Welcome to this issue, which focuses on some of our exciting news from the science areas. We at Gonzaga University are so fortunate to have our top-notch science programs under one roof with the social sciences, the arts, and the humanities. Our liberal arts context provides a distinctive flavor to teaching the sciences and adds important value to a degree in one of the science fields. Students benefit from the context in which their technical know-how and scientific knowledge is embedded, which on a daily basis challenges them to develop a consciousness of how science and technology affect the humanity and the world.

Take for example alumnus Ryan Bart, who has been profiled in this newsletter. He is one of our many students admitted to medical school—note that our 55% acceptance rate to medical, dental, and veterinary schools is well above the national average of 25%. As Ryan’s story demonstrates, graduates from the College go on to do great things; they are involved in community activities and display a strong understanding of the importance of social justice.

As this issue of our newsletter shows, our faculty are award-winning teachers and outstanding mentors; they receive grants from prestigious agencies such as the Howard Hughes Medical Institute, which directly benefit students by providing the funding to involve them in undergraduate research and real-world problem-solving. In its Liberal Education & America’s Promise Initiative, the Association of American Colleges and Universities identified undergraduate research as a high-impact educational practice that has proven to be beneficial to students from diverse backgrounds. While science faculty have already reshaped courses “to connect key concepts and questions with students’ early and active involvement in systematic investigation and research,” as the AAC&U advises, our next goal is to engage faculty and students from other areas of the College as well. At the same time, we continue to seek out additional research opportunities through our partnership with the University of Washington medical school.

As we take particular care to develop cutting-edge degrees such as the new Bachelor of Arts in Computer Science and Computational Thinking, we are also concerned about career placement. As of this year, all degree programs provide opportunities for academic internships. We truly want to educate future leaders for a better world. Undergraduate research and other experiential learning experiences are at the forefront of our minds.

In the spirit of our Jesuit, Catholic, and humanistic mission, the College of Arts & Sciences values creativity, collaboration, engagement, and integration. Faculty, staff, and students work across the disciplines, and with community partners to live that mission and to follow these values. We hope that you follow us on Facebook and Twitter, and that you share your stories with us. As always, we want to hear from you!

—Elisabeth Mermann-Jozwiak, Ph.D.
Professor Vesta Coufal has been awarded the Pacific Northwest Mathematical Association of America's Teaching Award. This prestigious award is given once a year to those "whose teaching has been extraordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms." Coufal is the third female recipient in the history of the award.

It's easy to understand why Gonzaga's Mathematics Department first nominated Coufal for this honor, as her innovative teaching philosophy centers on the student. "It boils down to getting students engaged with the material," she says. "I want the students to do math, so I lecture as little as possible. It's a lot more work to create worksheets for every class than it would be to just stand there and talk, but in the end it's worth it. You can really see them start to understand."

Through her instruction, Coufal hopes to get students to participate in the collaborative process of math. She has them work on problems in teams, before one student from each group presents their findings to the whole class.

"I feel terrible," she laughs. "I would have been so scared to do that kind of thing as a student. But honestly, I do it because it helps them learn those real-world skills of talking to others and presenting their ideas."

Coufal's mathematical specialty is the field of topology, the study of shapes as they are stretched, squished and otherwise tortured while keeping their near points together. Ultimately, her own story is one of resilience and passion. She was educated in a one-room elementary schoolhouse two hours north of Spokane, always happiest when she was set loose in the world of mathematics.

"I took my math book home for spring break when I was in third grade, and I finished the whole thing. They didn't know what to do with me," she says.

The education system in Coufal's hometown couldn't keep up with her personal drive, and by the beginning of high school she was teaching herself calculus. Thus, her personal learning journey mirrors her teaching philosophy, as she now seeks to help students teach themselves.

"Students need to understand for themselves what's going on, so I try to help them understand it through experience," she says. "And as an unintended consequence, students are learning to actually read math. That's so cool to see and so important for their future."

The Mathematics Department didn't tell Coufal they were nominating her for this prestigious award, and when it was announced that she had won, they decided to surprise her with a faculty party. She was stunned. Later, when asked what the award meant to her, she was almost at a loss for words.

"Sometimes you feel like you work really hard, but you never see the results. This award is so special because my department validated my teaching. It meant a lot, to be told in such a real way."

Learn more about Gonzaga's Mathematics Department and its world-class faculty at www.gonzaga.edu/math
Ryan Bart is using his Gonzaga education to do magical things in the world. Since he graduated in 2012 with a Bachelor of Arts in psychology, Bart has given a powerful TEDx talk, traveled to Colombia to teach magic, and enrolled in medical school at Western University of Health Sciences in Pomona, California.

As a Gonzaga student in the pre-med track, Bart volunteered at Providence Sacred Heart Medical Center, where he discovered that magic could help patients find emotional release through entertainment and wonder.

“My time at Sacred Heart really showed me the power of magic, and I believe it has immense healing power,” he says. “Laughing and smiling releases endorphins physiologically, but magic is also a vessel to connect with human beings.”

Bart was awarded a Fulbright Scholarship his senior year. With the help of his mentors in Gonzaga’s Comprehensive Leadership Program, he connected with Magicians Without Borders, an organization that seeks to bring magic to all parts of the world. Using their resources and guidance, he got on a plane to Colombia and began to teach magic to children in impoverished neighborhoods.

“I wanted to integrate magic with my career goals of becoming a doctor, and the pieces just fell into place,” he explains.

Carlos, a young boy from Bogotá, was among Bart’s first students. Today, long after Bart has left, Carlos is teaching magic himself. “Right now, he’s in Costa Rica, helping to start a school,” Bart says. “It’s become a sustainable and absolutely life-changing thing for these kids, and I am so happy. It’s really taken off. We’ve already started schools in India and El Salvador.”

Many of Bart’s former students are currently being hired by local media organizations for magic shows, and some have gone on to attend a prestigious regional magic school. “Our mission,” he says, “is to entertain, but more important than that, it’s to empower children of the world.”

When asked how he was able to do such amazing work, his answer is simple.

“It really comes down to Gonzaga, and I can’t say that enough,” Bart says. “Gonzaga instills the fight for social justice. I didn't know what that looked like until I came here.”

His story is one of determination, fighting for good, and never giving up. “It seems crazy,” he laughs. “To try to solve child gang violence with magic. But it’s working! My best advice would be to aim for the stars. My opportunities have all come from not being afraid to try. And none of it would have been possible without Gonzaga's focus on social justice and working for others. I mean that.”

“My opportunities have all come from not being afraid to try. And none of it would have been possible without Gonzaga's focus on social justice.”

- Ryan Bart (Psychology, ‘12)
Two Gonzaga biology professors have received National Science Foundation grants, an impressive achievement with wide-reaching effects on undergraduate students, who now will be able to contribute to important scientific research both in the lab and in the field. Professor Brook Swanson will study the rhinoceros beetle, while Associate Professor Joseph Haydock will investigate the behavior of the acorn woodpecker.

The NSF is an independent federal agency that funds research and education in science and engineering through grants. They receive approximately 40,000 proposals for funding every year.

**The Rhinoceros Beetle in the Wild**

Brook Swanson's particular interest in the beetles of the subfamily Dynastinae is the giant horn that gives the insect its evocative common name. The origin of the horn, which the rhinoceros beetle uses to fight over females, is as yet unknown. Swanson and his students seek to unveil the answer to this mystery, with the long-term goal of understanding how and why animals evolve such impressive anatomical structures. "Really, it's about evolution," he says. "Our research could be more broadly applied to any organism with weird, exaggerated structures, such as the giraffe's neck or the hammerhead shark's head."

Collaboration is key to Swanson's project. He and his students are working with the University of Montana and Washington State University in Pullman to paint a broad and all-encompassing picture of the beetle's development. "WSU is able to manipulate the genes responsible for growing horns, and UM has students that can run experiments in the field," Swanson says. "For our part, Gonzaga is able to provide excellent undergraduate researchers, and our lab is able to examine the mechanics and material properties of the horns."

The NSF grant will also pay for students to travel to Southeast Asia to study the beetles in their natural habitat. Possible destinations include Taiwan and the southern islands of Japan. Currently, Gonzaga retains several beetles for study in campus labs, but as Swanson explains, "There are differences between a wild beetle and one bred in captivity, so the field experience will be invaluable to understanding the horns."

Because Swanson's grant includes travel funds, he hopes to send multiple groups of students throughout Southeast Asia. "It will be a very cool experience for students, and it will really help them see how these beetles live in the wild," Swanson says.
The Curious Cooperation of the Acorn Woodpecker

The grant awarded to Joseph Haydock funds research of the acorn woodpecker, a species indigenous along the western coast of the United States to northern Colombia. This woodpecker provides a fascinating example of cooperative breeding, whereby members of groups work together to raise offspring. Essentially, there are several closely related breeders in each group, and in an effort to prevent incestuous reproduction, offspring of these breeders do not breed themselves, but rather help raise other offspring. Haydock and his team hope to learn how this altruistic behavior evolved.

The NSF grant will provide funds for students to travel to the Hastings Natural History Reservation in Monterey, California in order to study the woodpeckers in the wild for several days. At the Hastings Reservation, researchers are able to observe the woodpeckers’ behavior using nanotags, which record the birds’ location.

Haydock explains, “My colleagues and I assist, but it’s mostly students doing the work.” Students take the blood gathered from the Hastings Reservation, extract the DNA, prepare samples for genotype analysis, and analyze the data.

The students are looking to map how the helper birds are related to the offspring. Haydock theorizes that the more closely related the helpers are to the offspring, the more likely they are to care for the young. “Some helpers help more than others, and we want to figure out why,” he explains.

The overarching goal for Haydock’s research is to discover the evolution of complex social organisms, which will inform wider research in the future.

Brook Swanson’s research, too, is built on the idea that experimentation and research will provide insight into biological genetics as a whole.

Equally important is the fact that Swanson and Haydock are allowing students to learn by experience, to travel to the source of information, and to have a hand in exciting new discoveries. They are crafting the researchers of the future.

For more information on undergraduate research at Gonzaga, visit

www.gonzaga.edu/undergradresearch

STUDENT ACTIVITY BY THE NUMBERS

• This year, 50 Gonzaga students participated in the Math Tutoring program. Together, they tutored 74 local elementary and high-school students.

• 99 students presented original research at the 2016 Spokane Intercollegiate Research Conference.

• The Science in Action! program brought 111 Gonzaga students into 31 elementary-school classrooms to lead hands-on experiments for 680 students.

• 14 College departments and programs sponsored a total of 25 honor societies and student clubs.
NEW DEGREE COMBINES COMPUTER SCIENCE AND LIBERAL ARTS

Two seemingly disparate fields have been brought together in the College of Arts and Sciences’ new Bachelor of Arts in Computer Science and Computational Thinking (CSCT). This program is designed for students who want to enter the job force with a degree and training in computer science, but also wish to gain the educational advantages provided by the study of the humanities, sciences, and social sciences.

From smartphones to email to network infrastructure, technology has become an essential part of the modern world. Because of this, computer science is an important and growing field. It’s easy to understand why many college students relish the idea of creating software with world-changing potential.

The new degree offers an alternative to the B.S. in Computer Science offered through the School of Engineering and Applied Science. The B.S. degree focuses heavily on math and science, often leaving little room in a student’s schedule for liberal arts. Studying the humanities has many proven benefits, including increased critical-thinking skills, communication skills, and an aptitude for lifelong learning.

Thus, the new Computer Science and Computational Thinking degree was created. Professor Rob Bryant, director of the CSCT program, explains that students will have a dualistic experience: “They’ll be taking computer science classes through the School of Engineering and Applied Science, but they’ll still be students of the College of Arts and Sciences. So they’re really getting the best of both worlds.”

In addition to the computer science coursework through SEAS, each student will choose a concentration or "Discipline for Computational Thinking" within the College of Arts and Sciences, such as art, environmental studies, English, or philosophy. This allows students to gain an interdisciplinary, well-rounded education, and trains them to think critically in a computational world.

In order to make room for this and other liberal arts requirements, CSCT students will not be required to take as many math courses as their SEAS counterparts. And while B.S. in Computer Science students must take at least eleven credits of science electives, students working toward a B.A. need only take four.

Students in the College of Arts and Sciences will have more freedom in choosing the additional computer science electives necessary to complete their degree, giving them the liberty to pursue a wide and ever-growing range of topics, such as artificial intelligence, robotics, and computer graphics.

"Recent graduates in Computer Science have been able to get jobs at big companies—Apple and Microsoft, for instance," Professor Bryant says. "Many are also choosing to work at smaller start-ups. It's a very promising field, and the job prospects are amazing. By combining this with the benefits of liberal arts, the possibilities are wide ranging."

The Computer Science and Computational Thinking degree began enrollment in the fall of 2016 and continues to grow.
Internships are an essential part of a student's education and preparation for the workforce, providing experiential learning beyond the classroom. Ray Rast, College of Arts and Sciences’ Interim Internship Coordinator, explains, “Our goal is to move toward a closer integration of our students’ off-campus learning (through internships) and our own on-campus teaching.”

Science departments are eager to provide internship opportunities for students, as hands-on learning is crucial for gaining skills necessary for careers in medicine, research, and more. For example, the Biology Department has begun offering a new internship through the Inland Northwest Blood Center. This position gives undergraduates the opportunity to become familiar with laboratory medicine, in particular the support of transfusion and transplantation.

This year, two students interned at the INWBC with Human Leukocyte Antigen Laboratory Director Ellen Klohe, who received her undergraduate degree from Gonzaga. Klohe has recognized the growing need for immunologists and wants to provide opportunities that expose students to this career path, as the profession of laboratory technologists is projected to grow 14% by 2024. This internship is possible thanks to a donation by the Blood Center Foundation, which seeks to train and support medical professionals in order to facilitate superior care for all patients.

Departments across the College are developing internships tailored to the contemporary work environment. History, for example, now offers the “Telling Stories in the Digital Age” internship, which involves bringing on-campus archives together for digital storytelling, preservation, and exhibition. In partnership with the Providence Center of Faith and Healing at Sacred Heart Medical Center, the Philosophy Department offers its own Health Care Ethics Internship, for which students assist in developing monthly ethics programming for Sacred Heart residents, nurses, and staff.

Every CAS department offers a dedicated course code for internships. To earn course credit, a student must meet regularly with a faculty advisor and complete other requirements. Students interested in learning more about internships can do so through Zagtrax—Gonzaga’s online career management system—or by talking to a professor.

“Our goal is to move toward a closer integration between our students’ off-campus learning (through internships) and our own on-campus teaching.”

- Ray Rast, CAS Interim Internship Coordinator

Senior journalism major Josh Horton poses in front of the Spokesman-Review, where his summer internship includes covering the Spokane Indians baseball team.

Visit the College Online

www.gonzaga.edu/cas  Facebook.com/GonzagaUniversityCollegeOfArtsAndSciences  @GonzagaCAS
Gonzaga students of all disciplines gain valuable experience by presenting their research at state, regional, and national conferences, where participating students showcase their research to peers and professors, network with experts in their fields, bond with fellow Gonzaga students, and gain valuable communication skills.

**Students Make a Mark at Mathematical Association of America Section Meeting**

One exciting conference opportunity comes annually from the Mathematics Department. Every year, a group of students travels to the Pacific Northwest Mathematical Association of America Section Meeting to listen to theoretical and practical talks by big-name speakers and faculty from surrounding universities. Students then present their own research to peers, judges, and other participants. Last year, Gonzaga students won two of the conference’s three prizes for undergraduate research. Mathematics major Samantha Fall presented her research regarding a flaw in the code for the computational math program Mathematica. Because of Fall’s findings, Mathematica’s developer is working to fix the bug. Furthermore, a group from the 2015 conference published their ideas in a mathematical journal.

Faculty of the Mathematics Department assist students with their research, taking the time to mentor their advisees through the process of formulating and executing ideas.

Professor Thomas McKenzie, a longtime participant in the regional event, says, “Math is interdisciplinary. We have a lot of students come to us from outside the Mathematics Department—Computer Science, Physics, and so on. We try to help them as best we can, and we get students from a wide array of disciplines at this conference.”

Fifteen Gonzaga students attended this year’s conference. “It was a huge growing experience,” Fall says. “Giving a presentation in front of a lot of people, you gain confidence in your own ideas.”

**Undergraduate Women in Physics**

This year, physics major Emma Peatfield and physics and engineering double-major McKenzie Horner presented at the Conferences for Undergraduate Women in Physics. Their journey to the event began in the summer of 2015 with Assistant Professor of physics Erik Aver. Together, using observations of galaxies taken by the Sloan Digital Sky Survey, the three worked on a research project regarding the so-called “primordial helium abundance.” Their collaborative research provides rare insight into the conditions of the universe just three minutes after the Big Bang, which allows them to evaluate current understandings of the behavior and makeup of the early universe. Peatfield and Horner attended CUWiP at Oregon State University in Corvallis from Jan. 15-17, where they presented a poster on their research, which received high marks from evaluating members.

**The Impact**

Biology Professor Nancy Staub, an advisor to many students, explains the benefits of presenting at research conferences. “They offer the opportunity to interact with a wide variety of peers doing research, as well as give students exposure to well-known and recognized scientists.”

The awards and honors received by undergraduates at these conferences are a testament to students’ hard work and dedication to their craft, and also to the support of Gonzaga faculty.

**Supporting Our Students**

In line with the College’s mission to foster scholarly inquiry and collaboration, conference attendance—including travel, lodging, and fees—is funded by the College of Arts and Sciences through University and donor support.

To give online to the College of Arts & Sciences, visit [www.gonzagawill.com/giveonline](http://www.gonzagawill.com/giveonline), select ‘I’d like to choose my Gonzaga Will Campaign Priority,’ and under Academic Innovation, select ‘College of Arts and Sciences Excellence Fund.’

The CAS Excellence Fund supports student research, academic innovation, global engagement, and community outreach.