shelter animals since. She said the CSU program is unique because students learn about business and animal care.

"The best nonprofits I've worked with are run like businesses," King said.

BY KORTNY ROLSTON

From the time she was little, Annie Wallin knew she wanted to work with zoo animals.

She majored in biology and zoology as an undergraduate and got accepted into a veterinary school. But then Wallin read about a new master's degree at CSU that prepares students to manage zoos, aquariums and animals shelters, and she changed course.

"I had never heard of this type of program before," the Utah native said. "I thought I had to become a veterinarian to work with animals."

In May, Wallin and four of her classmates will become the first students to graduate from Colorado State with a master's degree in zoo, aquarium and animal shelter management. Housed in the College of Natural Sciences, the CSU program is one of only two such graduate degrees in the country. And it's the only one in which students pursue advanced training while also developing workplace and business management skills.

"Ours is an interdisciplinary program that emphasizes a combination of coursework and hands-on experience," said Paul Laybourn, College of Natural Sciences graduate program director. "It combines applied science with management coursework to produce a well-rounded professional."

The CSU program has garnered support from animal advocates like Judy Scherpelz, executive director of the Rocky Mountain Raptor Program. When Scherpelz joined the Fort Collins nonprofit 20 years ago, she cared for the rescued birds. But as the organization has grown, so has her role.

The wildlife biologist now spends most of her time managing staff and business operations. Her experience, Scherpelz said, is common in animal organizations and is why she is a proponent of the CSU program.

"Everybody starts because they have a passion for animals," she said. "By default, someone is pushed into an administrative role even if they don't have management or business experience. This program changes that dynamic. It takes people with a passion for animals and provides them with the scientific knowledge and business skills to run these organizations."

The need for both science and business was reinforced during the professional projects Wallina and her classmates were required to complete. All worked for various animal organizations and performed a variety of tasks, from organizing fundraisers to writing training manuals or protocols.

"It takes a lot of different people and skills to operate a shelter or run a zoo or aquarium," said Jennie Willis, a CSU instructor of animal behavior who teaches courses for the program. "Our students learn about those other aspects through their coursework and professional experiences. This program prepares them for the business side and animal side of these operations."

Wallin said she learned the value of both through her work with the fledgling Poudre River Wildlife Center, a Fort Collins nonprofit that will rescue squirrels, foxes and other native animals.

The experience also made her realize she wants to work in outreach and education. "I like working with volunteers and educating the public about coexistence with animals," she said.

To learn more about Colorado State's master's degree in zoo, aquarium and animal shelter management, go to col.st/1bRUKGP.

COLLEGE OF NATURAL SCIENCES

The College of Natural Sciences at Colorado State University offers bachelor's, master's and Ph.D. programs in the physical, mathematical, behavioral, and life sciences. The College includes the Departments of Biochemistry and Molecular Biology, Biology, Chemistry, Computer Science, Mathematics, Physics, Psychology, and Statistics. The outstanding faculty are involved in research that makes a difference around the globe. natsci.colostate.edu

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YOUNG STANDOUTS, REVISITED
Jessica Witt, associate professor of psychology, was recently selected as an Outstanding Early Career Awardee by the Psychonomic Society. The Psychonomic Society exists to promote open discourse about psychology and allied sciences, and this award is one of a select handful given each year.

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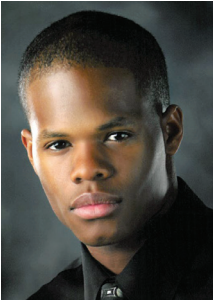
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SUSTAINABILITY STARS
CSU earned a "gold" rating and achieved the highest score ever reported – 83.48 out of 100 – to Sustainability Tracking, Assessment & Reporting System, a national survey that measures sustainability efforts at colleges and universities. Of the 300 universities that participate in STARS, only 18 percent have achieved gold; no university has ever earned platinum, the highest ranking.

Student Voice: Kenneth Young

Kenneth Young graduates this year after a full, multifaceted experience in the College of Natural Sciences. He visited the dean's office to think back and share advice for younger students who might follow him in the sciences.



Kenneth Young

In a word or two, describe your experience in the College of Natural Sciences.

Nothing less than exceptional. From academics to working in the dean's office, I have experienced a place of safety, a place I can call home.

What are you going to miss about the College/CSU?

Undoubtedly, I will miss the people. I have built so many long lasting connections to auspicious, genuine people. I have spent the past five years – yes, I know, an extra year, don't remind me! – becoming a well-rounded individual, and this could not be possible without the love and compassion of my support system.

What's your thesis about?

"Hormonal Regulation of Gene Expression During Neurodevelopment" focuses on the potential biological basis for sexual orientation and the biological mechanisms behind individuals who fall under the trans* umbrella. Moreover, I plan on discussing the ethics of research involving sexual orientation and gender identity. Although it may have been highly controversial even eight years ago, I believe this is the perfect time to interweave social justice and science.

Biochemistry and Molecular Biology is a demanding major. How did you manage the work?

Truth be told, I cannot recall how I managed the course load with my other activities/jobs. However, I believe all majors in all colleges are demanding, and all have the same validity. One doesn't have to be exceptionally brainy to be a good scientist, doctor, engineer, poet, artist, or social worker. Common sense one cannot do without, and one would be the better for owning some of those old-fashioned virtues: application,

diligence, a sense of purpose, the power of communication, contagious laughter, and the ability to persevere and not be cast down by adversity.

How have your experiences outside the classroom defined your college years?

I cannot even begin to describe how all the various extracurricular activities have made an impact. I do know my intent was just to have a well-rounded college experience, but the impact was and will forever remain earth-shattering. From Special Needs Swim to the Student Organization for Gay, Lesbian, Bisexual, Transgender, Queer and Allied People, to research internships, to alternative spring breaks, to many social justice retreats – each one has challenged me in a new way and demanded that I stretch myself and grow.

What do you hope you've contributed back to the college?

I would like to think that in every space I have entered, every community I have had the pleasure of being a part of, my voice and words have left a mark. Some of the conversations weren't always comfortable, but I believe that "awkward" or "uneasy" feeling is good thing. We spend so much time trying to be comfortable and never feel out of place. But it is in human nature to adapt, to survive when the environment changes. Through that uncomfortable and vulnerable environment people are allowed to truly reflect, grow, and take something away from the experience.

What's next for you?

My plan is to take a year off, work, and study for the GREs with the intent of going to graduate school to get my master's in biomedical sciences. Then the plan is for biomedical school. Following OB/GYN, and most likely endocrinology residency, I plan on providing health care to individuals falling under the trans* umbrella.

What advice would you give to a student just starting at the CNS?

Balance is key for any student starting college. However, more specifically for the College of Natural Sciences, you will want to find a place where you experience secure relationships and affirmation. Find your own safe place and develop a network of support, where the relationships are nurturing. Find your home.



Kaitlyn Voccola

Voccola uses math to make radar smarter

BY ERIK SCHMIDT

Kaitlyn Voccola, a research scientist in the College of Natural Sciences, is embarking on a three-year Young Investigator Research Program grant funded by the U.S. Air Force Office of Scientific Research. She'll be working on synthetic aperture radar (SAR) – something that typically makes people think of engineers, not mathematicians.

SAR is used for everything from telling the difference between a truck and a tank at long range to creating stunning images of Venus. In Voccola's case, her work will allow the Air Force to turn raw imaging data into smarter, safer tactical decisions.

As a mathematician, how do you work with SAR?

We mathematicians take the data an engineer collects and turn it into a picture an analyst can use. We can model different types of potential targets – a truck, say – and tease it out of the data. We can tell a lot from these images; NASA used them to check the Space Shuttle after launch looking for damage, for example.

Why is this opportunity important to you?

This grant is a launching point for young

researchers working on their portfolios. It encourages us to be involved because these are issues important to the Air Force right now. I guess you could say I was "brought up" with the Department of Defense because of my graduate work, so it's worked out really well.

What drew you to your research?

I was drawn to it in part because it's rewarding to talk to other people about it. Recently I went to Blevins Middle School and chatted with students, and I loved seeing their eyes light up about studying math and science. Another practical reason is that there are jobs out there. Majoring in science and math gives you a good outlook, and there are endless numbers of problems you can work on.

Who's your math hero?

My Ph.D. advisor, [Yates Chair and Professor] Margaret Cheney. She's absolutely brilliant, and she came up at a time when there weren't too many women in the field, especially working with the Department of Defense. She's given us a great example of what success can be, and she's always been uniquely focused on her students. That's what I hope to emulate myself as a teacher.

Faculty turn laboratory research into viable startup companies

BY KORTNY ROLSTON

Having a second job isn't unusual for professors within the College of Natural Sciences.

Alongside their teaching and research, several have launched startup companies with the help the University's technology-transfer arm, CSU Ventures.

Of the 42 active startups currently supported by CSU Ventures, 10 were started by professors in the College of Natural Sciences.

"Natural Sciences is one of our most active colleges," said Todd Headley, president of CSU Ventures. "The researchers are innovative and empowered."

Janice Nerger, dean of the College of Natural Sciences, considers the program a priority. "To the extent that we foster this culture of innovation, we support our mission as a college," she said.

Here are the active startups from the college:

Advanced Microlabs (advancedmicro labs.com) was started by Chuck Henry, a professor in the Department of Chemistry. It develops a lab-on-a-chip-based detection solution that monitors low levels of contaminants in industrial water.

Beken Learning Systems (beken learning.com) was started by Paul Kennedy of the Department of Mathematics and Steve Benoit. The company specializes in online instruction, homework and assessment systems that can be delivered to students online or in a lab setting.

Carbo Analytics (carboanalytics.com) was started by Dale Willard, a former graduate student in the Department of Chemistry. The company develops lab-on-a-chip technology for analysis of sugar for various industries. Its products streamline the identification and analysis of carbohydrates, amino acids, and alcohols in the beer, wine, food, pharmaceutical, and biofuel industries.

Caros Consulting (carosconsulting.com) was started by Associate Professor of Psychology Pat Aloise-Young, Associate Professor of Sociology Jennifer Cross, and Gwen Sieving of Hartshorn Health Services. The company helps large organizations improve energy efficiency programs.

Cetya Therapeutics (cetya-therapeutics.com) was started by Robert Williams, a University Distinguished Professor in the Department of Chemistry. The company develops small-molecule drugs for the treatment of cancer, auto-immune diseases and hemoglobinopathies such as sickle cell disease and anemia.

Diazemed (diazamed.com) was started by Assistant Professor Melissa Reynolds and Instructor Ben Reynolds, both of the Department of Chemistry. The biomaterials company develops coatings for medical devices that prevent blood clotting and infection.

Jobzology (jobzology.com) was started by Kurt Kraiger and Bryan Dik, professors in the Department of Psychology. The company provides software tools to match employers and employees based on job attributes and cultural fit.

Numerica (numerica.us) was started by Aubrey Poore, a professor emeritus in the Department of Mathematics. The company provides algorithm-driven software solutions that enhance national security.

Plura Biosciences (plurabioscience.com) was started by Tomislav Rovic, a professor in the Department of Chemistry. The company develops specialized catalysts and chemicals for the manufacturing of live science products such as pharmaceutical and anti-bacterials.

Prieto Battery (prietobattery.com) was started by Amy Prieto, a professor in the Department of Chemistry. The company is developing a non-toxic, rechargeable lithium ion battery that is expected to be up to 1,000 times more powerful and last 10 times longer than traditional batteries.

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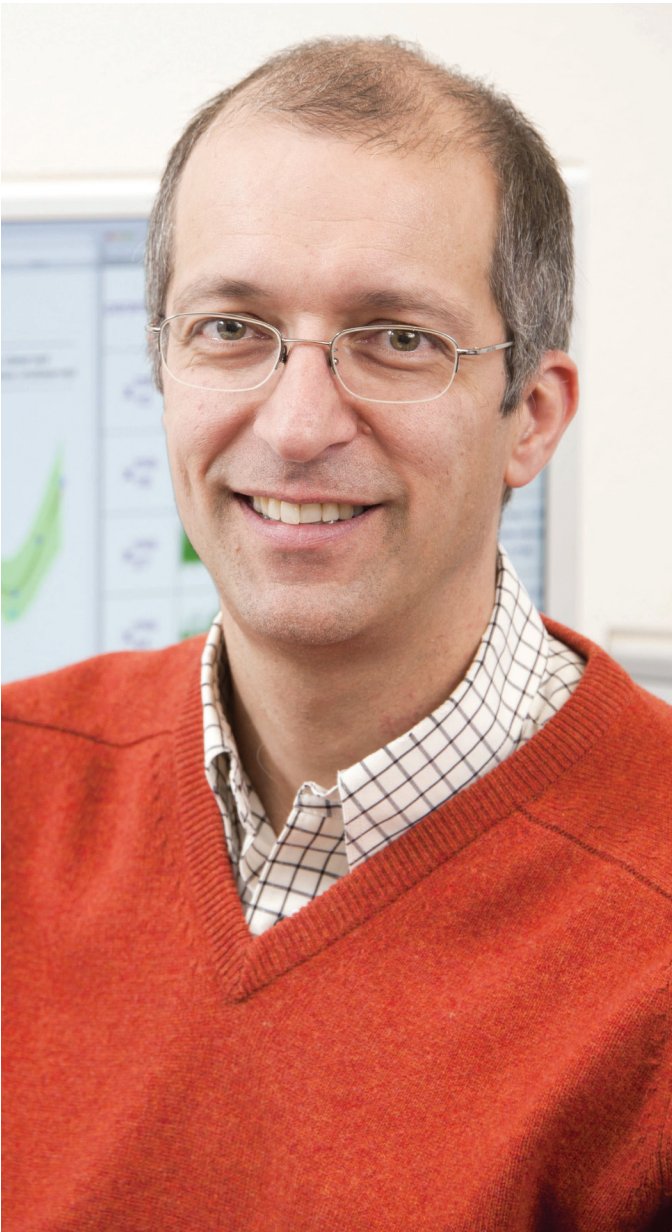
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Jean Opsomer

Neuroscience and statistics both now undergrad majors

BY KORTNY ROLSTON

Starting this fall, CSU students will have two new four-year undergraduate degrees to choose from: neuroscience and statistics.

The degrees in the College of Natural Sciences are a good fit, faculty say, because CSU already has strong graduate programs in both areas – and student demand is increasing.

The number of undergraduates enrolling in statistics courses has spiked in recent years, enough that faculty applied to bring it back as a major. Since 2000, statistics has been offered only as a concentration in the mathematics department.


Jean Opsomer, chair of the Department of Statistics, attributes the renewed interest to more Advanced Placement statistics courses being offered in high schools, and new demand for analysts to crunch data in the private sector.

“More students are being exposed to statistics and the job opportunities in the field earlier than ever before,” he said.

Student interest in neuroscience also is strong, and undergraduate students have long participated in neuroscience research at CSU. Since 2010, more than 40 undergraduates have co-authored more than 35 papers with neuroscience faculty.

CSU’s undergraduate neuroscience degree will be the first offered at a public college or university in Colorado.

“There are very few public research universities that offer undergraduate degrees in neuroscience,” said Michael Tamkun, a professor in the Department of Biomedical Sciences who is heading the neuroscience program. “We think this program fills a real niche for Colorado and the region. It fits our mission of expanding educational opportunities for students.”



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Computer Science team connects mind and machine

BY ERIK SCHMIDT

In a small lab in CSU’s computer science building, Ph.D. student Elliott Forney dons a confusing-looking cap with wires protruding every which way. It’s like the snarl of cords coming out of a desktop computer, only more delicate. He’s worn the cap a hundred times before, but still, a grin creeps across his face as he yanks it down over his hair.

That’s because he’s preparing to do something that has always seemed like science fiction: control an inanimate object with his mind.

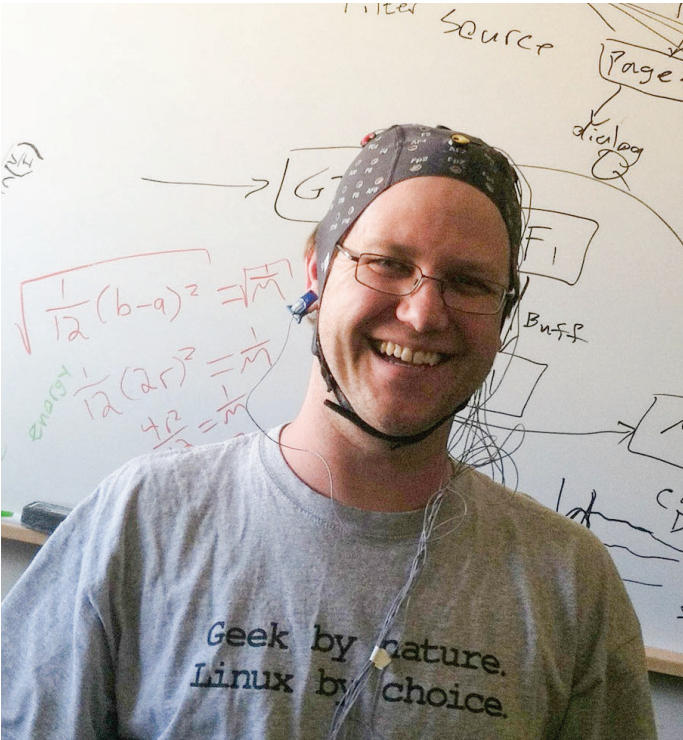
The lab’s doorplate says EEG, which is a merciful shortening of the term electroencephalography. Here, Forney and computer science Professor Chuck Anderson continue to probe what can be done by recording, analyzing – and then obeying – the electrical fireworks of a person’s brain. Today they’re enabling test subjects to control a wheeled robot just by imagining their left or right hand moving to issue left/right turning instructions. They hope to soon work with veterans with disabilities, empowering them to steer wheelchairs, manipulate prosthetic body parts, and otherwise reclaim mobility lost from injuries in the line of duty.

“It’s a baffling situation,” said Anderson, “when someone is fully capable mentally but the physical means of expression are no longer there. Imagine that struggle.”

The team’s focus is on replicating voluntary muscle control. Although we don’t often stop to consider it, the actions of walking around, clipping out a newspaper article or pecking away at a keyboard are all expressed initially as electrical impulses in the brain, which get translated and moved along through the body’s architecture to muscles. Some people, whether through acute trauma or other damage – from ALS, for example – lose that mind/body connectivity.

So researchers go right to the brain. “We can measure electrical activity in microvolts from sensors resting on a person’s head,” said Anderson. He noted that this subtle activity is localized in more-or-less predictable spots around the skull, so a cap’s sensors can catch important patterns. A computer program “learns” the subject’s brain activity and translates it into commands that are fed to a machine, thus completing the mind-to-object transfer of information.

Naturally, the computer programming needed to make the process work is complex and always evolving – hence the interest and involvement of the Department of Computer Science – but making the system non-invasive



Elliott Forney

and portable is another important challenge. Researchers elsewhere insert electrodes into people’s skulls with successful results, but Anderson and his team are focused on creating something people can use in their own homes. They’ve partnered with faculty in the Department of Occupational Therapy and the Department of Human Development and Family Studies; together the teams have made several home visits, which have provided important input and skills for working with people outside the lab environment. The faculty members remark on how holistic their approach to the project has become, and how beneficial the collaboration has been.

Interestingly, Anderson said, the video game industry has begun its own work on brain-computer interfacing, though the technology has not advanced very far. It remains to be seen whether an entertainment-market influence will be felt anytime soon, or whether it will provide systems that are particularly robust.

The CSU brain-machine interfacing program has been funded by the National Science Foundation, and it continues to turn complex lab work into practical applications – progress that widens our understanding of the brain while doing some good for people.

CNS researchers conduct substantial work abroad

Many of the College of Natural Sciences’ approximately 175 faculty members maintain international partnerships, and these connections facilitate much of the college’s research output. They stretch CSU’s influence all over the globe and ensure, as faculty say, that students are exposed to diverse applications and modes of inquiry.

Here’s a snapshot of representative projects going on right now.

Biological diversity studies

CSU faculty: LeRoy Poff, Chris Funk, Kim Hoke, Pat Bedinger (Biology)
Seeking to understand the evolutionary and ecological mechanisms that generate and maintain biological diversity
Partners in: Ecuador

Purified tea compounds and HIV protease autoprocessing

CSU faculty: Chaoping Chen (Biochemistry and Molecular Biology)
Seeking natural compounds for novel anti-AIDS therapeutics
Partners in: China

Anti-diabetic vanadium complexes, characterization and biological activity

Studying the metal vanadium as a drug and how vanadium complexes interact with cells
CSU faculty: Debbie Crans (Chemistry)
Partners in: China

Sexual and violence health risks among sex workers in Nepal

CSU faculty: Jennifer Harman (Psychology)
Qualitative analysis of interviews and focus groups of women who have been forced or enticed into sex work in Nepal
Partners in: Nepal

Statistics exchange program with ENSAI

CSU faculty: Jean Opsomer, Jay Breidt (Statistics)
Collaboration with France’s primary graduate statistics institution; several students each year come to CSU for internships and/or academic credit.
Partners in: France

Laurel Village, learning community for students in the natural sciences, set to open fall semester

BY ERIK SCHMIDT

In science, it's called symbiosis.

Laurel Village, a new 600-bed residential complex on the northwest end of CSU's main campus, is set to welcome its first group of residents in the fall semester – but it's not your typical residence hall.

“We're combining academics with residential life in one space to support our students,” said Lisa Dysleski of the College of Natural Sciences dean's office, who will serve as the learning community's director. “Students find that their studies improve because of the sense of community and shared goals, and their extracurricular experience is enriched because they're surrounded by people they can identify with. The benefits go both ways.”

Two-thirds of the hall's denizens will be College of Natural Sciences students. They'll share rooming options that run the gamut from singles with private bathrooms to larger, apartment-style quads with shared living and bathroom space – but the most important element of the new space will be its academic character.

This is especially true for freshmen hungry for connection and community in a large-college environment, but it also provides new incentives for upperclassmen to continue living on campus.

CNS Assistant Dean Jack McGrew has been part of the project from the get-go. “This system definitely helps students make the transition from high school to college,” he said. “They've got built-in mentoring and modeling.”

Dysleski, a member of the chemistry faculty, was the recipient of a Colorado State University Alumni Association 2014 Best Teacher Award. She's been in the lecture halls, labs and study sessions; she's seen what kinds of support students need to meet some of the intellectual challenges – notably, math – critical to studying the natural sciences.

And she should know: She received her



The Laurel Village complex is the newest residential learning community on the CSU campus. It is located near Moby Arena, the rounded building in the lower left of this drawing.

AERIAL VIEW LOOKING NORTHEAST CSU

chemistry Ph.D. from CSU in 2003.

She views Laurel Village as an opportunity to invigorate CSU's existing learning-community programming. There are already 17 learning or theme communities on campus, and over the years, they have gelled into a cohesive program as their curricular and co-curricular benefits have become more obvious.

The Laurel Village complex is defined by two main residential buildings, an outdoor amphitheater, and a central pavilion. The pavilion is the first project on the main

campus to pursue LEED Platinum certification, and the entire complex will seek at least LEED Gold. The site includes classrooms, offices for academic advisers and faculty, study rooms that will facilitate group work, and versatile space for guest lectures and other events.

Dysleski is quick to remind incoming students that they don't need to have their future in the sciences totally scripted to benefit from the learning-community approach. Those who are not completely decided – or who might change their major

along the way – can still reap the rewards.

“One of the core ideas at CSU is that we'll support students wherever they want to head. When they're surrounded by their peers and truly immersed, they discover all kinds of things about themselves and where they want to go,” she said.

For now, several hundred budding natural-sciences students want into the newest residential option on campus. Doors open Aug. 20.

Learn more: housing.colostate.edu/laurel-village or on Twitter: @csucnslc

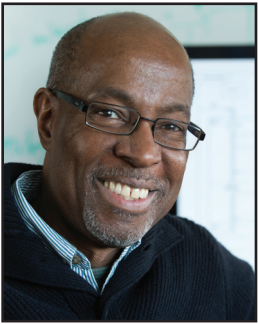
2014 Professor Laureates

Each year, the College of Natural Sciences recognizes faculty who define our focus on research and results, fruitful partnerships between teachers and students, and academic community. These scholars are second to none, and they enrich the CSU community in ways that go far beyond their professions – by changing lives.



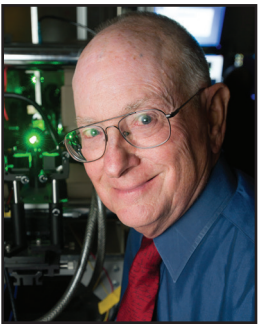
Robert B. France
(Ph.D. Massey University, New Zealand)
Computer Science

A Ram since 1998, France is renowned for his work on model-based software engineering and, in particular, the use of Unified Modeling Language. He is in high demand as an international speaker, and in 2007 he was invited to write a “state of the research” paper on model-driven software development for the International Conference on Software Engineering. This year he was named international chair of INRIA, a France-based computer-science research organization, and awarded the prestigious Dahl-Nygaard Prize.



Carl E. Patton
(Ph.D. California Institute of Technology)
Physics

Patton joined CSU in 1971 and has led a remarkably productive career in magnetism and material physics. A life member of the Institute of Electrical and Electronics Engineers (IEEE), he has also been named Distinguished Lecturer and received both the Millennium Medal and the Lifetime Achievement Award by the IEEE. Over the years, he has guided no fewer than 29 post-doctoral fellows and visitors. He has published 255 refereed papers and given approximately 275 invited talks, including several lecture series. His service to the department and university, continual over 43 years, has included work on the Committee on Strategic Planning; the Committee on Scholarship, Research, and Education (CoSRGE); and the Faculty Council.



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Mathematics in Nature

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CSU Math Circles

In collaboration with Poudre School District, the Department of Mathematics invites students entering 8th or 9th grade for a week of discovery!

- Each day, students will be led by CSU mathematicians through in-depth activities and lectures
- They'll discover nature through the amazing world of math
- Lunch is provided Monday-Thursday, and parents are welcome to attend Friday's closing events
- Program is limited to first 25 girls and 25 boys registered by May 16

For more information, **contact Melissa Adkins** (swager@math.colostate.edu). Registration is \$50 per student; snacks, lunches and t-shirts will be provided. Need-based scholarships are available.

Algebra I background is required.



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