

CASCADE

UO COLLEGE OF ARTS AND SCIENCES

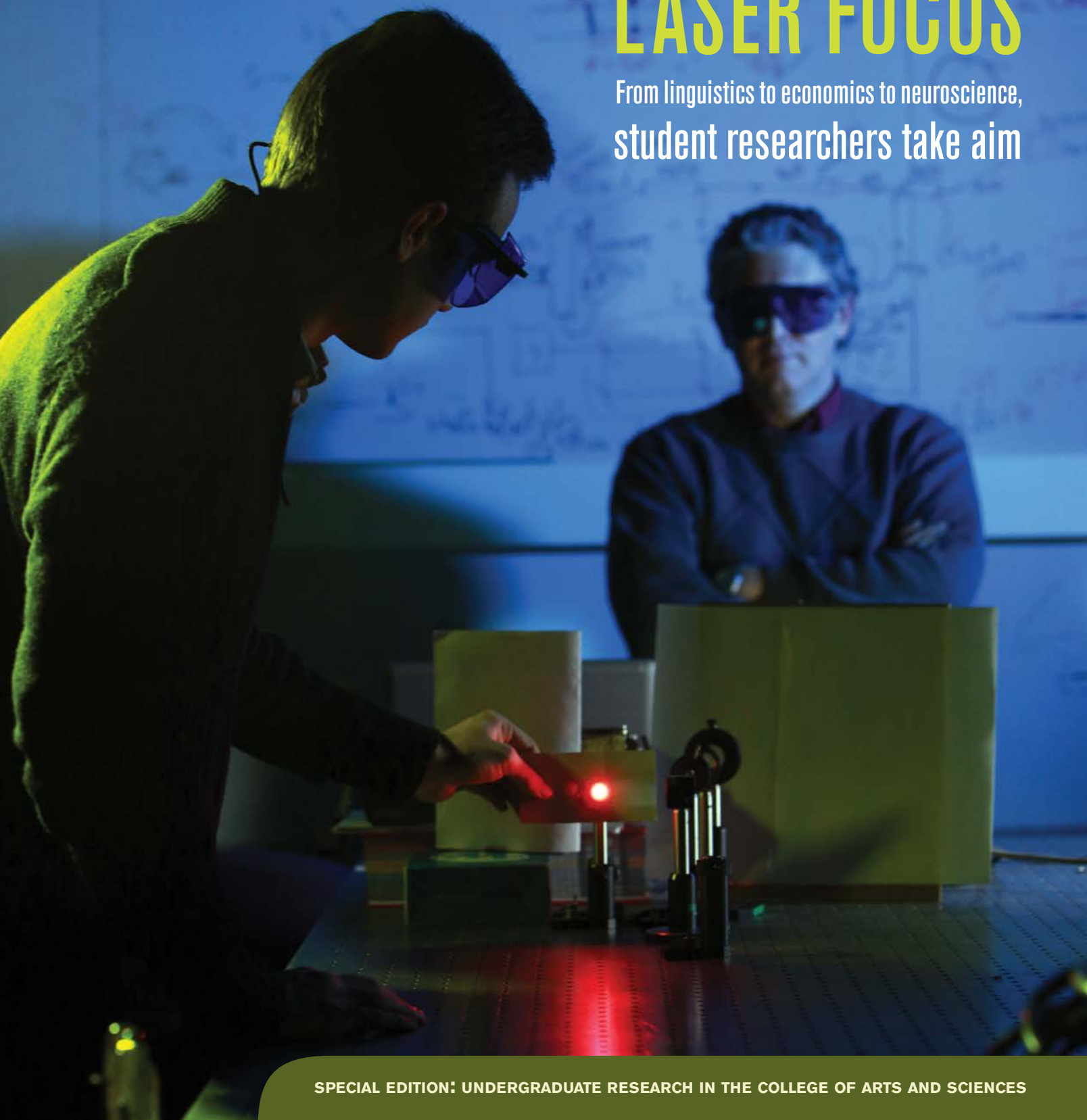


UNIVERSITY
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WINTER 2013

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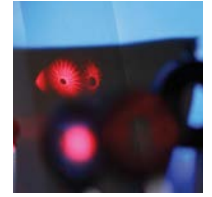
From linguistics to economics to neuroscience,
student researchers take aim



SPECIAL EDITION: UNDERGRADUATE RESEARCH IN THE COLLEGE OF ARTS AND SCIENCES

Guest Editorial

What's Your Question?



For this special undergraduate research issue of *Cascade*, we are giving this page—usually the Dean's Page—over to a guest editorial by Alexandra Hartman '12. She was covaledictorian for the Department of Biology last spring and this is the text of her commencement speech delivered to her biology peers, edited for length for this page.

Answers, delivered or interpreted as truths, serve to justify the state of the world, rather than to explain it.

What are the three conditions for Natural Selection?

What two ions are responsible for the action potential?

How large is the human genome?

People who choose to major in biology are likely to be the sort of people who derive a sense of satisfaction from knowing the answers to questions like these. For such people, the first years of the biology major can be frustrating: with those years comes the recognition that a good scholar is not necessarily a good scientist—someone who is marked *not* by her ability to drum up the answer, but to formulate a question.

Knowing how to answer a question is not the same as knowing how to ask one. It is perhaps for this reason that the phrase, “*What's your question?*” is so familiar to us (written in red in the margins of a research paper, asked by a faculty member after a formal project proposal, and so on). This question can come as a real blow to a student operating under the assumption that science, like so many other things, is about the answers.

Indeed, *What's your question?* is so common to us, so fundamental to scientific education, that it hardly seems worth the pause. But it exactly encapsulates what it means to think like a scientist, and its ubiquity is nothing but a testament to its gravity.

This is an exciting time to be a young scientist. We are in the second decade of what has been called the Century of Biology. Dramatic changes are taking place in the way we collectively regard our health and our planet. Despite this, the amount of scientific thinking undertaken

by the average American is on the decline. More and more, our culture has begun to rely on scientists as authorities, collectors of *facts*, sources of *answers*. History tells us that this is a dangerous practice: answers, delivered or interpreted as truths, serve to justify the state of the world, rather than to explain it.

While our work toward these diplomas is certainly to our credit, the effort should serve, too, as a reminder of a debt. We owe it to ourselves to challenge the authority placed upon our shoulders; we owe it to the world to discourage lazy habits of thought.

Knowing how to answer a question is not the same as knowing how to ask one.

What's your question? should leave this university with you, as a reminder that science is about the questions, not the answers. It is our *responsibility* as young scientists—we more than others before—to remind the world that science is a dynamic and ongoing process, an adaptive pursuit, whose value is lost the moment we settle on an “answer.” It is incumbent upon us, yes, to do our best to explain scientific headlines to our peers—but as “informants,” never to dispense just-so stories without making people *think* about what it is they really want to know and *why*—because the “answer” is a cheap thrill compared to an understanding of the process by which we came to know it. ■

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Cascade is the biannual alumni magazine for the UO College of Arts and Sciences.

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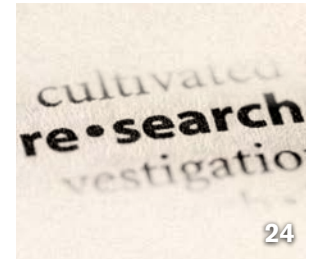
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Cover and other laser photography: Michael McDermott



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Ask the Expert

Life Lessons: Preparing for Uncertainty

This special issue of *Cascade* magazine is devoted entirely to the subject of undergraduate research. The increasing visibility of undergraduate research on the University of Oregon campus makes it clear that the time is ripe for showcasing this topic.

For instance, there is now an annual spring symposium that gives dozens of UO undergraduates—most of them majoring in fields in the College of Arts and Sciences—an opportunity to share their work publicly. Another example: With the support of the UO Libraries, the *Oregon Undergraduate Research Journal* (page 24), now in its second year, publishes student research papers and is edited by students themselves.

There are also numerous recognitions (scholarships, fellowships, and so forth) that award funding to UO undergraduates for research projects. Moreover, the President's Office is making a concerted effort to ensure that UO undergraduates are considered for high-profile national honors that recognize their research scholarship, and this effort has resulted in numerous prestigious awards—see page 28, where you'll also find a compendium of data points that underscore the vitality of research conducted by UO undergraduate students.

But what do we mean by undergraduate research? To help us define our terms—and explore the reasons why undergraduate research is important—we ask Ian McNeely, associate dean for undergraduate education in the College of Arts and Sciences.

Interview by Lisa Raleigh

Q: What do we mean by the word “research”?

A: When people think about research, they automatically think of white lab coats and safety goggles, and laboratory research is obviously a key part of what research is—especially on this campus, with a big commitment to the sciences. But research happens in every field. Everything we do in the university has a research component.

Take my own field, for example—history. A lot of people think of history as looking up facts and that's about it; there's not much creativity involved. But we're always reinterpreting the past. You can think of episodes in your own life that you revisit over time, with a different interpretation based on what you've learned in the meantime, and in the field of history, we're always doing that. We're discovering new texts and new materials, and also finding new ways to reinterpret old materials.

Even something that seems fixed is always changing. Take Shakespeare or Plato, for instance; scholars have been reinterpreting the same passages of their texts for hundreds if not thousands of years, always putting them in a new context.

Q: How does research differ across the sciences, social sciences and humanities?

A: To oversimplify greatly: in the sciences, you do lab experiments; in the social sciences, you might interview or survey people or run statistical analyses; and in the humanities, you read texts really closely. But that simplification obscures more than it reveals. There are literally hundreds of different ways we do research.

Each field, each faculty member has a particular way of slicing and dicing the world—a *method*, a *discipline* for understanding the natural world, the social world, the spiritual world even. What unites them all, whether they're



Ian McNeely, Associate Dean for Undergraduate Education

natural scientists, social scientists or humanists, is that they don't merely apply these methods like turning a crank, but they continually refine and improve them as a means of discovering things that weren't known before.

Knowledge is never a fixed body of information that you can simply master and rely on; that's a dangerous illusion perpetuated by textbooks that give students a false sense of finality.

Q: If faculty members conduct research based on their deep expertise in a subject, what does it mean for an undergraduate to do research?

A: Usually we mean the chance to either work with a faculty member on his or her research project or the chance to do independent work of one's own, also under the guidance of a faculty member. Of course, tons of our classes involve research in the sense of trying to answer a question, finding evidence, applying problem-solving methods and the like. But when we say "undergraduate research," we usually mean students who take that to the next level by actually participating in the process of investigation and discovery of new knowledge.

Q: Why is this an important part of undergraduate education?

A: The experience of doing research is critical to success in life. It teaches you how to pose a question and solve a problem. It teaches you the habits of mind and the discipline to take on questions and problems you've never even heard of before. It teaches you to cope with uncertainty: knowledge is never a fixed body of information that you can simply master and rely on; that's a dangerous illusion perpetuated by textbooks that give students a false sense of finality. Instead, knowledge is ever-changing; what we know today may not hold true in the same way tomorrow. And research is the best way, maybe the only way, to experience that sensation in your bones.

That can be daunting, even nerve-racking. But that's life in the twenty-first century. In the uncertain world we live in, to leave here with exposure to research is to prepare yourself to live in and adapt to an ever-changing world. "Throw a problem at me and I'll help solve it—analytically, collaboratively, creatively, joyfully." That's what we hope will be the experience of our graduates in their working lives and their

lives as citizens.

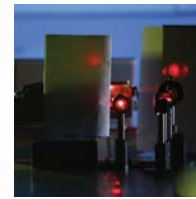
Q: The UO is a liberal arts institution. How does all of the above relate to the context of a liberal arts education?

A: The great thing about the liberal arts is that they encompass things that are worth studying for their own sake—subjects like chemistry or literature or anthropology are just intrinsically valuable, intrinsically fascinating. Of course, not every subject is everyone's cup of tea, which is why we let you major in whatever you want. And that's critical because it gives you the motivation, the curiosity, the sense of questioning that leads you to dig deeper and learn more through research.

So you major in what interests you and it trains you to think creatively and analytically, to communicate, to collaborate. The skills you learn that way are actually far more important than whatever subject you study, whatever specific knowledge you gain. It's great if you're an English major and go on to study English in graduate school; it's great if you're a physics major and go on to design silicon chips. But your career doesn't need to follow your major: what a liberal arts education does, particularly when it culminates in undergraduate research, is prepare you for life afterward. The fun, the sense of wonder that you get as payoff for studying a particular subject—that you chose yourself—is what makes the enterprise worthwhile.

Q: What's different about undergraduate research at the UO?

A: Our research faculty members are more involved with undergraduates than at many other places with larger campuses and larger budgets. We're big enough to be a national and international player in a lot of fields: we do big science; our humanists and social scientists win coveted national awards. But we're small enough that regular interaction with undergraduates is something we expect of



**Why do you need discipline?
Because that's what you
need to succeed in life.
Life is tough. You get out
of here, it's tougher than
ever before.**

our faculty members, and there are lots of opportunities to pursue advanced research under their guidance.

Q: Why would a research experience matter to a student who isn't interested in graduate school?

A: For all the reasons I outlined before: research isn't just for preprofessionals, for people looking to build up a skill set in a prescribed field. That's great, of course, if that's what you want, but research prepares you to perceive problems, pose questions, develop discipline and rigor and method, and enjoy the satisfaction that comes from shedding light on some area that had been dark before.

We actually call research fields "disciplines" because they're all about training yourself to do hard work. It's like pumping iron. It's like getting up at six in the morning and rowing a boat over and over again. Why do you need that discipline? Because that's what you need to succeed in life. Life is tough. You get out of here, it's tougher than ever before. The economy is being upended by globalization and technology. You need to know not only how to be a good worker, but to have the imagination, the creativity, the adaptability, the flexibility to react to an ever-changing world. That's what any of the disciplines give you. And you can only experience that by being exposed to research yourself. You can't get it by reading a textbook. Besides, it's fun to explore. ■

Consider the Humble Bumblebee

Which bee is better at pollinating blueberries? The Sustainable Farms team discovered the answer—and so much more.



By Lisa Raleigh

When a family member inquired about his bee-monitoring field research project, UO senior Keane Daly had an authoritative explanation at the ready.

Pollination can't be done artificially, he informed his relative. But it is essential to agriculture. And the only way to accomplish it—and sustain the production of flowering crops—is naturally. Thus the vital importance of bees.

Preferably healthy populations of prolific pollinators. Ideally native species. Like the bumblebee (*Bombus* spp.).

These were some of the takeaways, in terms of knowledge gained, for the students participating in the Sustainable Farms project—one of the field experiences offered last year by the UO's Environmental Leadership Program (ELP).

Yet the indispensability of bees was only one lesson learned; students also acquired a host of collaborative teamwork skills along the way.

Now in its twelfth year, ELP is a service-learning initiative that partners

teams of undergraduates with local community agencies in an effort to jointly address environmental needs. Projects range from restoring wetlands to educating schoolchildren about the value of the forest canopy—all resulting in a demonstrable impact in the real world.

The Full Package

At the same time, each undergraduate participating in an ELP project hones a comprehensive package of professional skills that, depending on the project, can include conducting field surveys, performing data analysis, formulating recommendations, writing reports, presenting their findings publicly and taking a role in team leadership.

With the Sustainable Farms project, funded by the Katherine Bisbee II Fund of the Oregon Community Foundation, students got exposure to all of the above.

According to Daly, an environmental studies major, each of the nine team members was involved in every aspect of the project in some way, and each assumed a leadership role in a particular area, such as managing the website or writing a report.

In Daly's case, he was in charge of data collection on the six blueberry farms in the study, and he is now working to revise the final project report (coauthored by two other team members) to turn it into an article for both the *Oregon Undergraduate Research Journal* (see page 24) and also an outside professional publication, *Northwest Naturalist*. In this latter effort, he is collaborating with one of the student coauthors of the original report.

Another student, Aaron Poplack, was the colead on the second phase of the project—a pollinator conservation plan written for the Berggren Demonstration Farm on the McKenzie River. The student-written plan makes specific and extensive recommendations for creating a habitat that will support native pollinators

and help the farm model effective practices to educate the public.

"It was really different to collaborate on a document with nine people," said Poplack, an environmental studies major with a minor in planning, public policy and management. And that's not counting the multiple editorial reviews by a faculty mentor, a graduate student reviewer and the clients at Berggren, as well as a peer review by a botanist and an entomologist—all necessary steps toward the plan's completion.

"It was a very rigorous and exhausting process for them," said Peg Boulay, the undergraduate coadviser for ELP. "But it allowed them to achieve professional-level work."

Bee Prepared

The Sustainable Farms project began in the classroom last winter, with the students learning first about methods for reviewing scientific literature and for conducting a monitoring project in the field. They also received training in another set of methods: the basics of professional team



The honeybee (above) is subject to colony collapse disorder and pollinates at only one-third the speed of the native bumblebee (above left).

THE SUSTAINABLE FARMS TEAM



collaboration, such as meeting protocol (how to write an agenda, lead a discussion, take minutes) and the art of organizing and assigning tasks, coordinating results and determining next steps.

By spring term, the students were ready to take their newfound skills out into the field. The purpose of their research project, as stated in the executive summary of their final report, was to:

*... monitor the behavior and population counts of *Bombus* spp. [bumblebees] and *Apis mellifera* [honeybees] on *Vaccinium* [blueberry] farms in the Willamette Valley of Oregon. With global pollinator populations declining there is a concern for the reproduction of plants that rely on biotic pollination, most notably food crops. Through this study we obtained a better understanding of the role each genus plays within pollination services.*

The general method for the study was based on a protocol from The Xerces Society for Invertebrate Conservation. “But for the most part, we figured out what needed to be done,” said Daly—i.e., what steps needed to be taken and who was going to perform them.

The team monitored the bees by establishing three transects at each of the six blueberry farms in the study (three large and three small farms) and then counting how many flowers were pollinated per minute by each species group (bumblebees and honeybees). They also performed a population count to establish the numbers of each species group at each location.

Their key finding: honeybees, on average, pollinated 3.52 flowers per minute and bumblebees pollinated 11.22 flowers per minute. In other words, bumblebees pollinate at a rate more than three times faster than honeybees.

“I’ve known all along that bumblebees are better pollinators,” said Norma Grier, owner of Royal Blue Organics, one of the large farm sites. “But I didn’t know how

much better. The students had the real-time information.”

From the population count, the team also found that honeybees were more abundant than bumblebees, but there was no strong correlation between population and other variables (size of farm and so forth).

But even though honeybees were more numerous overall, at certain sites bumblebees were more effective at pollinating blueberry bushes, despite their smaller population. The team observed that this occurred at farms with higher habitat assessment scores, meaning those (like Royal Blue Organics) that had better native pollinator habitat.

The Bee of Choice

This points to the crux of the Sustainable Farms study: bumblebees are native to the Willamette Valley and are active during the cool spring when blueberry bushes flower. In addition, honeybees are experiencing colony collapse disorder and other challenges that make the maintenance or renting of honeybee hives an increasingly risky expense for growers.

The students’ data suggest that native bumblebees can provide important pollination services for local farmers—and might even be considered the bee of choice.

However, the bumblebee presents its own set of challenges.

Bumblebees are solitary ground nesters, which means that tilling can disrupt or destroy their nesting opportunities. In addition, they need diverse nectar plants blooming throughout the spring and summer.

Recommendations for overcoming these obstacles—and more—are explained in part two of the Sustainable Farms project: The Pollinator Conservation Plan,



The Sustainable Farms team. Left to right, standing: Raj Vable (graduate student mentor), Miguel Pacheco, Meagan Maxon, Keane Daly, Kelsey Kopec, Amanda Whitcomb, Bret Cypel, Chelsea Johnson. Kneeling: Aaron Poplack. Not pictured: Lauren Ward.

a custom plan written for the Berggren Demonstration Farm. This farm—a joint project of the McKenzie River Trust and Cascade Pacific Resource Conservation and Development—is a thirty-acre parcel along the McKenzie River that is being converted from pastureland to organic food production.

Among the students’ recommendations for creating a bumblebee-friendly habitat: minimize tilling; leave snags and abandoned rodent holes undisturbed as potential nesting sites; plant flowering cover crops between rows; create a mid-field hedgerow of native flowering shrubs that bloom in successive seasons to keep bumblebees happy and within range.

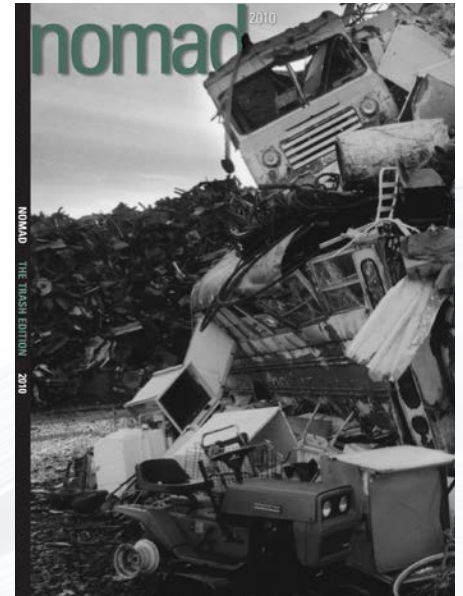
Their plan includes the team’s design for a demonstration pollinator garden—intended to draw bees as well as butterflies and hummingbirds. The student writers suggest more than twenty flowers, shrubs and herbs as an additional nectar habitat.

As the owner of one of the blueberry farms in the study, Norma Grier was invited to attend the team’s public event last June, and got to hear not only the Sustainable Farms presentations but also all the other ELP presentations on the full range of projects completed last year.

“Wow, it was really impressive to hear about all their work,” she said. Because her farm had been one of the studied sites, she knew first-hand “what goes into these projects,” making her all the more appreciative. “I was just flabbergasted at how rich the opportunities were for the undergraduates.” ■

Visit Online Extras at cascade.uoregon.edu to read the Sustainable Farms reports.

nomad: the journey is the reward



By Lisa Raleigh

Literature and cinema are rife with secrets. Across the globe and throughout the ages, telling the tale of human experience has often involved heroes (or antiheroes) who shelter secret identities or lovers, who harbor secret schemes or plots. From the conspiracy that brought down Julius Caesar to the over-the-top intrigue of James Bond blockbusters, we love the narrative tension of secrecy.

But even the act of narration can be a secret. Consider Anne Frank. Or Russian dissident Aleksandr Solzhenitsyn, forced to do much of his writing in secret after his novel, *One Day in the Life of Ivan Denisovich*, revealed brutal conditions in Soviet labor camps.

These are just a few small glimpses into a rich vein of possibility for this year's *Nomad* journal, which will center on the theme of "Secret."

The students who contribute to *Nomad*—the undergraduate journal of the UO Department of Comparative Literature—will decide for themselves how to explore this theme in the context of scholarly research and analysis.

Last year's *Nomad* theme, "Trick," included articles ranging from an examination of magic realism in Isabel Allende's *The House of the Spirits* to the use of 3-D in cinema to trick the eye. Previous issues focused on themes such as "Trash," "The Undead" and "What Sustains Us."

a little bit provocative

"We try to pick themes that can work many different ways," said Lisa Freinkel, comparative literature department head. "We like to be a little bit irreverent and provocative, while coming up with a theme that lends itself to both contemporary cultural studies and traditional literary analysis."

Now in its thirteenth year, *Nomad* is dedicated to giving undergraduates an in-depth experience of developing, writing

Cover-to-cover, each issue of *Nomad* features original research papers written exclusively by undergraduates.

and publishing an academic essay. Cover-to-cover, each issue of *Nomad* features original research papers written exclusively by undergraduates. The students also present their papers at a full-day conference in the spring.

But it's not just the end product that makes *Nomad* unique; it's also the process.

It begins in the fall, when faculty members and graduate students invite eighteen to twenty promising undergraduates to join the *Nomad* editorial team (about twelve of them will see it through the entire year). Most often, these students are recruited via introductory comparative literature courses, where they acquire a foundational understanding of the discipline.

Each student is then paired with a mentor. In many cases the mentor will be a graduate student, but sometimes a faculty member will volunteer. This year, Lisa Freinkel is mentoring a freshman on the *Nomad* team.

intensive one-on-one

Thus begins an intensive one-on-one relationship, which Freinkel likens to an apprenticeship experience. This has

becoming an apprentice to the discipline

benefits all around. Not only do the undergraduates receive individualized attention and guidance, but the graduate student mentors also gain invaluable lessons as teachers.

“We learn how to meet them where they are,” said Emily McGinn, a graduate teaching fellow and this year’s *Nomad* mentorship co-coordinator.

Even the faculty mentors benefit. Because undergraduates are on a learning curve and “aren’t yet fully professionalized,” said Freinkel, “they help us have a fresh perspective on our discipline. Some of the most exciting moments I’ve had have come from their ‘disorienting’ perspectives.”

Once paired with a mentor, the undergraduates undertake a yearlong process of immersion in the “conversation” of comparative literature. Building on their basic understanding of the field, they learn about library and digital research methods that will come in handy when they choose their angles on the “Secret” theme.

an original idea

Their research mission will be to learn what’s being said among scholars that is relevant to their particular topic and how the discussion has been framed thus far. Next—and this is where a *Nomad* project departs from a typical term paper for a class—the students are expected to develop an original idea that adds to the conversation. This is the fundamental task of professional scholarship.

Two years ago, when Olivia Awbrey joined the *Nomad* team as a sophomore, the theme was “What Sustains Us.” Awbrey, a double major in comparative literature and history and a student in the Clark Honors College, became intrigued by the possibilities of a Senegalese story called “Tribal Scars,” which she had read in a class the previous year.

“Tribal Scars” is a story of survival in a time of French colonization, when native Senegalese became human fodder

for the slave trade. In Awbrey’s view, “Tribal Scars” demonstrates that the act of storytelling itself can be a means of cultural and personal preservation—i.e., sustenance.

As she writes in her *Nomad* piece, her research aim was to explore “the possibility that storytelling can revive the past and create a new sense of meaning to sustain an individual’s identity that was dismantled by colonial rule.”

But her path through that exploration was not predetermined by any means. Even though ably coached by her graduate student mentor, her research took her into domains—like scholarly analysis of African literature—that broke new ground for both of them.

more piercing questions

Also, it seemed that one source inevitably led to others. “Different sources bring up different, more piercing questions,” she said, many of them opening further doors into an almost bewildering array of possibilities.

Eventually, though, Awbrey narrowed the field to a (still large) stack of articles and books that were most relevant to her research question. And then she confronted the “now what?” moment.

“I really wasn’t sure how it would all fit together,” she recalled.

Rising to this challenge—fitting together the puzzle pieces to develop an original piece—is the moment of truth for any scholar in the humanities, and Awbrey forged ahead. Next stop: the first draft.

Here again the *Nomad* essay differs from the average term paper, which might—in the case of a few advanced classes—be expected to undergo a revision or two, at most. *Nomad* essays, in contrast, undergo successive revisions that are reviewed by mentors, other graduate students and faculty members, as well as undergraduate *Nomad* peers.

Jacob Plagmann recalls the peer review workshop as an eye-opener. Under the encouragement of his mentor, he felt he

was making good progress on his paper for the “What Sustains Us” issue, on the topic of sin and redemption in *The Brothers Karamazov* and the works of Søren Kierkegaard. But the feedback he received in the peer workshop made it clear that some were having trouble following his narrative thread. And so he went back for another significant round of revision.

Plagmann, now a senior majoring in comparative literature and Russian, looks back at this a little ruefully but also with appreciation for what he learned. He characterizes the editorial process as “meticulous,” as does Awbrey (who also successfully navigated the revision hurdles to see her essay through to completion).

This is indeed what’s promised on the *Nomad* web page: that students will experience the full extent of the editorial process, “from the subject matter’s conception, to research methodology, to putting words on the page, to structuring arguments, to final and perfect proofreading.”

in service of fluency

Throughout the year, *Nomad* students also deepen their understanding of comparative literature through a host of visiting lecturers and events centered on the *Nomad* theme. Last year, for instance, in support of “Trick,” guest speakers included a writer of noir fiction, an expert in subversive graffiti and a performance artist.

It’s all in service of developing what Freinkel calls “fluency” in the discipline. Just as mastering another language requires much more than learning vocabulary, mastering comparative literature goes far beyond the (necessary) knowledge of terminology and taking an active role in participating in the dialog.

If students are indeed going to enter into the conversation, she says, “they need to speak the way the natives speak,” while taking the risk and initiative of putting forth their own ideas and developing an argument in a sustained way. ■

The Science Channel

Scientists across disciplines welcome undergraduates into their world

The term “research” typically evokes the scientific laboratory, and there is indeed serious undergraduate research taking place in the dozens of science laboratories in the College of Arts and Sciences.

Undergraduates are surveying invertebrate ocean life for the Oregon Institute of Marine Biology. They have traveled to Bolivia to camp out at 17,000 feet in the Andes to study high-altitude sickness. They have examined fossil records to gain insight into modern-day conservation efforts. They have studied the genetics of cell division, the effects of stress on memory and the potential for new materials to improve the efficiency of solar cells.

The list goes on and on. In fact, hundreds of UO undergraduate students are doing meaningful work as members of scientific research teams or under the one-on-one mentorship of science faculty members. Here are just a few outstanding examples.

Profiles by Matt Cooper
Photos by Jack Liu



MEASURING THE SIXTH SENSE

Field testing the iPod Touch as a proprioceptive tool

For the ambitious undergraduate drawn to human physiology research, the question isn't what to study. It's what not to.

Cardiopulmonary systems. Exercise and muscle physiology. Motor control. All of these areas of UO faculty expertise create opportunities for undergraduate research experience. For good measure, the Department of Human Physiology also features a climate-controlled environmental chamber that, with the press of a button, can plunge to zero degrees Fahrenheit, or zoom up to 130, allowing researchers to observe and assess the human body under physical stress conditions.

For Lizzy Gillespie (above), the answer was scapular biomechanics. Gillespie was a sophomore honors student looking for thesis ideas when she introduced herself in 2010 to associate professor Andy Karduna. Karduna studies occupational disorders—research with the imminently practical goal of improving health—and Gillespie found this intriguing.

Karduna gave Gillespie two options for developing a thesis and exploring the

world of research: Work under a graduate student or, as Karduna put it, pursue “this crazy idea that an iPod Touch might be a tool for our lab.”

Not a tough choice.

Gillespie, great granddaughter of former university president Robert Clark and a student in the Robert Donald Clark Honors College, has spent three years studying the iPod's effectiveness for measuring proprioception. Often referred to as the “sixth sense of position and movement,” proprioception is the sense of one's body orientation and movement in space without the use of sight.

Doctors and physical therapists test motor control and nerve damage with proprioceptive tests during which subjects are asked to copy a specific joint position—say, flexing an elbow to a 90-degree angle. But tests are typically possible only in a lab setting due to the limitations of the equipment; Karduna thought an iPod Touch might enable work to be done in the field, given it contains the same devices—a triple-axis accelerometer and gyroscope—that are used in the lab.

Although Karduna and his graduate students guided Gillespie through the project, it was essentially hers: she was

The university is studying the potential for putting the iPod app on the market. Said Gillespie: “It would be kind of cool to say to my grandkids one day, ‘I helped invent that app.’”

instrumental in designing all experiments and coordinated the data collection.

Over the initial months of study, Gillespie recorded the iPod's accuracy for measuring joint angles and found it to be off by no more than half a degree—better than the laboratory's own accelerometer.

Next came creation of an app to run proprioception tests. The university's InfoGraphics staff members developed the app with Karduna; Gillespie oversaw a series of trials that lasted more than a year, during which subjects wearing an iPod Touch used the app to run through a range of arm positions.

The climax came in Florida: Gillespie spent five days at the annual meeting of the American Society of Biomechanics in Gainesville, where, working with Karduna and two graduate students, she studied the app's effectiveness by testing more than 100 people.

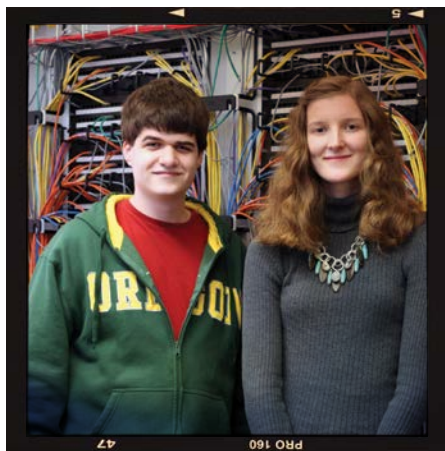
"The thing that I enjoyed the most was that it was truly my project," Gillespie said. "I took responsibility and because I had the freedom to do with it as I might, it made me want to work harder—to get those 100 subjects, which was my goal."

It can be intimidating to ask to join a professor's lab, and the learning curve is steep. But Chris Minson, head of the human physiology department, said all nine tenure-track faculty members in his department rely on undergraduates for a range of laboratory duties.

"Everyone's interested in exercise or knows someone who has a problem associated with aging or high blood pressure," said Minson. "The work we do and the approaches we take tend to resonate very well with students."

And what became of the iPod app? The university is studying the potential for putting it on the market.

Said Gillespie: "It would be kind of cool to say to my grandkids one day, 'I helped invent that app.'"



POKING HOLES IN THE 'CLOUD'

Stealthy Students Find Weaknesses in Virtual Computing Security

The latest revolution in the Information Age is "cloud computing." The data-crunching power and storage capacity of multiple computers are pooled in an offsite virtual "cloud," creating a shared resource for users. One example: Instagram, a photo-sharing service.

Cloud computing also allows for complex functions to be processed with lightning speed. It's especially useful for mobile devices such as smartphones, which have limited power.

And it's vulnerable to attack by UO undergraduates Ryan Snyder and Hannah Pruse (above).

Both seniors in computer and information science, they've become adept at poking holes in the "cloud," so to speak.

In November, UO researchers announced that, in a joint effort with North Carolina State University, they had found a way to exploit cloud-based web browsers, using them to perform large-scale computing tasks without official access. They showed that third parties could potentially take the free computing power of cloud browsers and use it to

crack passwords, thereby gaining stealth access to cloud resources—a finding sure to make industry sit up and take note.

Snyder was a coauthor of the accompanying paper, "Abusing Cloud-Based Browsers for Fun and Profit." He is skilled at "reverse engineering," which is the process of discovering the technological principles of a system through analysis of its operation.

Snyder was at a campus job-recruitment event last year when he met Joe Pletcher, a UO graduate teaching fellow involved in the cloud-browser project; Pletcher quickly put Snyder to work unlocking the ways that the browsers under review by the research team talked to each other.

Snyder recalled "a lot of late nights" in Deschutes Hall over a five-month period, laboring to write programs giving him access to the browsers and staring at screens of data incomprehensible even to most computer experts. But it was worth it.

"With regular course work, I feel like it's jumping through the hoops that everyone has jumped through before you," he said. "With research, you're contributing something new, something that hasn't been done before."

Pruse had a similar reaction after her first taste of research. After excelling at a classroom project in assistant professor Kevin Butler's operating systems class in 2011, she was invited by Butler to join his lab, the Oregon Systems Infrastructure Research and Information Security Laboratory.

That fall, Pruse began looking at the potential for sensitive data to be compromised through the sharing of computers that is fundamental to cloud computing. Under a concept called "coresidency," an untrusted party can be an undetected "resident" on information channels; Pruse orchestrated a number of attacks illustrating that this problem

is not isolated but rather “a real threat in the cloud computing model,” as she stated in a paper presented at the 2012 Cloud Computing Security Workshop in Raleigh.

“I’m surprised I could be a part of solving real problems,” Pruse said. “I really enjoyed putting my knowledge to work to benefit the future of information security.”

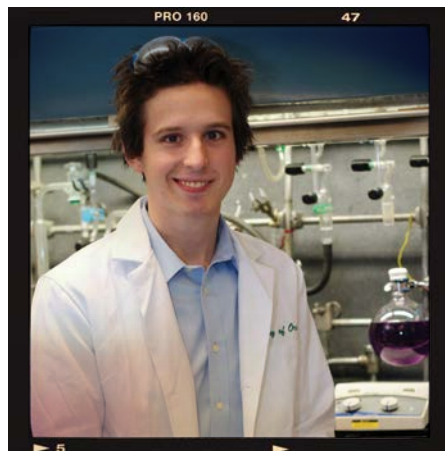
Computer science and security is a great area for students to explore, Butler said, as industry increasingly focuses on sales and product development while relying on universities for research.

The Oregon CIS department includes three courses that offer academic credit for undergraduate research and numerous professors fund undergraduate work from their research grants. Ten undergraduates have worked in the Network Security Research Laboratory, for example, and at one point the lab even included a student from South Eugene High School who analyzed computer traffic for a year.

Undergraduate research is “almost essential” for students seeking entry to top graduate schools, Butler said. And for talented students such as Snyder and Pruse, the career impact can be even more immediate.

“The company in question on Ryan’s project responded very positively to the study,” Pletcher said. “They said, ‘we’d love to hire you.’”

Pruse orchestrated a number of attacks illustrating that this problem is not isolated but rather “a real threat in the cloud computing model.”



GOING WAY BEYOND THE TEXTBOOK

Chemistry student one of only fifty-two in the nation to receive \$19,000 research award

Gregory Harlow thought his future was set: Finish his chemistry studies at the UO. Get a pharmacist’s degree. Find a job in retail pharmacy—Target, maybe.

Not too exciting, perhaps, but what else was there for a guy who gets fired up about molecules, carbon-based compounds and nitrogen-boron ring systems?

Enter: Shih-Yuan Liu’s organic chemistry class.

Liu encourages students to “go beyond the textbook,” to ask their own questions and find answers in whatever resources are available, including scientific journals and articles. It was Harlow’s first taste of true research, and it awakened something within him.

“I found myself spending my free time reading about chemistry beyond the scope of the class—just out of curiosity,” Harlow said. “It opened me up to the whole scientific process. It required me to think.”

That was March 2011, when Harlow (above) was a junior. In the twenty months since, Harlow has joined Liu’s laboratory,

landed a prestigious scholarship, contributed research that will appear in two published papers and scratched the pharmacy career path in favor of pursuing a PhD in chemistry.

Harlow was one of only fifty-two students nationwide to receive \$19,000 from the Arnold and Mabel Beckman Foundation to support his research on a new class of nitrogen-boron systems. His work could ultimately contribute to human-health applications such as blood-glucose monitoring for diabetic patients.

Harlow is one of only five undergraduates in Liu’s laboratory, which develops molecules for biomedical research and materials science.

“It was a no-brainer to make space for Greg,” Liu said. “He’s already at the graduate level. He’s working completely independently—that involves planning, searching the literature, execution and analysis of the outcome. It comes to Gregory very naturally, but perseverance and hard work are things that research teaches.”

At the UO, roughly 65 to 80 percent of each year’s graduating class in chemistry has done at least one term of undergraduate research—a statistic generally unheard of among the nation’s other top research universities, said Michael Haley, department head.

Finding a spot in a laboratory is competitive, but Haley said there is always room for an ambitious, qualified student who starts the process early.

“Training an undergrad to be productive requires a lot of time and effort, so people tend to take students at the end of sophomore year or early in junior year,” Haley said. “That way we get a good return on investment and they get enough research done to write a great thesis and—more often than not—be a coauthor on a published paper.”

Faculty members appreciate the fresh energy and ideas that undergraduates

bring to laboratories—and Harlow does not disappoint. As he discusses the intricacies of binding cyclohexane derivatives to molecules that contain multiple oxygen-hydrogen groups, he exudes an enthusiasm that, as he said, “grows day by day.”

But not everything comes naturally for him. Research has also taught Harlow how to handle failure.

Harlow recalled an experiment with azaborines—synthetic chemical compounds used as a surrogate for benzene—that ran into a roadblock. For more than three months, try as he might, he couldn’t produce the reaction that he sought.

“It required me to keep the general goal in mind but move to a different process,” Harlow said, recalling the experience with a smile. “I’m learning when it’s time to think about a new way to think about things.”

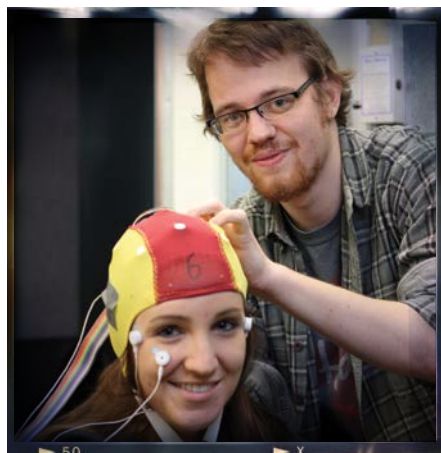
EXPLORING THE DIMENSIONS OF ‘VISUAL CROWDING’

Neuroscience laboratory entrusts undergraduate with brain-wave experiments

The electroencephalography cap—it looks much like a swimmer’s cap—is a fundamental tool for cognitive neuroscience.

The EEG cap fits snugly over the head, allowing the attached electrodes to record the brain’s spontaneous electrical activity. Any number of factors can throw off readings from this highly sensitive equipment, and Dan Klee, a recent graduate of the Clark Honors College, (above, right) considers every one of them every time he fits a subject with the cap.

The headgear, which can be uncomfortable, must be perfectly positioned, the calibration adjusted precisely for each subject. There is also



the human element to consider: Klee must strike a perfect tone with his subjects, calming and defusing those who are apprehensive while projecting the authority necessary to ensure that a test is conducted properly.

It’s the kind of work that typically goes to a graduate student, given the expense of these tests and the demand to get things right the first time. And for Klee, one of precious few undergraduates in cognitive neuroscience entrusted to run these experiments, it’s been thrilling.

“I was game to do it—it was a great opportunity,” Klee said. “The EEG is the meat of the whole cognitive neuroscience process. This was an opportunity to really be doing serious research.”

Klee, in fact, has been game for anything asked of him since joining the laboratory of psychology professor Edward Awh three years ago to study visual working memory and attention.

Klee came to the university expecting to study music. But his real interest was psychology, and the more he studied it the faster he progressed; by sophomore year, he was convinced that he wanted to apply to graduate schools so he began mass-emailing professors in the hope of finding a position with a research laboratory. Awh was the first to respond, initiating a three-

year relationship during which Klee has enjoyed the latitude to take on whatever interests him in the lab.

Klee studies “visual crowding,” a phenomenon that limits our ability to recognize objects in peripheral vision. Research could bring educational benefits for individuals with attention deficit hyperactivity disorder and the development of learning tools for individuals with specific types of visual impairment.

Undergraduates in Awh’s laboratory start “in the trenches,” the professor said: They learn to develop theories and conduct experiments, recognizing that everything takes longer than the textbooks suggest. Graduate students generally handle data collection but Awh allows talented undergraduates such as Klee to help.

Klee, in fact, is a coauthor for three published papers developed by Awh’s lab, which will only strengthen his application to a PhD program.

His first published paper focused on “subitization,” which is the brain’s ability to instantaneously count, on sight, a number of items; it was published last year in the *Journal of Neuroscience*. The study incorporated use of the EEG cap; Klee learned the intricacies of the device first by observing a graduate student work with it, then by performing those experiments himself under supervision.

Awh credited Klee not just for his performance in running tests but for being able to join in the higher-level discussion between professors and graduate students about what those tests mean.

“Dan’s one of those students who is able to hold his own in these discussions,” Awh said. “That’s what I’m looking for in a student who wants to be a coauthor and a collaborator at that level. Dan has gone as far as any undergraduate research assistant in my lab for fourteen years.” ■

Got the Right Stuff?

Find out, in the Advanced Physics Laboratory



Under the eye of lab supervisor Bryan Boggs (right), students such as Jacob Magers work with spatial light modulators and other research-grade equipment.

Steve Gregory is looking for a few good nerds.

For the associate professor of physics, there is no higher distinction. Gregory's the first to admit that he's a nerd himself—a "lab rat," a guy who spends an absurd amount of time in a special laboratory deep in the bowels of the physics building. There, Gregory and his buddies rip apart and reconfigure any number of high-end scientific gadgets, the functions of which would inspire only head-scratching among normal people.

Atomic force microscopes. Spatial light modulators. Erbium-doped fiber amplifiers with continuous wave lasers.

But Gregory and colleague Bryan Boggs didn't pull together this panoply

of precision devices for their own amusement (although that's a nice byproduct). The idea is to recruit that certain subset of undergraduates—the ones who aren't necessarily A-plus speakers but know how to use their hands, the ones who get a charge out of superconductivity projects, the ones for whom the concept of "surface plasmon resonance" resonates, the ones who are, well, for lack of a better word, . . .

"We're trying to attract nerds," Gregory said simply. "We need people like ourselves. You bring a nerd down here and they start quivering. That's one way you can spot one."

This is the Advanced Projects Lab, where undergraduates use research-grade equipment as they explore the frontiers of modern physics. It's a proving ground for students wondering if they've got the right stuff to do research.

At many large universities, million-dollar scientific instruments are the domain only of graduate students and professors. But Gregory and Boggs—recognizing the importance of inspiring tomorrow's researchers—went the extra mile to make such equipment available to undergraduates at the UO.

On a recent day at the lab, Mexican exchange students Adriana Vallejo and Mario Martinez worked with a superconducting quantum interference device, or SQUID. Senior Nick Anthony tinkered with a spatial light modulator as he experimented with "optical vortices," a field of study on the leading edge in research laboratories today.

Physics majors Trevor Jones and Matt Ruby, meanwhile, used a function generator and resonance oscilloscope to study sonoluminescence—the use of sound waves to generate light. Although stumped by the challenge of collecting and measuring the light emitted, both felt the work will help them stand out when they apply to graduate schools.

"The end result is not as important

as the path getting there," Ruby said. "Problem-solving skills are the most versatile skills there are."

Gregory and Boggs started the lab to give undergraduates a true research experience, one that can't be taught from a textbook. They got administrative support—and equipment—from then-department head Steve Kevan; physics senior instructor Dean Livelybrooks helped get the program off the ground and Boggs continues as supervisor. Startup funding came from Intel and the Tom and Carol Williams Fund, which supports innovation at the UO.

The laboratory runs year-round, usually for two or four credits. Students typically join in their third or fourth year, pick a project of interest and try to advance on what has already been accomplished.

"Students come in on their own schedule," Boggs said. "Most of the projects are like those in a graduate research lab. There's a lot of problem-solving."

The laboratory gives professors the ability to write letters of recommendation based on how students perform. The goal is to train young scientists to work independently and think their way through obstacles in an experiment—strengths sought by graduate schools and employers alike.

Ken Gross '11, an optical engineer with Vancouver, Washington-based nLIGHT Photonics, a maker of semiconductor lasers, said the lab gave him the tools to design the high-power lasers that nLIGHT customers need to process materials.

"Being able to implement something that 'looks cool' into actual, repeatable, working science is amazing—and the projects lab is perfect for that," Gross said. "It gave me the direction of thinking required to keep finding new ways to tackle a difficult application."

Said Gregory: "It's important for students to find out how research operates. There will be times where they'll get stuck. That's what happens in the real world—you get stuck for a few weeks, you get angry and you deal with it." —MC

MICHAEL McDERMOTT

Intensive Summer Program Goes Deep with Life Sciences

“If you want a career in science, it’s here.”

When she was a high school student with outstanding grades and sky-high ambitions, Alexandra Hartman was looking at exclusive liberal arts colleges and considered the UO her fallback if nothing else panned out. But then her high school adviser intervened.

“He said, ‘even though it’s your state school, it’s a research university. If you want a career in science, it’s here,’” Hartman said. “And I am so glad I took his advice.”

Among 4,600 U.S. universities, the UO is one of only 108 with the top-tier designation of “very high research activity” by the Carnegie Classification of Institutions of Higher Education. The UO hosts more than twenty research centers and institutes ranging from the physical and life sciences to the humanities.

Hartman is among the hundreds of young scientists on campus who avail themselves of meaningful research programs each year. One of the best (according to Hartman herself) is the Summer Program for Undergraduate Research, or SPUR.

Every summer, SPUR provides fellowships for more than twenty undergraduates from the UO and other institutions to engage in intensive daily research in life sciences laboratories. Students with limited income and other disadvantages are immersed in rigorous, high-profile projects under the direction of research professors from biology and other disciplines.

Hartman, who studied brain behavior under Michael Wehr, an assistant professor of psychology, during SPUR 2010, went on to work in Wehr’s laboratory until graduating last spring and continues on in that lab as a research assistant.

“SPUR helped me link to a nationally funded principal investigator and a real lab where people are publishing research and doing new and exciting things,” said Hartman, who was coaledictorian for biology’s class of 2012 (see inside front cover). “You see just how hard research is, and that’s invaluable. It’s just not something you can get at a small, private school.”

SPUR students work full-time in the lab on cutting-edge research investigations, under the close supervision

The students end the summer-long experience with poster and oral presentations worthy of a national conference.

of “bench mentors” that include postdoctoral fellows, graduate students, lab technicians and faculty members.

Hartman studied how circuits in the cerebral cortex encode and transform sensory information, exploring how the brain “filters out” irrelevant data—i.e., the mechanism that allows you to hold a conversation without being distracted by the background music of someone playing a piano.

SPUR students come to the program with backgrounds as wide-ranging as biology, environmental science and psychology; their research has focused on subjects as diverse as craniofacial development, stomach cancer, climate change in the Pacific Northwest and the effects of total knee arthroplasty.

Students write progress reports that are updated weekly and reviewed by mentors, principal investigators and SPUR director Peter O’Day. They participate in laboratory discussions and are encouraged to present their work at a midsummer meeting.

Leading scientists from the UO and beyond also introduce SPUR students to pioneering research during a seminar series. UO speakers have included NIH “New Innovator” and neuroscientist Cris Niell and chemist Brad Nolen, a 2011 Pew Scholar.

“SPUR is very different from sitting in a biology lecture and being told, ‘this is what we know,’” said Karen Guillemín, one of last year’s faculty speakers and also director of the UO META Center for Systems Biology and a leading scientist on the interaction of bacteria and host cells. “SPUR students are being told, ‘this is what we *need* to know.’”

SPUR builds camaraderie through weekend outings to destinations such as the Oregon coast or Portland’s Oregon Museum of Science and Industry. Guillemín took things even further last summer: She held regular research discussions for her young team at Café Roma, a coffeehouse near campus; the students surprised Guillemín with what she called their “intellectual excitement,” exhaustively poring over each other’s research as they worked on communication skills and critical analysis.

The students end the summer-long experience with poster and oral presentations of research worthy of a national conference. Stellar work has emerged: Eight students from the 2012 program received national research awards at the annual Biomedical Conference for Minority Students in San Jose.

“We are very interested in enhancing the diversity and talent of the next generation of life scientists,” O’Day said. “SPUR provides spectacular opportunities for students to engage themselves in the life of a scientist and make career decisions based on a richness of information and authentic research experiences.” —MC

TRACING THE PATH TO OREGON

STUDENT DOCUMENTARIES CAPTURE ORAL HISTORIES OF TRANSNATIONALS

By Lisa Raleigh

The tattoo on Lidi Soto's forearm undulates from elbow to wrist. What could it represent? As you learn more about her—her origins, her research as a student at the University of Oregon, her current job as a liaison with migrant workers in Lane County—an idea begins to dawn: could it be a map?

Yes, Soto confirms. The tattoo is an outline of the state of Oaxaca, where she was born.

Soto's family is one of thousands that have made the journey to Oregon from this struggling region in southern Mexico. Her family followed a path traversed by many Oaxacans: first traveling to Veracruz on the Gulf of Mexico, then to Sinaloa and Baja on the Gulf of California, and



then eventually on to Oregon—ranging farther and farther north in search of work.

Soto, who graduated last spring with a degree in ethnic studies and political science, captured her family story in a documentary she produced in her final year as a UO student, for a unique class in ethnographic research called Latino Roots in Oregon.

The subject of Soto's ten-minute film is her mother, Rosalina Morales, who recounts her personal journey from her hometown of Santa María Tindú to Scotts Mills, Oregon.

Morales first began migratory agricultural work when she was eight, going with her father to Veracruz to work the sugarcane fields. After she married, she continued to leave Tindú with her husband and children in search of seasonal work. Her husband eventually came to the U.S., but the money he sent back wasn't enough to support the family, and he gradually brought the oldest children to Oregon, then his wife and remaining children (including Soto).

As a child, Soto worked the fields around Mt. Angel with her family for many summers.

"I came here with the intention of staying two years," her mother says at the beginning of the video. But she did not return to visit Tindú until eighteen years after coming to the U.S. (left).



YEARS IN THE MAKING

THE LATINO ROOTS course, offered for the first time in 2011 and now again in 2013, has been several years in the making. One of the first milestones in its development was a 2009 exhibit produced and curated by anthropologist Lynn Stephen, College of Arts and Sciences Distinguished Professor, and Gabriela Martinez, associate professor of journalism, which focused on the underrepresented history of Latinos in Lane County.

The educational panels created for the exhibit—originally displayed at the Lane County Museum and now traveling around the state—documented the lives of Latinos who have populated the county for generations. Stephen and Martinez also conducted several oral histories, including video interviews, which were an integral part of the exhibit.

These activities created a model for the students who would soon be enrolling in a unique course developed by Stephen and Martinez, also called Latino Roots. Both the course and the exhibit are sponsored by Selco Community Credit Union.

The Latino Roots course is a two-term intensive in cultural anthropology, ethnography and documentary filmmaking that culminates in a capstone video project documenting an individual or family history.

Cotaught by the two professors, the class introduces students to an alternative narrative to the white pioneer

history of Oregon, examining the depth and breadth of Latino and Latin American immigration, settlement, social movements and civic and political integration in Oregon during the twentieth century.

So far, this might seem like the syllabus for any of a number of courses in ethnic studies, anthropology or history, but some key points of departure make this a singular class.

SELF-INTERROGATION

ON A VERY PERSONAL level, students in this class are asked to also examine their own histories. Where did their parents come from, what are their roots? The purpose is to make them better aware of the differences among themselves, as well as their unexplored biases, to prime them to go out into the field to take another person's oral history.

"The first step of investigation is to ask oneself the same questions that will be asked of others," said Stephen.

Because the first cohort of students came from a wide range of ethnic and socioeconomic backgrounds, disclosing their personal histories in class led to searching discussions about racism, stereotypes, privilege and other challenging topics.

At the midpoint of the first term, the emphasis then shifted from this immersion in history, context and personal perspective to practical matters. Students began to learn how to research archival materials, how to conduct an oral history, how to master the basics of audio and video recording. In other words, they were delving into the methods of ethnography, steeped in the big questions of the practice, such as: Whose side do you tell a story from? What is truth? What is fact? What is the line between fiction writing, history and ethnography?

Only a select group of students was invited to enroll. "Students hear about it and they think it sounds really cool, especially because of the documentary capstone project," said Stephen, "but it's actually twice as much work as a regular class."

To ensure that the students who

enrolled were committed—and also able to handle the intellectual and technical aspects of the class—Stephen and Martinez interviewed all students interested in signing up. They accepted twenty-two, eighteen of whom saw the class through to completion.

Building on the foundation of the first term, the second term is highly technical. It's essentially a crash course in documentary filmmaking—production planning (aesthetics, lighting, framing sound); creating, building and refining the rough cut; adding music and subtitles; hours and hours in the Cinema Studies Lab at Knight Library, using Final Cut Pro, fine-tuning a final version.

The end result is a "digital portfolio" that contains the student's documentary as well as a transcript and selected pictures, documents and other source materials—all of which contribute to the Latino Roots in Oregon project and become part of University Archives and Special Collections at Knight Library.

DEPORTATION NATION

BYRON SUN HAD ELEVEN hours of interview footage with his parents to trim down to ten minutes. Like Soto, he was born outside the U.S. and originally came into the country without documentation.

When he was a toddler, Sun, a native of Guatemala, came to the U.S. with his mother to join his father; they were transported by a "coyote." At the beginning of his documentary *Deportation Nation*, Sun recounts this journey in a voice-over, narrated over a stream of family photos and depictions of life in his home country:

It took us over a month because the coyote wanted to sexually abuse a younger woman in the group. The train helped us escape, taking us closer to the border and to the hands of another coyote. "¡Aaaa-puuu-ren-se!" Darkness . . . the smell . . . the rats . . . the American Dream . . . the sewage tunnel dumped us in San Isidro; La Migra arrested us; they stripped us of our clothes checking for drugs; a few days went by and we got bailed out by my father.

But Sun and his mother did not show up for their immigration hearing; instead they stayed in the U.S. undocumented for seven more years. He grew up as a bicultural kid in Van Nuys, California, speaking Spanish at home and English at school, celebrating birthdays with piñatas and dressing up for Halloween as a Teenage Mutant Ninja Turtle.

And then they were deported. Sun's U.S.-born younger brother (shown with him in the photo, left) left the country with them.

Having been Americanized, Sun now had to re-acclurate to life in Guatemala



City, witnessing the daily perils of street violence, drugs and poverty but also more peaceful moments: "[from] the clapping of hands covered in *masa* making tortillas, to the blessings that I got from elderly women, to the hundreds of people walking in the streets talking."

Four years later, Sun and his mother received a pardon, which enabled them to return to the U.S. legally. Sun was uprooted once again and re-entered life in the States—this time in Oregon, where his father now lived.

Sun, who graduated last spring with a degree in ethnic studies and Spanish and is now in a bilingual creative writing program at the University of Texas, considers himself "a transnational human," with roots in both the U.S. and Guatemala.

"What I can't find in one part of my identity," he said, "I can find in the other."

CONTINUED ON PAGE 17

It's Complicated

Exploring the Nuances of 'Code-Switching'

“Un poquito de todo—yo soy un world citizen.” (A little bit of everything—I am a world citizen.) –“Jack”

When a bilingual speaker switches between one language and another, what motivates the switch? That was the essential research question for Sarah McCauley '12, who double-majored in linguistics and Spanish.

To explore this question, McCauley designed her own study centered on the phenomenon of “code switching,” the linguistics term for switching between languages. Code-switching might involve a single word, a phrase, a sentence or an entire conversation.

Not surprisingly, McCauley found that the Spanish-English speakers in her study switched languages depending on context—i.e., they changed it up depending on who they were speaking to and the topic of conversation.

AFFILIATIONS AND ASPIRATIONS

But she also discovered that many other factors came into play: where the speaker was born and grew up, family heritage, social affiliations and aspirations—even physical appearance.

In fact, this latter determinant had a profound influence: to what extent did the speaker believe he is perceived as Latino? And how strongly did he want to be perceived as such?

In other words, it's complicated.

For her study, which she submitted as her Clark Honors College thesis, McCauley recruited four Latino bilingual speakers from the UO student population, all of whom happened to be male. She first conducted an interview with each of them—in either English or Spanish, depending on their preference—to get their personal histories, and then she paired them up for one-on-one conversations that were digitally recorded.

McCauley was not present for those paired conversations, but suggested that

the participants discuss whatever topics they liked (sports, family, school and so on) and speak to each other in English or Spanish or both in a way that seemed most natural.

From the interviews and recordings, she analyzed their individual patterns. How often did each person initiate a switch from English to Spanish or vice versa? Did the switch involve occasional words or phrases, whole sentences or long passages? When one speaker switched, did the other follow? She then charted and graphed their behavior.

'IT'S REALLY ABOUT THE WHY'

But the pie charts didn't give her answers; they only raised more questions. “I thought it was going to be about the data,” said McCauley. “But it's really about the ‘why’.”

Why, for instance, did “Armando” speak primarily English—in all contexts?

Armando (a pseudonym) was born in Eugene, the first in his family to be born in the U.S. His father is Mexican, his mother is Dominican and his skin tone is dark. He grew up in a bilingual household, where both his mother and his uncle spoke only English to him. Today, he primarily uses English, even with his family, and he chose to speak English in the interview with McCauley, stating that he could express himself better in this language.

To what extent did the speaker believe he is perceived as Latino? And how strongly did he want to be perceived as such?

But another reason for preferring English, he revealed, is his sense that others perceive him as “black,” not Latino. This has led to awkward social interactions when he speaks Spanish and so he avoids using it. Because of his skin color and the way he perceives others respond to him, “his struggle is proving he's not really black,” said McCauley.

As a result, Armando has lost confidence in his Spanish skills, so that when he was paired with “Santiago” for his one-on-one conversation, he spoke minimal Spanish in that context, even though Santiago moved fluidly between languages.

Santiago was born in Mexico but raised in Los Angeles. His father, of Italian descent, and his mother, of Lebanese descent, were also born in Mexico and spoke Spanish in their home when Santiago was growing up. In fact, he did not learn English until he started school in the U.S.

Immersed in the Latino community in Los Angeles, he grew up fully participating in the traditions of his Mexican roots and still considers himself to be part of this culture.

In conversation with Armando, Santiago initiated numerous switches from English to Spanish, but Armando would reply with only very brief answers in Spanish, and Santiago eventually abandoned the effort.

CROSSING AND RE-CROSSING BOUNDARIES

This contrasts with the other pair, “Jack” and “Richard,” who easily crossed and re-crossed the Spanish-English boundary in their conversation.

Like both Armando and Santiago, these two men also trace their family histories back to multiple countries.

LATINO ROOTS, CONTINUED FROM PAGE 15

IN DAILY CONVERSATION

NOT EVERYONE in the Latino Roots class focused on their own family. Other students interviewed friends and acquaintances.

Scott Erdman, for instance, interviewed “Aurora López,” who had been his coworker at a food processing plant in Eugene. He gave his friend a pseudonym and also filmed her so that her face is never revealed, protecting her identity because she is in the process of seeking citizenship.

In the video, López is shown in daily conversation with her family in Tulancingo, Mexico, where her father and six of her siblings live. Taking advantage of cheap international cell phone rates, she chats during her lunch break at work and also at home while engaged in everyday tasks such as frying tortillas.

In one conversation with her father, he recounts first coming to the U.S. in 1940 as a bodyguard for General Miguel Flores Villar of the 26th Mounted Regiment of Mexico. After World War II, he came back as part of the *bracero* program, which brought five million agricultural workers into the United States between 1942 and 1946 (photo, page 15). He picked oranges and cotton in Texas, but then was deported—along with his wife and two U.S.-born daughters—under “Operation Wetback” in 1954.

Eventually, the two daughters who were U.S. citizens returned to the United States and helped two of their sisters (including López) come to Oregon. When López decided to leave Mexico to find work, she travelled by bus to Tijuana, where she met one of her sisters and they went to meet a man at a bar.

Her sister told her, “You leave with the guy and I’ll see you on the other side.” The man drove her to a drop-off location and López crossed the desert on her own. She made her way to Klamath Falls to work the potato fields with her sister, and then they both moved to Eugene, where López earned a GED at the UO.

Jack was born in California and grew up in a bilingual household. While he did not give many specifics about his family heritage, he said his ancestors came from several Latin American countries, including Ecuador. He views bilingualism as a strength and thinks of himself as a “world citizen.”

Richard was also born in California, to a father of Italian descent and a mother born and raised in Mexico, and grew up in Eugene. He learned both English and Spanish in his home and considers himself, like Jack, to be truly bilingual, reliant on the two languages equally.

McCauley notes that both Jack and Richard are light-skinned and so can “pass” as Caucasian; however, both have consciously chosen to embrace their Latino identity and purposely use language to reinforce this. Richard, in particular, deliberately uses Spanish among his friends “by way of proving that he’s not just another gringo,” said McCauley.

INTENSELY PERSONAL

So what determines when a Spanish-English bilingual speaker chooses to use one language or the other? This small sample of four provided McCauley a glimpse into how intensely personal each person’s circumstances and motivations can be.

There was an additional complicating factor for the men in her study, McCauley noted: the surrounding culture—i.e., the Anglo-dominant community of Eugene, where less than eight percent of the population is Hispanic or Latino. Yet even that was not a universal influence, as revealed by Armando and Richard, who both grew up in Eugene but demonstrated very different patterns of language use.

All of this led McCauley to conclude that generalizations can go only so far. “Every person brings with them a unique experience and attitude,” she said. —LR

KNOWING WHAT THEY ARE FACING

ERDMAN USES THE SKILLS he acquired in this class every day. After earning his degree in Latin American studies last spring, he was hired as a legal assistant for an immigration law firm in Eugene. In this capacity, he works directly with individuals and families—many of them from Oaxaca—who are trying to adjust their legal status, extend their visas or avoid deportation. This often means creating a narrative that conforms to the requirements of the U.S. Citizenship and Immigration Services.

In the Latino Roots class, “I learned how to guide someone through the process of telling their story,” Erdman said. And while the storytelling in his professional life must conform to what the CIS requires, “it’s similar to guiding a subject through to a coherent story line,” as he did in producing his documentary.

The cultural knowledge Erdman gained through the course has been invaluable, too. “I took away an understanding of transnationals,” he said, “especially knowing what they are facing if they go back.”

At the end of the course, Erdman’s video—alongside those of his peers in the Latino Roots class—was shown at a public celebration at Knight Library, when their digital portfolios were officially made part of University Archives and Special Collections.

The videos are already being used to educate the next generation. Spencer Butte Middle School in Eugene, for instance, incorporated the videos—as well as the Latino Roots exhibit—into a day-long Latino Festival last November.

And in a very personal turn of events, a UO ethnic studies professor is now showing Lidi Soto’s documentary in one of his classes.

This brings it full-circle for Soto, who just a few years ago was sitting in a UO class about immigrants and, during the viewing of a video about farmworkers, was very surprised to recognize some of the workers in the film. Now the documentary is hers and the story is hers to tell. ■

Watch the student videos at latinroots.uoregon.edu.

Analyze This

ECONOMICS HONORS PROGRAM SERVES LOCAL GOVERNMENT AND NONPROFIT CLIENTS

By Matt Cooper

Danny O’Neil was looking for a challenge.

He wanted to push himself in class—and to take classes that would push him, too. He sought out tough courses that would provide, as he put it, “difficult experiences” that he could call on later in life.

As a junior in economics, O’Neil found what he was looking for in the economics honors program, which gives students a chance to conduct real-world research for local governments, nonprofit organizations and other community groups.

O’Neil and a partner spent months examining the economics of timber revenue, poring over reports and crisscrossing the state for data. They found that counties across Oregon were generally ill prepared for the end of a federal program that had long provided payments as compensation for lost timber revenue.

But the real breakthrough was what O’Neil discovered about himself. He learned that he possesses the tools he needs to be a social scientist—discipline, organization, perseverance, patience and, perhaps most important, the ability to think and work independently.

Now a senior, O’Neil isn’t sure where the path leads after graduation. But his initiation into the rigorous world of research has convinced him he’s ready for the future, whatever it holds.

“I had done a few basic papers for classes, but nothing near this extent,” O’Neil said. “I became comfortable working individually and guiding myself without somebody saying, ‘do this and do this.’ There was a lot of independent work.

“That’s probably the way it’s going to be,” he added, “in whatever I do after this.”

Real Work

Economics students want to do real work; governments and community agencies have scores of projects to analyze, but lack the people power to get them done. UO economics professors Bruce Blonigen and Bill Harbaugh put the two together, creating a program that does as much for the community as it does for undergraduates.

Now in its tenth year, Economic Analysis of Community Issues is a research class where undergraduates rigorously analyze projects and issues important to local governments, nonprofits and other community groups. This is applied research at the most fundamental level: students get practical experience in analysis and applied statistics while helping local policymakers answer questions ranging from the effects of Medicaid expansion on health insurance coverage to whether the city of Eugene should raise the minimum wage.

Blonigen and Harbaugh created the course to provide ambitious undergrads with a viable path to receiving an honors

distinction in economics. Startup funding came from the Tom and Carol Williams Fund for Undergraduate Education and now the department supports the program; organizers recently received a federal grant to fund a graduate teaching fellow to oversee the course.

Since the inception of the program, the number of students who have earned economics honors has tripled, with roughly fifteen now completing the requirement each year.

The course begins winter quarter, when organizations propose projects and professors work with students on the research methods necessary to carry them out. Students devote considerable time during spring term to data collection, analysis and writing, producing an in-depth report and following up with a PowerPoint presentation to the client.

“We work their asses off,” Harbaugh said, smiling. “They are stunned by the end of this. It can take a year to do a regular research project in economics; this group does theirs in three months. They say, ‘this was the most work by far that I ever did at the University of Oregon.’”

Not Your Average Consumer

Explaining things in economic terms, Harbaugh described most college students as “consumers”—they consume knowledge that is provided by others. But a smaller group of undergraduates engages in research, creating new knowledge.



And a still smaller group—those in the economics honors program—creates what Harbaugh calls “practical new knowledge,” providing real answers to real questions posed by others.

Among other topics, students have studied mass transit, competition in the NBA, free trade agreements and parental support to public schools.

Tanya Raterman '05 analyzed the extent to which the benefits of a potential “living wage” policy for Eugene workers would be offset by reductions in eligibility for state and federal aid such as food stamps, housing aid and medical insurance. In other words, would a living-wage raise make people ineligible for these entitlements?

Her report contributed to a decision by the city of Eugene not to raise the living wage, while convincing Raterman that she had the analytical tools necessary to skip graduate school and enter the working world. Today she's a senior consultant with London-based Deloitte Consulting, one of the largest professional services networks in the world.

“One of the answers that the undergraduate is looking for is, ‘what can I do with my degree?’” Raterman said. “This program offers a variety of projects to do. You can find something interesting to you and do it from A to Z—that's very eye opening. By the end of the class, the student has a much more clear understanding of what kind of work they could do and what they would be interested in.”

Employers want people with the kinds of research skills developed in the program. Jeremiah Crider '05 said his economics honors project on the Oregon Lottery was essential to Walmart's decision to hire him because it demonstrated his

ability to put into practice the economic theories he studied in class. Today, Crider is the company's director of U.S. strategy and finance.

You Have to Get Over It

“There is a fundamental thing that you have to get over in the real world—which a lot of university programs don't prepare you for—and that's ambiguity,” Crider said. “We deal with that constantly—there's no clear answer and you've got to do your research and due diligence and explain why you think something is the way it is.

“That's a big part of (the economics course)—just dealing with ambiguity and doing primary research from scratch.”

That primary research can be invaluable for local governments and other organizations. They receive, for free, in-depth analyses that might otherwise cost tens of thousands of dollars through a consultant.

Laura Purkey, development director for Eugene Christian School, said a comprehensive market analysis performed in 2008 by students Doron Fletcher and Sarah Dickey was “pivotal” in helping the school develop a strategic plan.

The school sought a solution to declining enrollment; the student team developed a number of viable recommendations, including relocation to serve an untapped market in Springfield.

The school moved last fall and has seen enrollment grow 40 percent without drawing students from other providers.

“It is incredible how much of that report has now been realized,” Purkey said. “We came up with three reasons (to relocate) and all three fit in with what that UO study was saying. That was an amazing document.”

No Joy Ride

But producing an “amazing” document can take an amazing amount of work, as senior Megen Ickler discovered. Her project essentially required her to wrap her arms around all of Lane County.

Last spring, Ickler and her research partner Peter Hodel evaluated the effect of the guided-rail bus system, EmX, on residential property values in Eugene-Springfield. They found that as a property's distance from the high-speed line decreased, its value increased.

Getting there was no joy ride. Working with Lane County's property database, Ickler and Hodel spent weeks narrowing the field of more than 100,000 county properties under consideration; even then, they needed the help of five computers running simultaneously to crunch all the data in a reasonable amount of time.

The team met repeatedly with economics professor Joe Stone, who advised them to focus their analysis by running their regressions—economic formulas used to derive results—over and over again. Ickler and Hodel eventually presented their findings to the Lane Council of Governments, a service association for local governments, where they were required to defend their conclusions before a roomful of professional planners and engineers.

The experience was tailor-made for Ickler, who is considering careers in urban planning and research.

“It was kind of intimidating,” she said. “There was one person who was particularly critical of our results; he asked us quite a few questions that stumped Peter and me.

“He came up afterward,” she added, “and said, ‘you guys did a good job. I'm really impressed.’” ■



Street Improvements Don't Pencil Out

HONORS STUDY ANALYZES MOUNTAINS OF DATA AND OFFERS A CONCLUSION TO THE CITY OF SPRINGFIELD

Are street projects good for house values?

Depends on the project.

Economics undergraduates Ethan Rasmussen and Famery Yang arrived at that conclusion after an exhaustive cost-benefit analysis of proposed street improvements in Springfield, Oregon.

Rasmussen and Yang did the analysis last spring as part of their requirement as honors students in the economics department. Numerous organizations responded to the department's invitation to propose projects for the students to study; Rasmussen and Yang were drawn to one proposed by Springfield officials, who sought an analysis of the effect of street improvements on house values as it considered asking residents to pay for upgrades through property assessments.

Rasmussen and Yang first surveyed the existing literature on property valuation and infrastructure investments. Then they ran an economic test called a "hedonic price regression" to estimate the impact local street conditions have on residential house prices. Using data on house prices and other property characteristics from a regional land database maintained by Lane County, the two isolated the effects

of street improvements and estimated the value of improving local streets to varying degrees.

Rasmussen was stunned by the amount of data necessary for the analysis.

The team was lucky to have the county database as a resource because it provided more than 1,000 examples of homes for the study. But in fitting the available data to the parameters of the project, the young research team quickly winnowed the usable samples down to just a few hundred; nonetheless, Rasmussen had to ask Springfield for even more data before the team could draw conclusions.

"We ended up with somewhere around 2,000 homes in our data set. But the actual number of observations we were able to draw from ended up being quite a bit less," Rasmussen said. "I didn't quite realize how much work it would take and how important it would be to have a solid data set with a lot of observations. It was one of those things that you're warned about going in, but until you actually start trying to do some analysis and draw conclusions from the results, you don't fully understand how important it is."

Rasmussen and Yang found that for the most part, street improvements don't pencil out for homeowners.

Private benefits to the average homeowner were only 23 to 34 percent of homeowner assessment costs,

depending on the value of the house. The bottom line: residents could expect to pay \$15,000 to \$17,000 more in assessments than is captured in improved house value, the analysis found.

There was one caveat, however: Converting gravel roads to asphalt resulted in a return on investment as high as 123 percent to the homeowner. Homes on asphalt streets commanded a 16 percent higher sales price than those on gravel streets.

The project, which won the economics department's "best honors paper" award last year, was one of many completed for Springfield during a yearlong partnership with the university through the UO's Sustainable City Year Program.

Richard Perry, Springfield traffic operations engineer, said the student analysis was far more thorough than he had expected. City staff members enjoyed providing the students with a challenging problem, Perry said, and Springfield benefitted as well.

"We are very limited on resources—there are a lot of things we don't have time to get to," Perry said. "It multiplies our effort. We put in an hour and we got fifty hours back. That's a pretty good deal." —MC



Biology Program Matches Students with Faculty Mentors, Labs

Like the economics department, biology has created a systematic approach to furthering undergraduate research

There are more than thirty faculty members in the UO biology department, working on the cutting edge in cell biology, developmental biology, genetics, biochemistry, ecology and evolution, neuroscience and behavior, and more.

The department regularly distinguishes itself for advanced programs in molecular evolution and genomics, and it is the home of the zebrafish, an animal model for studies of human health and disease developed at the UO and now used in laboratories throughout the world. Interdisciplinary efforts are the rule, as prominent scientists push themselves to see things through a new lens of discovery.

For the ambitious undergraduate, the question can be daunting: How do I find a mentor among these high-powered scientists?

"I'm not sure students even realize the amount of research opportunities that are available," said Matthew Davis, who graduated recently with a biology degree. "It can feel pretty alienating just sending out e-mails and hoping to catch a professor's eye."

Davis eventually found a good position in a laboratory, but it was a trial-and-error process with more than one false start. Now the biology department is making it easier for talented undergraduates to find the right laboratory—and professor—for them.

The SMART-Biology program—Scientific Mentorship and Research Training in Biology—is being launched to match undergraduate students with research faculty members. Sophomores and juniors who meet academic requirements can submit an application

For the ambitious undergraduate, the question can be daunting: How do I find a mentor among these high-powered scientists?

and a coordinator will broadcast their interests throughout the department, seeking to match applicants with faculty members for interviews.

Among the 900 biology majors at the UO, more than seventy are working in laboratories. But pairing students with laboratories has historically been a convoluted, time-consuming process that detracts from the research experience, said Kryn Stankunas, an assistant professor who helped establish the program.

"There are exciting, transformative opportunities here—if you want to do research in a lab, you're not just going to be performing menial tasks," he said. "Students have to become immersed in experiments to learn from the experience. The SMART-Biology program is intended to show students what expectations there would be and what they can expect to achieve from laboratory research."

Besides establishing a mentoring relationship with a professor, SMART participants will have research meetings with peers and graduate students, and will present their work at an annual symposium. The program, which includes an honors thesis track, serves students who are pursuing graduate schools and research careers—or simply

desire an authentic, hands-on experience working in a laboratory.

Davis originally tried the mass e-mail approach for finding a position, only to discover that most faculty members and graduate students are exceptionally busy and it was difficult to establish a working rapport with them. He eventually landed a spot in a laboratory—only to discover that it wasn't a good fit for his interests.

Things changed in spring 2011, when a freshwater ecology class opened Davis's eyes to the fungal world existing in the soil. Intrigued, he started making inroads in research, earning a scholarship and a grant for his work.

He traveled to Ecuador, where he assisted graduate students and professors who were studying the mating strategy of orchids. And he landed a satisfying position in the laboratory of associate professor Barbara "Bitty" Roy, who studies the effects of fungi and insects on the ecology and evolution of plants. Eventually, he completed a thesis on an invasive grass in western Oregon that has spread aggressively in the absence of a fungus that is a "specialist enemy."

For Davis, it all started clicking once he had been "appropriately matched" with a laboratory—which is precisely the goal of the SMART program.

"Research was the fusion that made me feel like a part of this place," Davis said. "It's all about establishing a relationship with a professor." —MC

Visit smart.uoregon.edu.

"There are exciting, transformative opportunities here—if you want to do research in a lab, you're not just going to be performing menial tasks."

Undergraduate Social Scientists Range Far Afield

Undergraduate research in the social sciences can involve staying right here at the UO and delving into the Special Collections and University Archives of the UO Libraries or traveling as far afield as Chile or the Arctic Circle to pursue an original idea. It can take the form of bookwork, legwork or some unique combination that gives a student a foundation for his or her own analysis and conclusion, as shown by this sampling of recent undergraduate thesis topics.



A Plague in New York, Successfully Contained

During the week ending July 11, 1868, more than 800 people died suddenly in New York City. Another 250 died on July 13 and 14, then 240 more between July 18 and 22.

It was the start of the city's exposure to "Texas cattle disease," a plague that had scarcely been documented since reports of dying cows began surfacing in the 1850s. And it was a seminal moment for America's first board of health, according to Erik Erlandson, a recent Clark Honors College graduate, who double-majored in history and political

science and was mentored by history professor James Mohr.

In what he calls the untold story of the Metropolitan Board of Health, Erlandson follows the emergency response of New York officials to a disease "that no one knew about."

Erlandson casts a wide net in this exhaustive history, detailing the city's inability to keep pace with urbanization and immigration and painting a picture of deplorable meatpacking conditions that recalls Upton Sinclair's *The Jungle*.

In conclusion, he presents two reasons for the unparalleled interstate cooperation that successfully contained the epidemic: Lessons learned from England's inadequate response to a similar outbreak, and a spike in diarrheal deaths that prompted the board to consider the disease as an explanation.

Reduced Emissions Not Necessarily the Result of Climate Accords

Correlation does not equal causation. That was the conclusion of political science major Hale Forster, who

analyzed the effectiveness of the Helsinki and Oslo agreements in reducing sulfur emissions in the 1980s and '90s. Dozens of European countries committed to reductions and emissions subsequently dropped. But Forster, mentored by political science professor Ron Mitchell, shows that factors other than the agreements themselves were likely responsible for the bulk of reductions.

Forster sorts the countries into smaller groups with shared circumstances and meticulously researches the influence of the treaties in each. Among nontreaty factors that reduced pollution, he notes the fall of the USSR, which sparked a political restructuring across the region during which industrial activity—and therefore emissions—slowed. Countries also decided, independent of the agreements, to reduce coal-powered electricity in favor of nuclear and natural gas sources.

At the heart of Forster's analysis is his judgment that country-specific goals in the Oslo treaty did not prompt more reductions than would otherwise have occurred.

"The goals appear to have failed . . . because they were politically motivated, facilitating countries' choice of goals they were already planning to meet," Forster writes. "It will be interesting to observe how future protocols incorporate (such) goals."

Reproductive Services for Teens in Chile

Jaki is a fifteen-year-old girl in Valparaíso, Chile. She is considering becoming sexually active but is worried about getting pregnant and doesn't understand contraception. Should she risk getting pregnant or not have sex at all?

So begins the narrative for international studies major Molly Bennison's evaluation of support services for pregnant teens and teen mothers in Chile. Bennison, mentored by Yvonne Braun, an associate professor of women's and gender studies, developed the idea while studying abroad in 2011, after interviewing a Chilean feminist

activist and midwife who runs a support organization for pregnant women.

In a country with rising teen pregnancy, Bennison explores the history of reproductive rights, cultural attitudes toward contraception and abortion and the existence of support systems for teens who keep their babies. She also provides her own recommendations for how the system might better serve teens.

Bennison conducts compelling interviews with pregnant teens and young mothers, including one who greets her with hostility but quickly softens as she tells her story.

“What became clear,” Bennison writes, “is that teen girls throughout Chile, especially those from lower social classes, are not receiving the reproductive and sexual health support that they need.”

How ‘Progressive’ Policies in Sweden Have Reinforced Racism

When you’re doing research near the Arctic Circle, the first concern is the weather.

Bennett Hubbard, also an international studies major mentored by Yvonne Braun (see above), chose November for fieldwork in northern Sweden, when temperatures are not so cold as to impede travel.

Hubbard studied how “progressive” policies of the Swedish government have disenfranchised the Saami, an ethnic group living off the land in Sweden, Norway, Finland and Russia. He focuses in part on the Reindeer Act of 1971, touted as a protective measure for the group’s livelihood but which instead enabled the government to restrict reindeer herders like the Saami from land sought for resource extraction.

Speaking Swedish while in the field, Hubbard visited museums dedicated to the Saami to understand their plight. Among the more disturbing exhibits: tools once used to measure skulls and other body parts, relics from a campaign in the early 1900s to portray the group as “genetically inferior” and a threat to

the purity of the Swedish ethnic group due to their shorter frames and smaller skull sizes.

“The events of the early twentieth century in Sweden offer a study in how nationalism and economic interests can serve as catalysts for extreme cases of institutionalized racism and prejudice against indigenous peoples,” Hubbard writes.

Connecting the Dots: The Tea Party and the Times

The *New York Times* in 2010 gave more coverage to the conservative Tea Party movement than any other activist movement.

Coincidence? Not to Kadie Manion.

Manion, a sociology major, theorized that movements with ties and similar interests to elites receive more media coverage. Using a news article database, she counted stories in the *Times* with terms such as “demonstration” or “protest” for a one-week period each month that year; the Tea Party received the greatest number of articles and the longest articles on average, outpacing movements for the environment, immigration, labor, gay rights and other issues.

Manion cites established sociological research to connect the dots: Right-wing and conservative movements are often funded by elites in power; elites and conservative movements often share the belief that the path to economic prosperity is privatization and deregulation; elites that own most news organizations have investments that make it more likely that news coverage will be connected to the elites’ financial success.

“Both the news media and social movements have a very important role in democratic societies,” Manion concludes. “When there is corruption in either resource—and particularly in the relationship between the two—the integrity of our democracy is jeopardized.”



The Divorce Hazard Rate

There may never be an ideal time to divorce, but waiting until kids reach adolescence could be a better time than others.

Studies have long indicated that those who experience the divorce of their parents are significantly more likely to divorce as adults themselves. Maggie Price, a sociology major mentored by assistant professor Aaron Gullickson, takes the research further, studying this “intergenerational transmission of divorce” as it relates to the age at which one experiences divorce in childhood.

Using a national survey of families conducted from 1987 to 2004, Price teased out respondents who reported a parental separation or divorce at least once in childhood. Then, using a mathematical formula that expresses the probability of an outcome, she generated a divorce “hazard rate” for younger and older children.

Children aged ten to eighteen who experienced parental divorce were 18 percent less likely to get divorced as adults compared to children age nine or younger at the time of divorce. Research suggests that younger children are more deeply affected because divorce interrupts the attachment process.

“Divorce has detrimental consequences for children that can affect their adulthood psychologically, socially and economically,” Price concludes. “Individuals concerned for their offspring’s welfare in adulthood may prefer to wait to divorce until their children are in late childhood or adolescence.” —MC

FOR UNDERGRADUATES ONLY

THE OUR JOURNAL

re • search
investigation

STUDENTS GET A CHANCE TO PUBLISH RESEARCH PAPERS—AND EXERCISE SKILLS THAT REACH FAR BEYOND THE PAPER ITSELF

Lucy Gubbins was one of those students with an impossible-sounding array of academic interests and accomplishments. A 2012 graduate, she majored in linguistics and minored in anthropology and Japanese. She also worked as a research assistant in East Asian languages, helping with experiments and running laboratory activities.

Her research position led to a collaboration with a professor on the analysis of nonnative speakers of Japanese, and that in turn became Gubbins's thesis project—so successfully researched and written that she presented it at a national conference.

Meanwhile, she also found time to be the cofounder of the *Oregon Undergraduate Research Journal*.

“Students have the right to know that research is not just possible, but a powerful, formative part of the university experience,” she wrote in her editor's note for the first issue of *OUR Journal* (as it's also known), published in fall 2011.

The *OUR Journal* is the UO's first open-access, peer-reviewed journal for the publication of exceptional research by UO undergraduates. Gubbins and a determined cohort of undergrads teamed up with the UO Libraries and other campus partners to create this rare venue for undergraduate publication.

The value to students is multilayered: Those with an eye toward graduate school have the chance to publish their work and present it as part of their application. But for any student who prepares a paper for

submission—no matter what their future aspirations—this is an outlet for exercising skills that reach far beyond the article itself.

According to the journal's publication standards, the significance of the research submitted must be described clearly for a broad audience (i.e., not just specialists in the author's topic) and all submissions must be “thoroughly interpreted and analyzed . . . well written, efficiently organized, logically convincing and grammatically correct, with citations that conform to appropriate disciplinary standards.”

In other words, the authors must demonstrate high-level communication skills that apply to just about any path forward.

A Career-Enhancing Experience

For the student editors—all of whom are volunteering their time—this is also an opportunity for a life- and career-enhancing experience via the *OUR Journal's* peer-review process—modeled on the standards of professional scholarly journals.

Once a submission has been received, two members of the eight-person student editorial board work with the author in a “double-blind” review, meaning the author doesn’t know who is reviewing the work and the reviewers don’t know who has submitted it. A preliminary decision whether to include the work is made after two weeks; viable submissions are accepted pending revisions, initiating an editing period that can extend for months.

The editorial board assigns the submissions to one reviewer from within the paper’s area of study and another from outside it, and conducts these lengthy reviews even for submissions that don’t meet the standard for publication. (The acceptance rate is about 50 percent.)

“It’s really important for students to get feedback like that regardless of whether they’re published,” said Kelsey Ward, chief editor for 2012–13 and a student in the Clark Honors College. “That is really valuable feedback in understanding how their work can be accessible to somebody not in their field, as well as academically rigorous for somebody in their field of study.”

The journal accepts submissions from any major or department. To date, published articles have represented architecture, Asian studies, biology, communication disorders, economics, environmental science, geology and music, to name a few.

The fall 2012 issue includes articles on “Restoration Monitoring on the McKenzie River, Oregon” (environmental studies), “Stomata Density in Orchids and Cloud Forest Humidity” (biology), “Assessing the Relationship Between Topography and Plant Diversity in Restored and Remnant Wet Prairies” (biology) and “The Potential Role of Dietary Intake in Explaining Postoperative Muscle Loss in Total Knee Arthroplasty (TKA)” (human physiology).

A Willing Partner

The timing was right for the journal. As Gubbins and fellow undergraduate Drew Serres explored the idea of a research journal in 2011, faculty members and librarians were also discussing possibilities for a publication serving undergraduates.

When Gubbins asked the UO Libraries for help, she got a willing partner for all aspects of the project. UO Libraries is the publisher, overseeing production and distribution twice per year while providing support to the student editorial board through faculty advisor Barbara Jenkins, director of instruction and campus partnerships.

The journal also fits perfectly with the UO Libraries’ transformation from a repository of information to the creator, facilitator and distributor of it, said Deborah Carver, Philip H. Knight Dean of Libraries.

“We’re much more focused now on what I call the ‘lifecycle of information,’” Carver said. “We play a bigger role in the creation of research, working with the students and faculty in the organization and dissemination of it. We saw this as a huge opportunity to help these incredible students and to support undergraduate research.”

JQ Johnson, director of scholarly communications and instructional support for UO Libraries, played a key role, introducing Gubbins to the Open Journal System, the library’s online publishing platform for hosting UO-based research journals. Johnson, who died last July of cancer, worked on the journal as a labor of love and became an ardent supporter.

“Establishing a peer reviewed journal is a substantial undertaking, and the work that the student editors and various UO faculty and staff have put in has been quite impressive,” Johnson wrote, in an editorial introducing the inaugural issue. “Peer review works well in mainstream academic scholarly publication, and the editors realized—correctly—that by mirroring the process of other academic journals they had the best chance of identifying the most outstanding undergraduate research.”

During a meeting last year, the editorial board discussed plans for the third issue.

Published articles have represented architecture, Asian studies, biology, communication disorders, economics, environmental science, geology and music.

At one point, Ward interrupted the discussion to announce that another prospective article had been submitted—alas, from a student at a university on the East Coast, an indication of the journal’s reach, perhaps, but not a candidate for a publication that focuses on UO student research.

Successful submissions have included shortened thesis projects for the Clark Honors College, papers that have won the library’s Undergraduate Research Award and those that have won departmental undergraduate honors. Submissions must be nominated by the author’s faculty mentor, an assurance that the material put before the editorial board is accurate and relevant.

“It Gave Me Courage”

Ida Pollanen, an exchange student from Finland studying comparative literature, was encouraged by the process that preceded the inclusion of her article, “Abject by Gender and Race: The Loss of Antoinette’s Identity in Jean Rhys’s *Wide Sargasso Sea*,” in the spring 2012 journal.

The prevailing attitude in academia, Pollanen said, is that undergraduates are only beginners in their fields, and all work culminating with a bachelor’s degree is simply “rehearsing your skills for doing competent academic research.” She was surprised to find a venue for her work at the UO.

“It’s exactly what I needed at this time to hone my skills,” Pollanen said. “It gave me courage: ‘If I can do this on the undergraduate level, I’ll be able to do it later on, too.’” —MC

Visit journals.oregondigital.org/OURJ

At the Intersection of Race, Politics and Literature

A Full-Tuition Fellowship Supports Research into an Overlooked Poet

Lots of students change their majors. They spend a year or two on campus going down their chosen path and then they take, say, a geography or linguistics class to get a requirement out of the way—and lightning strikes. A new world opens up and they are off in an unexpected direction, inspired with fresh energy and enthusiasm.

Joseph Bitney did this before even taking a single class as a freshman. He originally declared a major in human physiology, aiming to become a physical therapist. But after he registered for classes in chemistry and physics, “I went online and looked at my class schedule,” he recalled, “and I thought, ‘Is this what I really want?’”

He thought about his passion for film and literature and how much he had loved his advanced English classes in high school, and this led him to consider a different future as a teacher or college professor.

After talking it over with his parents, he switched his major to English. “They told me they could see I was so passionate

about it, they knew right away that it was a good choice for me,” he said.

It’s been a good choice indeed. Now a junior, Bitney, a Clark Honors College student, has distinguished himself as a standout among English majors.

A smaller corpus of scholarship and criticism can be a good thing for a budding scholar.

Among his many accomplishments, he received a 2012–13 Undergraduate Research Fellowship from the UO Center on Teaching and Learning. The URF funds three undergraduate research fellows per year, providing a full-tuition waiver in support of their projects.

ONE OF THE RARITIES

Over the years, most URF recipients have been students in the sciences, a few in the social sciences and fewer still in the

humanities. Bitney is one of the rarities in a humanities field.

He has given serious thought to the difference between humanistic and scientific research. In lab science, he says, there’s an existing protocol for the discipline. But in the humanities, “you have to establish your own protocol,” he said.

In Bitney’s case, figuring this out meant spending last summer reading everything he could that pertained to his general topic: ethnic American poetry. He read Native American, Latino, Asian American and African American poets, as well as critics, essayists and biographers.

For poets from previous generations, there is often a body of scholarship that serves as a guidepost along the way, but for more contemporary poets, their creative work is the only reference point. Because Bitney was left to his own devices to discern what was worthy of attention, “it was kind of nerve-racking,” he said, “but a lot more interesting” than following a codified procedure.

Bitney’s fellowship will focus on the responsibility ethnic writers feel to their

Frederick Douglass

By Robert Hayden

When it is finally ours, this freedom, this liberty, this beautiful and terrible thing, needful to man as air, usable as earth; when it belongs at last to all, when it is truly instinct, brain matter, diastole, systole, reflex action; when it is finally won; when it is more than the gaudy mumbo jumbo of politicians: this man, this Douglass, this former slave, this Negro beaten to his knees, exiled, visioning a world where none is lonely, none hunted, alien, this man, superb in love and logic, this man shall be remembered. Oh, not with statues’ rhetoric, not with legends and poems and wreaths of bronze alone, but with the lives grown out of his life, the lives fleshing his dream of the beautiful, needful thing.

Robert Hayden, “Frederick Douglass” reprinted from *Collected Poems of Robert Hayden*, edited by Frederick Glaysher. Copyright © 1966 by Robert Hayden. Reprinted with the permission of Liveright Publishing Corporation, a division of W.W. Norton.





communities and the ways that politics and literature intertwine. He discovered his enthusiasm for this topic in a poetry course last year. His paper for that class, “The Incomparable Horrors of Lynching,” won the English department’s 2012 Swig Essay Prize.

AN INTERESTING TENSION

Bitney has decided to work on three projects this academic year (one per term) rather than a full-year project and single terminal paper, the option usually chosen by URF fellows. For his first term, his focus was African-American poet Robert Hayden, whom Bitney characterizes as “neglected in both popular and critical terms.”

Hayden was writing at the time of the black nationalist movement in the 1960s but did not politicize his poetry—i.e., he did not use it as a vehicle for expressing overtly political views.

“He was more nuanced than that,” said Bitney. “He did his research. He had a complex view of history. He was also a member of the Bahá’í faith.” As a result, Hayden’s poems, such as “Middle Passage,” which dwells on the journey of slaves across the ocean, “have an interesting tension between his refusal to deny the horrors of the past and his impulse to universalize,” said Bitney.

In other words, Hayden’s work could be said to depict the human condition, not just a particular race. This meant he didn’t neatly fit into the “black poet” category and was therefore overlooked.

But a smaller corpus of scholarship and criticism can be a good thing for a budding scholar. In Bitney’s case, it means he has more opportunity to determine his own approach, make his own interpretations and draw his own conclusions.

And that’s what research is all about.
—LR

Undergraduate Research Funding and Awards at the UO

UO undergraduates who wish to pursue research opportunities are eligible to apply for fellowships and scholarships—including a full-tuition waiver—to support their projects, and they can also submit their work for public recognition and monetary awards.

- The **UO Libraries’ Undergraduate Research Awards** recognize students who demonstrate extraordinary skill and creativity in the application of library and information resources to research and scholarship. Granted annually, the awards typically range from \$1,000 to \$1,500. Recent award winners have included individual students as well as collaborative teams, most of them from College of Arts and Sciences departments, including environmental studies, history and women’s and gender studies.
- The UO Center on Teaching and Learning grants three **Undergraduate Research Fellowships** per year, providing a full-tuition waiver to promising scholars. Many of the recipients have been science students in the College of Arts and Sciences, but this year an English major was one of the three outstanding undergraduates to receive this prestigious fellowship (see story on facing page).
- For low-income and first-generation students, or those from a group that is underrepresented in graduate education, the **McNair Scholars Program** is designed to propel motivated students toward earning doctoral-level degrees. The program’s many support services include tuition support plus a \$2,800 summer research stipend. (Read about McNair Scholar Lidi Soto on page 14.)
- Students in the STEM fields—science, technology, engineering and mathematics—can receive a full scholarship and be employed upon degree completion at a Department of Defense research facility, under the **Science, Mathematics And Research for Transformation (SMART) Scholarship for Service Program**. Scholarships include a cash stipend of up to \$38,000 a year, full tuition, required fees, health insurance contribution and book allowance.
- The **UO Summer Program for Undergraduate Research** (SPUR—see page 13) provides fellowship opportunities for undergraduate students from the UO and other institutions to participate in ongoing research in life sciences laboratories at the UO during the summer months. SPUR provides student stipends and can also cover travel costs, as well as room and board for students visiting from other universities.

By the Numbers

The numbers tell the story—of the richness of the research opportunities for students in the UO College of Arts and Sciences (CAS).

787

Students taking research credits in the College of Arts and Sciences, 2011–12

Across the College of Arts and Sciences, nearly 800 students took research or thesis credits—meaning they received course credit for their research work—during the 2011–12 academic year.

Over the course of the year, some of the biggest research-hours enrollments for undergraduates were in:

Psychology—188 students

Biology—91 students

Chemistry—67 students

Political Science—57 students

Anthropology—53 students

Hundreds of other students received research or thesis credits in twenty-eight other CAS departments, across the sciences, social sciences and humanities.

But these numbers reflect only those students signed up for official credit for their research. Scores of additional students in the College of Arts and Sciences are engaged in research projects that may or may not be for-credit.

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Honors Thesis Programs in the College of Arts and Sciences

Nearly two-dozen College of Arts and Sciences departments and programs offer an honors program with a undergraduate research thesis requirement:

Anthropology	International Studies
Biology	Judaic Studies
Chemistry	Linguistics
Comparative Literature	Philosophy
East Asian Languages and Literatures	Physics
Economics	Political Science
English	Psychology
Environmental Studies	Religious Studies
General Science	Romance Languages
German and Scandinavian	Russian, Eastern European and Eurasian Studies
History	Sociology
	Women's and Gender Studies

In addition, CAS offers College Scholars, an honors-track program for high-achieving students that starts off their UO undergraduate experience with intensive interaction with research faculty members. A freshman colloquium introduces first-year College Scholars students to distinguished faculty members, who discuss current research and opportunities for undergraduates in their departments. The students are then expected to pursue research assistantships, departmental honors and other advanced opportunities, with additional advising and mentoring by the College Scholars program.

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Major Awards Granted to CAS Undergraduates Since 2009

MARSHALL SCHOLARS

The Marshall Scholarship honors former U.S. Secretary of State George Marshall. A maximum of forty Marshall Scholars from the U.S. are chosen each year. These prestigious scholarships cover university fees for two years of study at Cambridge University. Two CAS students have been recent recipients:

Josh Lupton, Biology and Human Physiology*
Tamela Maciel, Physics and Mathematics

BARRY M. GOLDWATER SCHOLARSHIPS

The Goldwater Scholarship is the nation's premier undergraduate scholarship award for the natural sciences, mathematics and engineering. Since 2009, there have been six CAS Goldwater recipients, three in 2012:

Amy Atwater, Biology and Geological Sciences**
Courtney Klosterman, Physics
Opher Kornfeld, Biochemistry**
Brianna McHorse, Biology**
Patricia McQueen, Geological Sciences
James Utterback, Physics

FULBRIGHT FELLOWSHIPS

The Fulbright U.S. Student Program provides grants for individual research projects or English Teaching Assistantships—all of them outside the U.S. Recent student recipients from CAS include:

Gina Blackburn, Physics (Fulbright Fellowship, Germany)
Lucy Gubbins, Linguistics (Fulbright English Teaching Assistantship, Armenia)
Jade Snelling, Comparative Literature (Fulbright English Teaching Assistantship, Germany)
Jan Verberkmoes, German and English (Fulbright English Teaching Assistantship, Germany)
Jordan Wooley, German and Business Administration (Fulbright English Teaching Assistantship, Germany)

*CLARK HONORS COLLEGE GRADUATE

**CLARK HONORS COLLEGE STUDENT

There's no better way to teach students to question critically, think logically, communicate clearly, act creatively and live ethically.

If you are a regular reader of *Cascade*, you are accustomed to seeing my column at the beginning of each issue, rather than here at the very end. But it was only fitting to give over my usual dean's page slot to the voice of a recent graduate to introduce this special edition dedicated to undergraduate research.

As the preceding pages reveal, undergraduates across the disciplines are stepping up to take advantage of the rich research opportunities in the UO College of Arts and Sciences. Just to summarize all that has been made abundantly clear: across the humanities, social sciences and natural sciences, students are actively pursuing their own research endeavors—forming appropriate questions, learning methodological tools, reading everything they can about a topic, developing rigorous work habits, facing unexpected results, changing their thinking about a problem, being open to suggestions, remaining nimble, working in collaboration with others and persevering to the end.

These are the fundamental keys to research success—and to success in life as well.

Undergraduates gain these opportunities here at the UO because of our dedicated faculty. As dean of the College of Arts and Sciences I have the privilege of working with more than 500 faculty members who are passionate about their research—and about teaching. These scholars and scientists are literally changing the world as they create new knowledge within their disciplines and through interdisciplinary collaboration. The results of their efforts are truly inspiring.

Because of the research accomplishments of our faculty, the University of Oregon has long been a member of the Association of American Universities (AAU), the most elite group of sixty-two public and private research universities in North America. In addition, because of the high research productivity of our faculty, the University of Oregon is classified in the top category of research activity by the Carnegie Foundation for the Advancement of Teaching. We regularly feature the exciting work of our faculty researchers in every issue of *Cascade*.

But these respected researchers are not sealed away in their labs or ivory towers—they are accessible and welcoming to students. The history, size, location and values of our institution underscore our special commitment to sharing the research mission with our undergraduates. UO faculty members love their research and, as the articles in this special issue of *Cascade* attest, they are also committed to training the next generation of researchers—instilling the quest for discovery while creating countless opportunities for students to learn about the research process.

I am proud to say we have some of the best teachers in higher education. In response to their efforts to innovate in (and beyond) the classroom, we have created various institutional supports make undergraduate research a meaningful reality. Our goal is to help our students understand the challenges and rewards of research within a wide range of disciplines, and this special issue illustrates how far we have advanced along that curve.



Scott Coltrane, Tykeson Dean of Arts and Sciences

The stories in this issue describe only a few examples of undergraduate research at the UO, but we hope they give you a sense of the excitement that we feel about including students in knowledge production. As our mission statement states, we strive to teach students to question critically, think logically, communicate clearly, act creatively and live ethically. There is no better way to achieve these objectives than to actively engage students in the research enterprise.

A handwritten signature in blue ink that reads "Scott Coltrane".



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UO COLLEGE OF ARTS AND SCIENCES

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