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A new generation of engineers





The academic procession for the inauguration of President Elizabeth Garrett begins to cross the Arts Quad on the morning of Sept. 18.

The job of the provost: An unbuttoned-down ‘shirt-wearer’ for Cornell

I am honored to be provost at Cornell – and I know I have just taken on an enormous challenge. While Cornell remains one of the greatest universities in the world, budgets are tight, forcing us to make difficult choices. Moreover, as the legendary historian Carl Becker once said, Cornell professors tend to “think otherwise.”

Espousing contrarian views, including disagreeing with deans, provosts and presidents, is the right and the responsibility of the faculty (and sometimes its joy). Great universities benefit from constructive criticism from within and without, but at times a fiercely skeptical view of administration on the part of the faculty presents a challenge to academic leadership and institutional change.

The historical system of governance among the Oglala Sioux Tribe has always struck me as an appropriate analogy for the role of faculty administrators. The Sioux appointed a “shirt-wearer” to preserve order and take into account the views and interests of everyone, including those without much power, but granted little power to compel others’ actions. In other words, the title conferred responsibility but limited authority. The shirt-wearer was also proscribed from taking offense when insulted – apparently the Sioux believed that a certain level of abuse comes with the job.

In my view, the provost of Cornell should be a 21st-century, unbuttoned-down shirt-wearer. After all, throughout our 150-year history, Cornell colleges and faculty have excelled because of their independence and independent-mindedness. Central leadership must acknowledge that the excellence of the university derives from individual faculty accomplishments and that a balance between individual and coordinated initiatives is essential to our achievements.

As I begin my term as provost, I am determined to emphasize shared responsibility. Although I must and will make decisions, I will, wherever possible, establish transparency and consultation as preconditions for action. I have taken the advice of colleagues – “get out of Day Hall” – and am meeting with individuals and groups of faculty to learn more about their opinions, concerns and aspirations. Like the shirt-wearers, I intend to bear in mind the needs of the entire community of faculty, staff and students as we deal with challenges both ongoing and new.

One of our most important tasks will be developing a strategic plan to guide us through the next decade. To create this plan we will use a collaborative process to identify institutional priorities and define the best strategies to implement them. Among the areas we will focus on are the curriculum, research priorities and ways to enhance our

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Provost Michael I. Kotlikoff

research, education and engagement goals through closer connections among our New York City, Ithaca and other campuses as well as our international programs.

Meanwhile, along with my faculty and administrative colleagues, I am considering ways to constrain costs and relieve some of the financial pressure we all have experienced. Working with the deans, as well as faculty, staff and students, we will need to make difficult choices as we invest in areas of current strength and future promise. Together with President Elizabeth Garrett, I am committed to fostering and facilitating faculty excellence – hiring and retaining superbly qualified individuals and supporting their research and teaching. I share her conviction that nothing is more important to the university’s future.

I am thrilled to serve as Cornell’s provost and to work with our dynamic new president – and the independent-minded people of our world-renowned university.

Michael I. Kotlikoff, V.M.D., Ph.D., became provost of Cornell University Aug. 1, 2015. A molecular physiologist, he has taught at Cornell for 15 years and was dean of the College of Veterinary Medicine for eight years before his appointment as provost. While provost, he will continue research related to heart repair in his NIH-funded laboratory. He also hopes to find time to continue to read English and American literature, his undergraduate major at the University of Pennsylvania.



CORNELL UNIVERSITY'S MAGAZINE

EZRA

features

08 A NEW GENERATION OF ENGINEERS

What excites Lance Collins, dean of the College of Engineering, most about the learning experiences of today's engineering undergraduates? It's the contrast they make with his own memories.

24 GROWING GLOBAL

Cornell continues to expand opportunities for meaningful international experiences.

36 PEOPLE

Engineer Bill Riley on team experience, race cars and rockets.

departments

02 FROM THE PRESIDENT

President Elizabeth Garrett's first letter to readers of Ezra

04 CORNELL UNIVERSE

A bear of a pour for new statue; in fashion, origami turns function into form; social media's dazzling windows on Cornell; Cornell Alumni Magazine as a 'recommended read'

06 PICTURE CORNELL

Homecoming fireworks over Schoellkopf

22 PICTURE CORNELL

Students pass by a wall of windows in the Physical Sciences Building

32 PICTURE CORNELL

Sunset, Milstein Hall

34 CAMPAIGN NEWS

Family's generosity helps public defender 'afford to do my job'

35 YOU CAN MAKE IT HAPPEN

38 PICTURE CORNELL

Inauguration of President Elizabeth Garrett

40 FROM THE COLLECTIONS

Images show how Cornell innovation surmounts challenges

42 LET'S GO BIG RED

Three coaches among Cornell Athletics Hall of Fame inductees

44 PEOPLE

Alumni twins co-found company that uses recycled sports materials

45 END NOTE

The job of provost: An unbuttoned-down 'shirt wearer' for Cornell

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ON THE COVER:

Photography by Robert Barker and Matthew Fondeur. Design by Clive Howard.

from the president

“Education is an inspiration, a taking hold of a broader life.” Those prescient words by Professor Liberty Hyde Bailey, carved in stone in Cornell’s Sesquicentennial Grove, speak to the kind of education found across our campuses every day. Among the myriad opportunities students can seize to embrace that broader life, none are more important than those that offer meaningful experiences throughout our interconnected and globalized world.

Cornell is already a remarkably international university, with students from more than 100 countries; more than 2,000 students traveling abroad each year for engaged learning; a faculty that is global in its composition and in the reach of its teaching, research and creative work; and alumni who live or work on every continent and enthusiastically support our efforts to realize Cornell’s full potential as a global university of the first rank.

I have been impressed by the support and leadership Cornell alumni have provided for our efforts to increase the international dimensions of the student experience. Martin Tang '70, who chairs the External Advisory Council for the Global Cornell Initiative, provided travel grants for 33 Cornell students to work or study abroad this past summer. Other members of the advisory council also have provided opportunities for students to “take hold of a broader life.” Three in particular caught my attention because of their geographic breadth and intellectual scope.

Hannah James '15 earned her degree in human biology, health and society last May and is now a Global Health Program Fellow at Cornell. She was among the students to benefit from support from Andrew Paul '78 and participated in a summer program in a resource-poor international setting. During an eight-week field experience in Moshi, Tanzania, in 2013, she completed a case study on the increasing prevalence of Type 2 diabetes in rural communities and also worked with the Network Against Female Genital Mutilation – experiences that have enabled her to further her interest in health in an international context.

With scholarship support from Ratan Tata '59, B.Arch. '62, Sushmitha Krishnamoorthy '17, a Tata Scholar from New Delhi, India, is pursuing a degree in computer science as a student in the College of Arts and Sciences while also blogging for Cornell, because, as she writes in her blog, “I’m a big fan of a liberal arts education.” Fitting an international experience into an already packed schedule took some planning. As it turned out, though, she had two interesting offers – one



at Oxford and one in Ecuador. In the end she chose the Ecuador program, which includes a service-learning project over the upcoming winter break, because it “would widen my worldview far more than Oxford could.”

Mike Zak '75 is a longtime supporter of the China and Asia-Pacific Studies (CAPS) program, a rigorous undergraduate major designed to train future leaders for careers in the various domains of U.S.-China relations. Among the students who currently benefit from Mike’s support is CAPS major Cole DeVoy '16, who is pursuing interests in energy security, foreign policy and the growth of Chinese “soft power” during his time at Cornell. With four years of intensive Chinese language training and two semesters of internships, in Washington, D.C., and in Beijing, he will graduate with unparalleled pre-professional training grounded on a solid Cornell liberal arts education.

The focus of my presidency is to advance the academic stature and prominence of this great university. The many aspects of our global portfolio – including the education of our students as true citizens of the world – will be critical to our success. I look forward to a deepening partnership with alumni who, like Martin Tang, Ratan Tata, Andrew Paul and Mike Zak, see the promise and the necessity of a fully global Cornell.

Elizabeth Garrett
President, Cornell University

“Education is an
inspiration, a
taking hold of a
broader life.”

– LIBERTY HYDE BAILEY



A bear of a pour for new statue

The new Touchdown statue – dedicated during Homecoming Weekend at the new 1915 Plaza in front of Teagle Hall – honors the four, live black bear cubs (each named “Touchdown”) who served as the university’s unofficial mascot in 1915, 1916, 1919 and 1939. The plaza commemorates Cornell’s first undefeated and national championship football team.

The statue, plaza, landscaping and a maintenance endowment were created through contributions by more than 300 alumni and friends, spearheaded by John Foote ’74 and Joseph Thanhauser ’71.

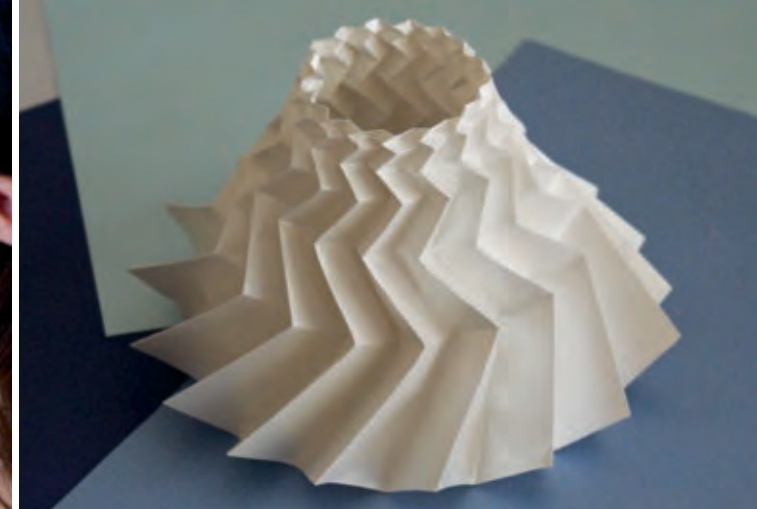
The bronze statue was cast over the summer at Elliot Ganz and Co. in Farmingdale, New York. According to Brooklyn-based sculptor Brian Caverly, who designed the sculpture, the “lost wax” method, also known as investment casting – a thousands-of-years-old process – was used to create Touchdown.

A plasticine (oil-based clay) sculpture is created and coated with urethane rubber and a fiberglass “mother mold.” Wax, poured in and out of the mold, is built up into a 3/16”-thick layer that is removed from the mold and dipped, in multiple pieces, into a liquid slurry. The pieces are baked in an oven and harden into a ceramic shell as the wax melts out, leaving hollow space in the form of the original sculpture.

The ceramic shells are buried in sand, into which molten bronze (heated to more than 2,000 degrees Fahrenheit in an induction furnace) is poured. About 150 pounds of bronze was poured to create the Touchdown sculpture, Caverly says.



After cooling overnight, the ceramic shell is removed from the bronze pieces; the statue is assembled and the pieces welded together, with the welds resculpted to match the surface of the sculpture. The final step is coloring and applying the patina to the finished sculpture using various chemicals and heat.



In fashion, origami turns function into form

A skirt with zigzagging, billowing crease lines that appeared on the runway of an international fashion show hides Cornell science in its folds.

Part of a Cornell alumna’s clothing line that debuted at Vancouver Fashion Week, Sept. 28-Oct. 4, the skirt’s design was directly inspired by Cornell physics research on using origami to tailor the mechanical properties of materials.

The “Fibonacci skirt” is part of the spring/summer collection of VOGEL, a brand launched by Lea Freni ’15, a graduate of the Department of Fiber Science & Apparel Design in the College of Human Ecology.



Freni

A designer drawn to mathematical elements and clean lines, Freni teamed with Uyen Nguyen, a research associate in the lab of Cornell physics professor Itai Cohen, on a project to factor origami principles into fashion design. She and Nguyen worked together on the skirt and are collaborating on other designs for VOGEL.

The designers based the skirt’s folding pattern on the Fibonacci sequence, a famous, self-similar number series.

Recommended read

CORNELL ALUMNI MAGAZINE



Since 1899, Cornell Alumni Magazine has been an independent source of news and views on your alma mater and has celebrated the achievements of Cornellians near and far. The upcoming issue recalls the “Fifth Down” game of 1940, when

Cornell chose ethics over gridiron glory; excerpts a new book by a Cornellian legal scholar chronicling Ruth Bader Ginsburg’s path to the Supreme Court; and offers holiday shopping ideas with a Big Red gift guide. The magazine also brings news of your classmates in the Class Notes.

To subscribe, go to cornellalumnimagazine.com/ subscribe. For a complimentary sample copy, e-mail Editor Jenny Barnett at jbarnett@cornell.edu, or write to Cornell Alumni Magazine, 401 E. State St., Suite 301, Ithaca, NY 14850. The editors also welcome your comments and story ideas.

Pam Divack



Social media’s dazzling windows on Cornell

Keep up with Cornell’s campuses, people and happenings (plus links and other info) on Cornell’s social media channels – Facebook, Instagram, Tumblr, Twitter and more; they are digital windows into the life of the university right now.

Check out, follow or subscribe to Cornell at www.facebook.com/Cornell, www.instagram.com/cornelluniversity, cornelluniversity.tumblr.com and www.twitter.com/Cornell.

A behind-the-crescent perspective on the fireworks display and laser light show that was part of Homecoming Weekend, Sept. 18 at Schoellkopf Stadium.



A NEW GENERATION OF ENGINEERS

Engineers are smart, creative people. Traditionally they work behind the scenes, innovating and solving problems.

Ezra Cornell was supposed to be one of those anonymous engineers.

Hailee Hettrick '17
mechanical and aerospace engineering

Jose Tiburcio '16
operations research and information engineering

Iyore Olaye '16
chemical and biomolecular engineering

Jovana Andrejevic '16
applied and engineering physics

Rahul Shah '16
computer science

Taylor Wright '17
operations research and information engineering

Nina Andrejevic '16
applied and engineering physics

Maurilio Nunio '16
mechanical and aerospace engineering





Clockwise from left: Lance R. Collins, the Joseph Silbert Dean of Engineering; Chris Schaffer, associate professor of biomedical engineering, with students in the lab using a femtosecond laser device; biomedical engineering students collaborate on a research project.

Contracted to establish the first city-to-city telegraph line in 1843 (from Washington, D.C., to Baltimore), Ezra Cornell hoped to usher businessman F.O.J. Smith – co-owner of the telegraph patent with Samuel F.B. Morse – into the history books. Instead, Smith backed out of the venture. Cornell was undeterred. Using his knowledge of agriculture, business, and mechanical and electrical engineering, he built the telegraph line on his own terms. He created his own company, amassed a fortune and used those resources to found his namesake university.

Ezra Cornell's entrepreneurship has inspired Cornell University's College of Engineering to lift the curtain and showcase its great problem solvers by offering academic programs designed to help its enthusiastic students blossom into engineers who thrive in the limelight and become leaders proud to take center stage.

EDUCATING IN A NEW ENGINEERING ERA

Ask Lance R. Collins, the Joseph Silbert Dean of Engineering, what excites him most about the learning experiences of today's young engineering undergraduates, and he might tell you it's the contrast they make with his own memories. Collins recalls that the chemical engineering curriculum in his era was highly theoretical, with precious few opportunities to learn practical knowledge. In one particular Princeton class, he says, a senior faculty member felt Collins and the other students needed to learn something about the real world. "So he brought in a wheelbarrow filled with valves," Collins says. "As we passed the valves around, he would say, 'This is a gate valve. This is a globe valve.' That was my experiential learning," he adds with a chuckle.

While that attempt at hands-on learning may seem meager by today's standards, Collins says his professor was on to something. Engineering education at elite schools such as Princeton and Cornell had strayed too far from their practical roots.

'PART OF WHAT WE'RE BEGINNING TO PILOT IS THE NOTION OF HAVING BLENDED CLASSES WITH SOME OF THE ACTIVITIES FOCUSED MORE ON APPLICATIONS IN THE CLASSROOM.'

During the Industrial Revolution, engineers designed structures and machines to house us, protect us, provide mobility and reduce our physical labor. The discipline was practical. However, as the desire for more sophisticated technologies grew, accelerated by two world wars, there was a need to diversify the disciplines as well as to develop their underlying foundational principles. Engineering began to resemble its parent disciplines, the basic sciences and mathematics, in terms of its rigor and analysis.

"What I'm seeing in the last 10 to 15 years is that the pendulum is starting to swing back," Collins says. "Students are interested in designing solutions to real-world problems. But as we're moving back, we're taking advantage of the incredible tools of today – tools such as simulation software and 3-D printers. It's going to be a glorious return because of all the hard work over the intervening century."

It's a return in which Collins sees Cornell playing a lead, and a shift he believes will benefit young students with a passion for learning. "We're not walking away from the rigorous curriculum we have here at Cornell," Collins clarifies. "There's still a lot of benefit to the traditional



'WORKING ON A SATELLITE THAT'S GOING INTO SPACE IS MORE THAN I EVER EXPECTED OUT OF MY UNDERGRAD EDUCATION.'

classroom, it's just that the classroom is undergoing a lot of change. Part of what we're beginning to pilot is the notion of having blended classes with some of the activities focused more on applications."

Collins says application-based, or "experiential," learning teaches students to think differently about the material they're studying, and can encourage students to break the established rules, get out of the classroom and, like Ezra Cornell, question deeply held assumptions.

ENGINEERING THE PERFECT CURRICULUM

Cornell's first attempts to run a telegraph cable from Washington, D.C., to Baltimore, using a patented plow he created to both dig the trench for and lay the lead pipe-enclosed wires, failed because condensation gathered in the pipes, compromising the wires' insulation and shorting out the electrical current. Fearing he would lose his money, Smith backed out of the project.

Cornell was convinced he needed to challenge the conventional wisdom of burying the cables underground, so he hit the books. After spending a winter studying electricity and magnetism in the Patent Office Library and the Library of Congress, Cornell had his solution. He invented and patented a glass insulator to connect cable wire to supporting poles without shorting out the electricity. The above-ground method proved successful, and on May 24, 1844, Morse tapped in code the first-ever message carried through telegraph: "What hath God wrought."

"Sometimes you have to be presented with a challenge you've never seen before," says Jonathan Butcher, associate professor of biomedical engineering. "It's like people who work in industry and then come back and get their advanced degree. They're so much more motivated and aware of all the things they wish they knew."

And that's the goal of Cornell Engineering's new biomedical engineering (BME) major, which is enrolling its first students this fall: to present hands-on challenges so students can see, upfront, the applications of what they're learning.

The new major comes at an exciting time for the college, which recently received a \$50 million gift to expand BME into the Nancy E. and Peter C. Meinig School of Biomedical Engineering (see story, p. 18). The Meinig family's generous gift not only will enable the new curriculum, but also will provide for new faculty, students, lab space and funding for biomedical research, says Marjolein van der Meulen, director of the Meinig School. "The gift is important and allows the growth that we need for BME to succeed," she says. "The flexible nature of the endowment will be key."

Building a major from scratch is a unique opportunity, and department leaders hope to shape the curriculum around existing strengths while designing an experience that is fresh, innovative and different from what peer institutions offer.

"Biomedical engineering is at a much earlier stage of development than other engineering disciplines," Collins says. "What's exciting to me is Cornell is going about it in a way that I think may actually define the discipline. It

continued on p. 14

'I'M EXCITED FOR OUR TEAM MEMBERS TO GET HANDS-ON EXPERIENCE AND INSPIRATION FOR FUTURE PROJECTS THAT WILL BE TARGETED TO VERY SPECIFIC PROBLEMS.'

In 2014-15, more than 1,100 students of all levels joined 23 competitive teams offered by the College of Engineering, including the Autonomous Underwater Vehicle Team, the Cornell Mars Rover team, Engineering World Health and the Concrete Canoe team.

While large gifts from a few alumni boost the project teams' programs, a new source of support took effect in 2014: online crowdfunding campaigns.

"Crowdfunding definitely made a big difference this year," says professor Al George, longtime adviser to Cornell Racing, the project team that designs, builds and races a formula-style race car in international competitions. The \$27,750 raised by 98 donors – alumni, parents, friends and racing fans – gives a boost to the teams' much-needed research and development efforts, George says.

Financial support in amounts large and small poured in to benefit four project teams in the 2014-15 school year through crowdfunding initiatives run on a platform similar to Kickstarter or Indiegogo. In addition to the successful Cornell Racing campaign, the Cornell Mars Rover project team, which designs a vehicle to compete in the University Rover Challenge, raised \$12,806 for travel costs and innovation. Cornell iGen, which engineers solutions using synthetic biology, or "living machines," raised \$6,400.

CUAIR, a team that designs an unmanned aircraft system, raised \$13,700 toward research and development costs. Cornell Engineering World Health, a biomedical-engineering oriented project team with the goal of designing novel technical solutions for improving health care in developing countries, raised \$7,607 through its crowdfunding campaign.

"I'm excited for our team members to get hands-on experience and inspiration for future projects that will be targeted to very specific problems," says Brecken Blackburn '16, vice president of Engineering World Health of Cornell.

Project team alumni say the real-life design teamwork and hands-on experience they gained are instrumental in their professional work.

Rebecca Macdonald, the Swanson Director of Student Project Teams at Cornell, says the 1,100 student project team members in 2014-15 ranged from undergraduates to master's degree students and Ph.D. candidates, representing every college at Cornell. More than 200 were from colleges other than engineering.

– Kate Klein

ENGINEERING PROJECT TEAMS EXEMPLIFY ALUMNI SUPPORT



continued from p. 11

hasn't been defined yet, and whichever institution does play the most significant role in doing that will immediately rocket its program to the top."

Butcher, associate chair of the Meinig School, says traditional biomedical undergraduate programs don't offer "deep" classes because students must first learn so many aspects of biology and engineering to build their expertise. "We really reject that mode of education. But to do that without taking 50 credits a semester, students have to figure out what they want to take."

That's why the new BME major offers four concentrations: biomaterials and drug delivery; instrumentation and imaging; biomechanics; and molecular, cellular and tissue engineering. Butcher says in each concentration students will

see applications for their education as early as their freshman and sophomore years.

"You're going to start by learning an equation for, as an example, cartilage lubrication. Very complex, graduate-level theory, but as an undergraduate you're going to play with it and see what it predicts in different

'THEY'RE NO LONGER DOING LAB EXPERIMENTS WHERE THE PROFESSOR KNOWS THE OUTCOME.'

conditions. In doing so, you're now going to become aware of all these different sources of variability, its limitations and assumptions, and now you're more motivated to learn the deeper underpinnings going forward," says Butcher.

"We are trying to more deliberately include professional development skills in the curriculum and integrate classroom learning with community activities and projects," van der Meulen says. "In fact, we received an Engaged Curriculum Grant from Engaged Cornell to pilot this integration in a new sophomore engineering distribution class being taught by professor Mike King this fall." Engaged Cornell is a new, universitywide effort to integrate community engagement into every student's academic learning experience, and the program gave out its first round of grants in September.

ESCAPING THE CLASSROOM

A metal box sits ominously inside a see-through chamber the size of a large closet, as if it had been quarantined by a bomb squad. Wearing a hair net, latex gloves and a lab coat, Hailee Hettrick '17 carefully steps into the chamber and points at the nearly 2-by-2-foot cube, noting, "this is set to launch into space in October 2016."

As a mechanical and aerospace engineering major, Hettrick spends much of her free time in the Space Systems Design Studio working on Violet – a high-agility nanosatellite designed to demonstrate a new method to steer spacecraft. It's scheduled to launch next year as part of the Orb-7 flight contracted by NASA and could change the way future satellites are designed and operated.

Hettrick, program manager for the satellite, coordinates the student project team working on Violet's different systems. "I've gotten to dabble in areas of engineering outside of my own major, and it's become clear to me the work I enjoy and the work I don't, and the type of technical challenges I like tackling," Hettrick says. "Being on Violet certainly has helped create a more definitive end goal for my career."

Because of her experience, Hettrick already has made important connections in the aerospace industry. Aside from overseeing the satellite's progress, she also maintains relationships with outside stakeholders like the Air Force Research Laboratory, which she calls "our ticket to space." Other organizations like NASA and Boeing also sponsor the project. Hettrick even landed an internship last summer at Ursa Space Systems – an Ithaca-based startup aiming to design, build and launch affordable satellite systems that can supply important data to clients.

"It's unbelievable," says Hettrick of launching Violet into orbit. "Working on a satellite that's going into space is more than I ever expected out of my undergrad education."

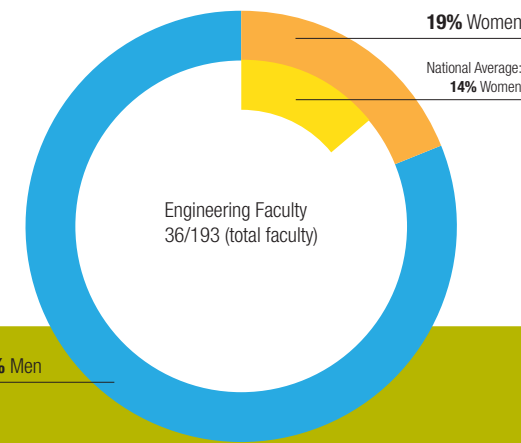
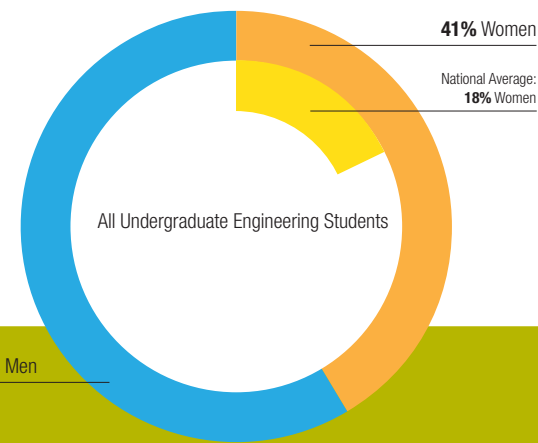
Collins says he'd like to see all students engaged outside the classroom. He says experiential programs, or "learning by doing," are among the best ways to keep young engineers passionate about STEM fields.

"Our peer institutions, frankly, don't offer student team experiences at this level," he says. "Cornell got way out ahead

'MOST IMPORTANTLY THOUGH, I FELT LIKE MY WORK HAD MEANING.'

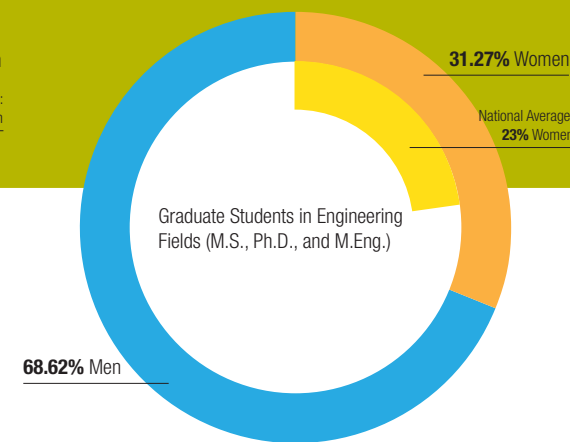
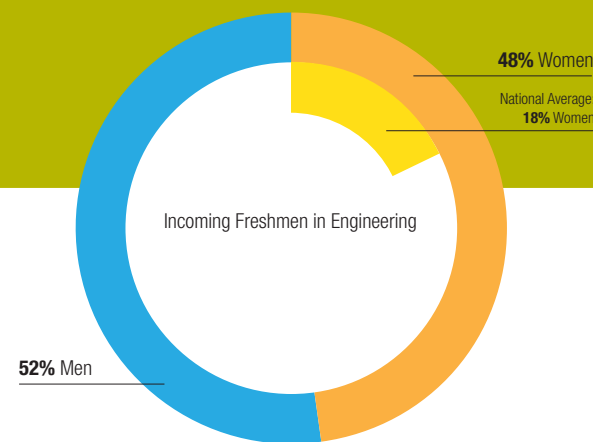


Abigail Brown '17



#ILookLikeAnEngineer

The field of engineering traditionally has been dominated by men, but Cornell Engineering's 2015 enrollment figures are helping to balance the scale. The engineering gender gap recently was brought into the national spotlight when a 22-year-old female software engineer from California started the viral social media hashtag #ILookLikeAnEngineer in order to empower women who didn't feel they fit the traditional mold. The hashtag has been used by Cornell students and faculty.



Source for national statistics: American Society for Engineering Education



Left: Monroe Weber-Shirk, senior lecturer of civil and environmental engineering and director of AguaClara, helps construct a water treatment system with students in Honduras. Above: Cornell students work with local contractors in Honduras to construct a water treatment system they designed as part of the AguaClara program.

of the technology, learn the cutting-edge engineering involved with building the treatment plants in his theory course, and are invited to travel to Honduras to see, firsthand, their engineering in context.

The international experience can be life-changing and further motivates students to improve water treatment technologies when they see how they are improving the quality of life for others. Weber-Shirk says students are consistently making discoveries and inventing new ways to advance water treatment. “They’re no longer doing lab experiments where the professor knows the outcome,” he explains. “The homework they’re doing doesn’t end up in the trash can at the end of the semester; it goes into bringing safe water to communities.”

That made all the difference for Abigail Brown ’17, a biological and environmental engineering student who was planning to switch her major to natural resources because she felt it would allow her to have more of an impact on the world. But after joining AguaClara, Brown says she decided to stick with her original choice. “I really loved learning in an active setting and creating things that would directly impact the lives of other people. This experience gave me an idea of how I can accomplish my goals through engineering. Most importantly though, I felt like my work had meaning,” she says.

But Weber-Shirk says there’s a problem with higher education that doesn’t allow all students to have an engaged learning experience. “Students have so many requirements that this ends up being one more thing they have to add to their schedule,” he says, adding that it’s sometimes students with advanced-placement credits and a lighter course load who have the time to join project teams. (See sidebar, p. 12.)

That’s where college leaders hope new class curricula and programs like Engaged Cornell – which incorporate community-based, hands-on experiences into time allotted for classes – can help students find time for experiential learning.

In September, AguaClara’s 11th filtration plant became operational, and four new plants are scheduled to be built in Honduras. Weber-Shirk has been meeting with government officials to discuss expanding the program to Nicaragua, and he is exploring the idea of creating a network of universities from other countries to expand the impact of AguaClara.

continued on p. 19

As technology advances, Cornell Engineering is changing – inside and out. New laboratory spaces are being created for such fields as robotics and biomedical engineering, facades of older buildings are being updated, offices and classrooms are being rearranged, and existing classrooms are being upgraded with new teaching technology.

“We’re bringing people together for easier collaborations,” says Bill Bader,

director of facilities for engineering. In 2014, the Computing and Information Science faculty moved out of Upson Hall into their new home in Gates Hall, just across Hoy Road. Some of the freed office space will bring mechanical and aerospace engineering faculty – previously scattered across several buildings – together at last.

The entire fifth floor and parts of the fourth floor of Upson Hall will become a center for robotics, with open lab space where robots can roll around, and offices for researchers in mechanical and aerospace, computer and electrical engineering, and computer science who

collaborate on robotics. “We’re really spread out, so the idea is to co-locate and realize some of the advantages of proximity,” says Ross Knepper, assistant professor of computer science.

Student project team space in the basement of Upson will expand by 50 percent. A widened window in the first-floor atrium will allow visitors to look down on the floor below and observe the diverse collection of equipment and activity.

The changes follow a master plan for the college that has grown with the times. “We did one in 2008,” Bader recalls. “Then the recession hit, and we didn’t have the resources.” The plan was revised in 2011 and another update will be started soon. Inputs to these plans have been sought from faculty, staff and students, in part through an interactive website.

“These current renovations are just the start. The entire Engineering campus eventually will see changes that will bring our facilities and academics to the next century,” Bader says.

– Bill Steele

ENGINEERING QUAD BOASTS MODERN LOOK, AND A MORE USEFUL INSIDE



of the pack, and we’ve been steadily building up a portfolio to the point now where over 900 engineering students are participating in project teams,” says Collins, adding that that amounts to over a quarter of all undergraduate students within the college.

That number is expected to grow with the implementation of Engaged Cornell, which will fund new and existing programs that marry classroom learning with real-world experiences. Perhaps the quintessential example of such a program is AguaClara. Students in AguaClara research and design sustainable water treatment systems for small cities, towns and villages in countries including Honduras and India that lack a reliable source of electricity. The water treatment systems are hydraulically designed so that water moves through the facility by gravity and is purified without using any electricity. Since its founding in 2005, AguaClara has provided clean drinking water to more than 45,000 people.

Monroe Weber-Shirk, senior lecturer of civil and environmental engineering and director of AguaClara, runs the program under the motto “research, invent, design, engage,” and says student teams do lab research on specifics

In Cornell's earliest years, the engineering program started out with one professor, two courses, hardly any lab equipment and no building. But in 1870, thanks to a gift from Hiram Sibley – a university trustee and one of Ezra Cornell's telegraph-business partners – the program found a home in the new Sibley Hall and later evolved into the Sibley School of Mechanical and Aerospace Engineering, now one of a dozen engineering fields at Cornell.

Once again, a trustee's vision and generosity are making Cornell engineering history: Cornell University Board of Trustees Chair Emeritus Peter Meinig '61, Nancy Meinig '62 and their daughters recently made a \$50 million gift commitment to expand the biomedical engineering (BME) department into the Nancy E. and Peter C. Meinig School of Biomedical Engineering.

"I've been working very closely with the dean, bouncing ideas off of him, looking at his strategic plan, and talking with other key engineering alumni," said Peter Meinig, a mechanical engineering alumnus. "It has become very clear to me that if we are to be regarded among the very top-ranked engineering colleges in the country we must have a robust program in biomedical engineering."

The Meinig School is a watershed moment in the growth of BME at Cornell. BME started as a department with three faculty members in 2004 and has expanded to 16 faculty today. Over this period, its programs have included an undergraduate minor available to students in the Colleges of Engineering, Arts and Sciences, and Agriculture and Life Sciences, as well as a professional master's degree and research-oriented master's and doctoral degrees. And while BME has risen swiftly in the national rankings, the Meinig family's gift – along with the launch this fall of the undergraduate major – positions the Meinig School for even greater prominence on the national and global stage.

"The first decade was creating and developing the department, and it ranked in the top 20. In the second decade, we want to move into the top 10," said Marjolein van der Meulen, the James M. and Marsha McCormick Director of Biomedical Engineering and the Swanson Professor of Biomedical Engineering.

The Meinig family's gift will allow the school to further develop the BME curriculum, attract outstanding undergraduate and graduate students, recruit pioneering faculty and support their teaching and research, including collaborations with Weill Cornell Medicine, where several BME professors have joint appointments.

Lance Collins, the Joseph Silbert Dean of Engineering, called the school the "centerpiece" of a broader multidisciplinary field of bioengineering at Cornell and underscored BME's unifying role: "It has many connections, from basic sciences like chemistry and physics to veterinary medicine, and it has been, by far, the most important bridge between the medical college in New York City and the Ithaca campus."

Connections with other fields at Cornell and with other medical and research institutions in New York City and elsewhere also will be strengthened by the

BME: Better engineering through philanthropy

'WITH OUR MISSION OF IMPROVING THE LIVES OF ALL NEW YORKERS – AND REALLY THE WORLD – THIS AN INCREDIBLY IMPORTANT STEP FORWARD TOWARD THAT BIGGER VISION.'

continued from p. 16

ENGINEERS AS ENTREPRENEURS

After Samuel F.B. Morse and Ezra Cornell's successful intercity test of the telegraph, Cornell partnered with Morse to run lines between more cities. The engineer once contracted to work behind the scenes found himself the owner of his own company and eventually a major shareholder of Western Union Telegraph Co.

Cornell's entrepreneurial spirit transformed his role from a small contributor to a major player in the industry who would decide which cities joined a new era of communication. And even more so than in the late 1800s, that spirit can make a difference for today's engineers entering their chosen careers.

"I think expectations of an engineer have grown considerably in the last 40 or 50 years," says Collins. "Today we expect an engineer to be able to start or lead a company, and so if we don't provide students with a full complement of skills, it's unfair to ask that of them."

That's why he's piloting a yet-to-be-named program for Ph.D. students. It will include a new business minor, leadership training and mentorship, fellowships and the opportunity to launch a product on campus.

Collins has enlisted Emmanuel Giannelis, Cornell Engineering's associate dean for research and graduate studies, to lead the program. Giannelis says some elements of the program already are being offered to students this fall. The college is continuing to raise funds and shape the program.

Engineering Ph.D. programs at most colleges have remained stagnant over the years, despite a changing world and changing opportunities for graduates entering STEM careers, Giannelis says.

"It used to be that the career path of an engineer was very clear: He or she would be offered a job by one of the tech giants and then would begin to receive training. Now, companies are looking for someone who can bring entrepreneurial experience to the table. Some companies are even looking to buy out smaller startups," he says.

Undergrad engineering students seeking to make themselves more marketable have many options available to receive business education at Cornell, but that's not the case for Ph.D. students. That's why the new pilot program is aimed at Ph.D.s, and will build on existing programs for undergraduates, such as those offered by Entrepreneurship at Cornell.

The benefits of business knowledge are clear. When Molly Morse '03 was studying for her bachelor's degree in civil and environmental engineering, she took Intro to Engineering Entrepreneurship and joined the Cornell Entrepreneurship Organization – a student group run through Entrepreneurship at Cornell that invites students from across the university to network, exchange ideas and attend conferences and workshops.



Top: Emmanuel Giannelis, Cornell Engineering associate dean for research and graduate studies, works with students on a materials science project. Above: Molly Morse '03, CEO and co-founder of Mango Materials, in her biocomposites research lab.

'I DEFINITELY ENJOY BEING A CEO MORE THAN A CONSULTANT. I GET TO REPRESENT A COMPANY THAT I BELIEVE IN.'

Morse continued her education before becoming a consultant for a venture capital firm. After hearing many product pitches, she began to realize the capabilities startup companies have to make a difference in the world. She decided to take a risk and start

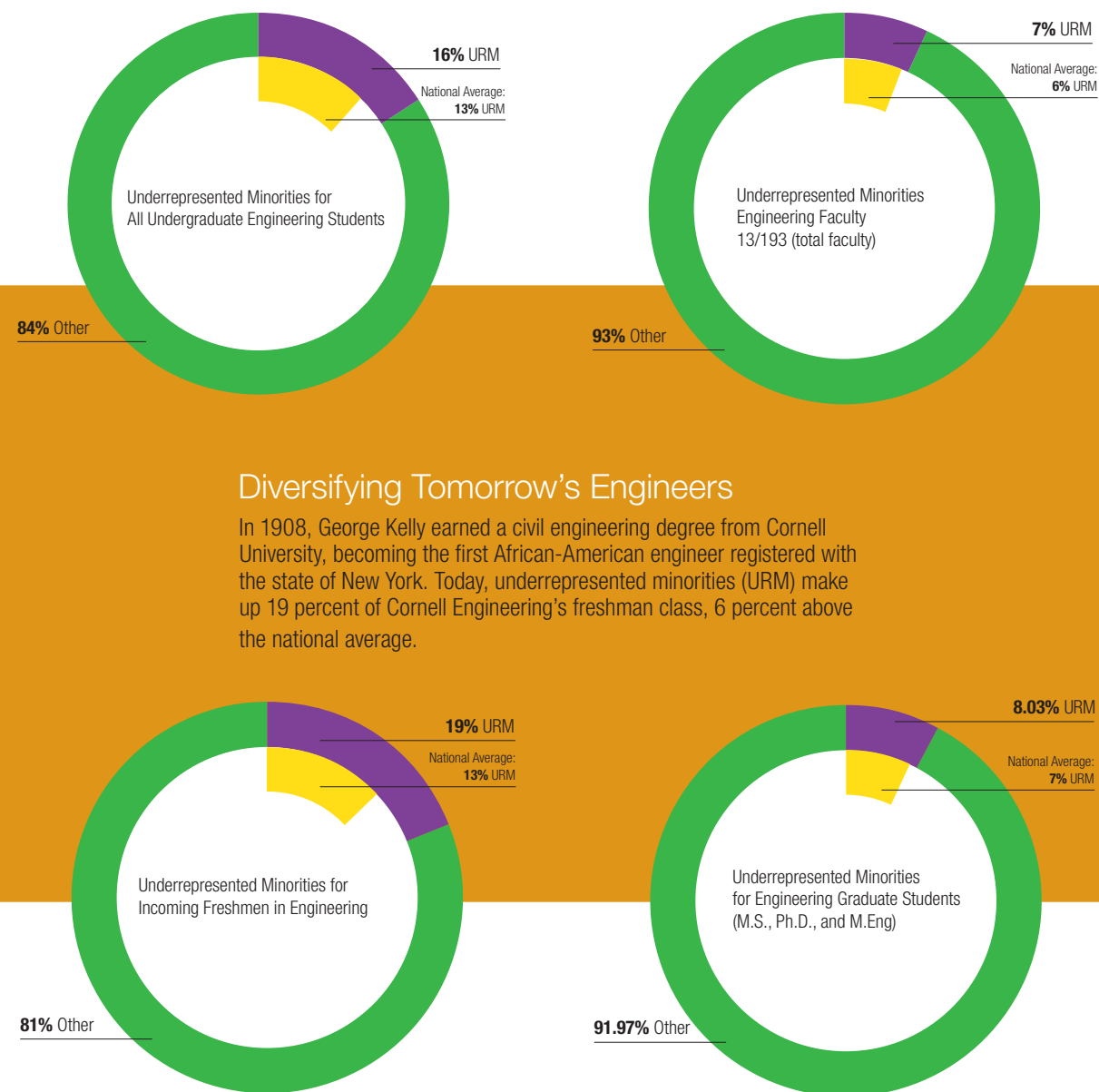
her own company – Mango Materials.

Using her knowledge of bioplastics and biocomposites, Morse created a new way to transform methane – a potent greenhouse gas – into a biopolymer to sell to other companies for use in ecofriendly, biodegradable plastics. The plastics then can be used in products typically viewed as polluters, such as water bottles or microbeads found in face washes.

"I definitely enjoy being a CEO more than a consultant. I get to represent a company that I believe in. When I get positive feedback, it gives me a special pride knowing that I'm doing something worthwhile," Morse says.

Mango Materials has earned startup funding and won several awards for its environmental innovation. Morse

continued on p. 21



Diversifying Tomorrow's Engineers

In 1908, George Kelly earned a civil engineering degree from Cornell University, becoming the first African-American engineer registered with the state of New York. Today, underrepresented minorities (URM) make up 19 percent of Cornell Engineering's freshman class, 6 percent above the national average.

Source for national statistics: American Society for Engineering Education

continued from p. 18

school, according to van der Meulen. Apart from Weill Cornell, she cited her own research projects with the Hospital for Special Surgery and other connections to Memorial Sloan Kettering Cancer Center as examples. She also discussed the promise of BME – from drug delivery to imaging and diagnostics – in addressing deadly diseases like cancer as well as debilitating illnesses like arthritis, and praised the unique ability of engineers to discover life-changing breakthroughs.

One of the forerunners of this new generation of engineers is Cornell trustee Robert Langer '70, a chemical engineering graduate-turned BME pioneer with more than 1,000 patents and hundreds of awards. Langer recalled his undergraduate years when the “very demanding but thorough and rigorous” engineering program had just shifted from a five- to a four-year program, and he was thrilled to hear the news about the establishment of the Meinig School and the launch of the major.

“I think it's terrific,” he said, mentioning that he might have taken the major himself. The David H. Koch Institute Professor at the Massachusetts Institute of Technology, Langer also recalled how his early postdoctoral work with a cancer researcher at the Children's Hospital in Boston and at Harvard Medical School led him to develop microscopic polymer spheres for time-release delivery of drugs that inhibit the growth of blood vessels in tumors now used by more than a million people each year.

Collins said the Meinig School will develop future generations of BME trailblazers like Langer. Recalling Cornell's and the College of Engineering's origins in the Morrill Land-Grant Act, he added: “With our mission of improving the lives of all New Yorkers and people around the globe, the creation of the Meinig School is an incredibly important step toward achieving that vision. The college is forever indebted to Pete, Nancy and their family for giving us the resources to grow BME's scope and influence.”

— Jose Beduya

continued from p. 19

attributes her successful transition to CEO to her additional business education and to her confidence to take a chance: “More knowledge and education always helps, but sometimes you just need to get out there and build it.”

Rahul Shah '16 realized his entrepreneurial ambitions much earlier and is taking Morse's “get out there and build it” advice. A computer science major with a passion for artificial intelligence, Shah joined eLab – an Entrepreneurship at Cornell business accelerator that offers courses and credits from multiple colleges across the university.

Through eLab, Shah and Christopher Goes co-founded Fox – an automated information assistant. The software can decipher specific details about digital content, such as who appears in a photo or what topic a news article is about, and then help its users categorize those files based on the details it gathers. Initially, Fox will be offered as a consumer product with the later goal of targeting enterprise information management, according to Shah.

“Seeing the real-world application of what I'm learning in college has given me tremendous motivation to stay and learn more. Working on Fox has allowed me to bring a lot more context to scattered lessons learned in lectures, and as a result, it sparked a genuine curiosity in computer science,” Shah says.

Shah plans to launch the company later this fall and continue working on it after he graduates in the spring. He says being a software CEO is more than just being the face of a company. “I often find it valuable to be a CEO who has programmed. It allows me to more rigorously understand the technical challenges we come across and promotes a much more fluent and transparent communication channel between technical development and product strategy,” he says.

Many other computer science students participate in opportunities offered by Entrepreneurship at Cornell and Cornell Tech in New York City. However, not all students from Cornell Engineering's other departments have been able to take advantage. Giannelis says that's because there is a need for more specialized facilities. “If you're a chemical engineer and you want to test your product, you need fume hoods and other laboratory equipment,” he says.

Giannelis hopes to open a new business incubator on campus as part of new Ph.D. program – one that will accommodate entrepreneurial doctoral students with unique product-testing needs. He says the plan is to have two companies occupy space in Kimball Hall in time for the program's full launch – one focusing on energy and the other on biomedicine. A soft launch for the lab is scheduled for October as part of the Center for Nanomaterials Engineering and Technology.

‘TODAY WE EXPECT AN ENGINEER TO BE ABLE TO START OR LEAD A COMPANY, AND SO IF WE DON'T PROVIDE STUDENTS WITH A FULL COMPLEMENT OF SKILLS, IT'S UNFAIR TO ASK THAT OF THEM.’

ENGINEER MEETS WORLD

After amassing his fortune, Ezra Cornell became a philanthropist who envisioned a university that gave educational opportunities to outstanding students, rich or poor. “My greatest care now is how to spend this large income to do the greatest good to those who are properly dependent on me, to the poor and to posterity,” he once wrote.

Collins says that, like Cornell, today's engineering students also are looking to make the world a better place. “I think it's generational. I think today's students have an even bigger sense of being the stewards of the Earth than my generation, and this

makes them more aware of societal problems such as climate change, availability of potable water and food, and sustainable development,” Collins says.

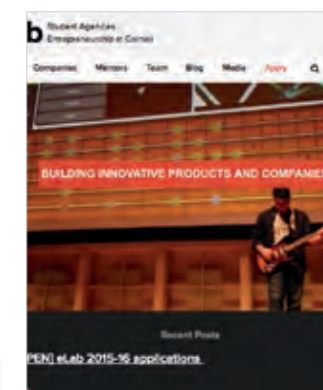
This generational shift comes not only with a changing mindset, but a changing face as well. In a field traditionally dominated by men, Cornell Engineering is balancing the scale. This year's freshman class is 48 percent women. That compares with the national average of 18 percent. And with biomedical engineering attracting a majority female

cohort at Cornell, the new BME major soon could tip the scale further. Also, 19 percent of the College of Engineering's Class of 2019 consists of underrepresented minorities, also ahead of the national average of 13 percent.

The mission remains the same: To keep young engineers enthusiastic about learning – all while molding them into tomorrow's great problem solvers.

“When I entered college, student engineers could aspire to a nice middle-class living,” says Collins. “Today, they see themselves as having impact at all scales. I think it's a kind of confidence that we have instilled in them.”

Images of the websites for Entrepreneurship at Cornell's business accelerator, eLab, right, and alumna Molly Morse's Mango Materials, below.



Students pass by a wall of windows in the Physical Sciences Building.



Growing global:

Cornell continues to expand opportunities for meaningful international experiences

BY JOE WILENSKY

Cornell is and always has been a global university. Cornell faculty, students and alumni are connected through their activities to scholars and leaders across the world.

The Global Cornell initiative, now in its third year, highlights the educational imperative of global education, including global engagement, and helps faculty and program directors across campus build networks to encourage and support development of meaningful international curricula both on campus and abroad.

Through international programs in Cornell's colleges and schools, as well as universitywide units and initiatives, every year more than 2,000 students travel abroad to study, work and serve. It's no coincidence that many of these programs highlight one of Cornell's central strengths: complex, collaborative, multidisciplinary work that is grounded in theory, practice and community engagement.

Here is a look at just a few ongoing programs that build on the university's commitment to internationalization.

From left, Keystone Foundation staffer Sharanya Das, Nilgiris Field Learning Center students Laura Powis '16 and Halammal Rangaswamy, and Janaki-Amma, a resident of Baviyoor village looking out over the hills in Tamil Nadu, southern India.
Credit: Samsuda Khem-nguad '17

Nilgiris Field Learning Center

In spring 2015, seven Cornell students studied and worked at the Nilgiris Field Learning Center in Tamil Nadu in southern India as part of a brand-new semester abroad program, which includes indigenous communities in the Nilgiri Biosphere Reserve. The students, living and working with Cornell faculty, members of local communities and the staff of the partner nongovernmental organization Keystone Foundation, worked on learning modules, fieldwork and research devoted to environmental governance, health and nutrition, and waste production and management.

The Nilgiris Field Learning Center was established in 2013 when then-Vice Provost Fredrik Logevall and Pratim Roy, director of the Keystone Foundation, signed a memorandum of understanding in Ithaca. Roy had developed the concept and framework of the NFLC during his tenure as a Hubert H. Humphrey fellow at Cornell in 2012-13, connecting with faculty and centers across campus.

Following two years of intense, collaborative planning in both countries, and among administrators and faculty from four colleges at Cornell, the first students traveled to the NFLC for the 15-credit study abroad program.

Neema Kudva, associate professor of city and regional planning, is faculty lead on the project. The other faculty subject matter experts and project partners are Rebecca Stoltzfus (nutritional sciences), Andrew Willford (anthropology) and Steven Wolf (natural resources).

Kudva, who notes that Nilgiris means "blue mountains" in Tamil, says that both the Cornell students and local learners rose to the challenge, traversing a cultural gulf through language study and through their shared work on the research projects.

The program's first seven weeks were spent largely in the classroom, with Cornell students sitting side-by-side with students from the indigenous communities; they learned with and from each other in classes and "Crossing Boundaries" exercises that included situated language learning. The next seven weeks were spent in the field, with Cornellians working on five research projects run out

of the NFLC, some developed with community members and Keystone, and others driven by Cornell faculty and student interest. The projects will continue for five years.

NFLC participant Cole Norgaarden '17, an urban and regional studies major in the College of Architecture, Art and Planning, wrote about his NFLC experience in a blog post published at worldsavvy.org. He recalled that he initially wondered how he could do fieldwork on a project "that would span multiple cultures, languages, educations and lived experiences." It was only after living there for a month, he wrote, that he realized he had to change his approach from thinking he was supposed to help improve the "developing" places elsewhere in the world.

"Instead of focusing on the results of our research project, I began to pay more attention to the process."

— Cole Norgaarden '17

"When I first arrived, I saw problems that (to me) had simple solutions," Norgaarden wrote.

"But with time I grew to recognize and appreciate the complexity of the issues I was observing, to better understand the culture they were embedded in, and eventually concluded that it was naive of me to think I could (or should) change anything of consequence in the course of one semester.

"Once I was able to shift my mindset about the purpose of my time in India, the work I was doing took on new meaning. Instead of focusing on the results of our research project, I began to pay more attention to the process. By striving to be intentional and inclusive with our communication, we as a team were able to build and maintain meaningful, mutually beneficial relationships across the language and culture divide."

Hope Craig '16 is a biology and society major in the College of Agriculture and Life Sciences with a minor in global health and policy analysis and management in the College of Human Ecology. At the NFLC, she worked with her partner, Jeyanthi, on a research project that looked at infant feeding practices

among indigenous communities in the region, conducting a focused ethnographic survey that used interviews and observation to collect data on infant feeding, maternal nutrition, and social support systems available for women and children. What made the experience unique



Cornell and community member students spell out "NFLC" in the Toda grasslands of the Nilgiri Biosphere Reserve. The Todas are a pastoral community, indigenous to this area.

Credit: Keystone Foundation, India

for Craig was the strength and resilience of the relationship she built with Jeyanthi during the semester, which she describes as a friendship and trust that “allowed us to work through barriers of cross-cultural collaboration ... to better understand one another’s perspectives and build off of each other’s strengths.”

“I am grateful for the confidence, patience and empathy that I feel I now carry with me,” says Craig, who also built meaningful relationships with her peers and faculty. “The NFLC provided a unique opportunity for me to explore the meaning, value and challenges of cross-cultural collaboration, and engage in meaningful, unique learning.”

Craig continued working on the infant feeding research over the summer and now is pursuing a senior honors thesis using the data she collected with Jeyanthi.

Hanna Reichel ’17, an urban and regional studies major and a Rawlings Presidential Research Scholar, says the impact of her



L. Eswari and Meghan Furton ’16 use a model they made of the Ambikapuram Valley in the Nilgiris to present their research on the relationship between water and waste in four peri-urban villages near Conoor town.

Credit: Neema Kudva

semester at the NFLC still reveals itself to her in new ways every day. While her previous semesters on campus informed her global consciousness, she says – “making me more aware than ever of the complexity and interconnectedness of contemporary issues, while giving me the background and analytical skills to become a more adept and original critical thinker” – it was the real-world setting of the NFLC that gave her the chance to actualize what she had learned, “with all the virtues and flaws that may only be alluded to in a lecture hall.”

Ultimately, the projects worked on by the students and faculty were presented first to community members in the local villages in Tamil. And it was the local community students who made the presentations, with Cornell students as assistants, Kudva says.

“We had elders coming to us saying, ‘You don’t know how amazing it is to find our kids explaining things to us. It’s not an

NGO person and it’s not an outsider,’” she recalls. “The word they used was ‘pride.’”

The Keystone Foundation has been an active presence in the region for 20 years, working with indigenous, tribal residents, Wolf says, in a variety of program areas that correspond to NFLC’s program focus on sustainable development and livelihoods.

“The NFLC is the embodiment of community engaged learning,” Wolf says. “Cornell students are living with and working with tribal members who speak a different language and come from roadless villages. Together they are living in dormitories, sharing their meals, doing the coursework, doing the research, doing the presentations across a vast cultural gulf. And I think, they are developing reflective capacity on their own knowledge, their own values, as well as learning something about the knowledge, values and prospects of these very different peers.”

Laura Powis ’16, who studied traditional healing and community wellness in the Nilgiris indigenous tribal communities, says her experience helped her realize her passion for preventive medicine and the use of proper nutrition as a means of combating illness in both developing and developed countries. She has continued pursuing these areas of study since her return from the NFLC, using the relationships she formed with Cornell professors and medical professionals in Ithaca.

Keystone Director Roy says the first year of Cornell students coming to the NFLC has given “being in the field” a “new meaning altogether.” Local people have been able to showcase their traditional knowledge and experience, he says, through their approaches and work with the Cornell students.

Roy describes that what surprised him the most is how easily the concept of the NFLC – an empowerment process that builds confidence levels and understanding on both sides – was internalized with the spring cohort of Cornell and local students.

“It was as though they always knew it, and someone just had to place it in this format,” he says. “The urge to know about each other and know oneself through an experiential learning and engagement [process was] evident.”

Wolf notes that setting up a program this complex certainly had, and has, its difficulties, with organizers in two countries wrangling with budgets, ethical screenings, safety protocols and more.

“The positive thing is that this has been so demanding that the faculty members have really had a chance to know each other, to know [more] about each other’s interests, their way of working and what’s important to them,” Wolf says. “It’s been a bonding experience. And it really has been interdisciplinary.”

Kudva agrees, saying it has been “an enormous learning curve” for the Cornell faculty members.

“Each of our research programs, the teaching we are doing in the NFLC, represents our disciplinary expertise, and hopefully there are some synergies and the sum is greater than the parts,” Wolf says. “And I think we are achieving that in undergraduate education. In research, it’s really hard. How do you marry

someone who wants to study cultural dislocation and mental illness with someone who wants to study sanitation and water quality? And how we’re doing it, is we’re sending our students, and our research people, to the same villages. They’re doing their research in the same geographic location, and over time perhaps, there will be spillovers.”

The students’ and faculty members’ experiences will also benefit the 550 undergraduates the four faculty partners collectively have in their classes each year, Wolf says. Case studies and curriculum models from the NFLC will be used in the classroom.

Keystone staff will spend some time at Cornell this fall assessing the first semester experience. Roy says he looks

forward to the next NFLC cohort arriving at the NFLC in spring 2016, when Cornell students and a new local group of learners will begin their work together.

“From the new cohort we expect an anticipation for a new learning,” he says. “An urge to get surprised. Little things – a nuanced, complex understanding and reading of people’s lives, aspirations and challenges. ... Perceptive leaders who have [both] the local tribal pulse and also the global waves and direction. The single instrument and the orchestra. ... The curriculum is changing and will be tweaked to incorporate things that we have learned and given feedback on, [as well as] how to make the integration of teaching and research work on the ground. This is just the beginning.”



Provided

The SMART Program

A SMART Program team worked with the Iketsetse Microenterprise Development Company in Lesotho as part of one of the projects in 2015.

The Cornell International Institute for Food, Agriculture and Development’s Student Multidisciplinary Applied Research Team (SMART) Program pairs teams of students and faculty from diverse disciplines with businesses, community groups and organizations in emerging-market countries to apply classroom knowledge to solve real-life problems.

Since 2002, more than 70 teams (composed of about 250 undergraduate and graduate students in more than 20 degree programs in eight Cornell colleges and schools) have worked on projects in 23 countries.

Program coordinator Margaret Lynch ’12 says SMART’s strengths include the fact that undergraduate students and graduate students work on teams together, and skillsets change each year because the projects, determined by the groups needing assistance, also change each year.

Teams try to draw on Cornell research, Lynch says, and prioritize having a strong faculty “anchor” with experience with the particular partner or client, or who has conducted research in that country.

“We try to tie everything back to a classroom or research,” Lynch says.



Provided

From left, Bryson Saez, MBA '14; Naomi Makgolo, owner of FoodNet Holdings; Andrew Pike '15; and Stephanie Toro, MPA '15, were part of a 2014 SMART Project team to FoodNet Holdings in Botswana.

CEO Agrifood Limited in Thailand. “It really helped me to expand my mind outside my specific Cornell discipline and learn more about the value of multidisciplinary groups in solving problems,” says Joseph, a 2014 graduate. An operations research engineering major, Joseph says her initial interest was in the scientific production of rice, but the program changed her perspective.

“It is a crop that is integral to Thailand’s economy, people and culture,” she explains. “Its success is equally linked to policy, business and science.”

Lin Fu, a doctoral student in government, participated in a SMART project in 2013 and led SMART projects in 2014 and 2015. “I’ve helped guide Cornell student teams as they research, analyze and write about specific companies and more generally about [small and medium enterprises] development in an emerging-market context,” she says. Her involvement with the program has “further solidified [my] research interests that lie at the intersection of business, government and the global economy.”

About 10 projects are planned for this year, focused on sub-Saharan Africa, Southeast and East Asia, and South America.

Teams will work projects that range from agriculture to management consulting-style projects that include business and marketing strategy, Lynch says.

“We really run the gamut of anything that a client in an emerging market country could possibly need,” she says, “and we can draw on the amazing resources here at Cornell to pull a team together to achieve that.”

“For most this is a truly meaningful engagement where they can transfer skills from the classroom to the real world.”

– Ed Mabaya

Past teams have assisted promising new companies to develop strategic business plans; worked with an international NGO to pilot IT training in four African countries; and collaborated with grassroots development professionals to enhance learning outcomes for farmers seeking to increase family food security. Teams work on location with a company or group for at least two weeks and sometimes up to eight weeks.

On their return, students create a case study or a professional report based on their experience; most students draw on those case studies in later coursework.

“I am still in touch with most of the students who have participated in my SMART projects,” says Ed Mabaya, associate director of CIIFAD, who has led a dozen projects over the past decade. “For most, this is a truly meaningful engagement where they can transfer skills from the classroom to the real world. It is also a unique opportunity to spend two weeks working with a faculty member who helps them navigate a foreign culture.”

“For many students, SMART also opens the door to a career in international development,” he adds.

Lindsey Joseph’s SMART Program experience was with

A 2015 SMART Program project team works with the staff of Jabon Kendal Tree Farm and Nursery in Indonesia.



Provided



In summer 2015, global health students and faculty, including Douglas Donnelly III '16, Adina Zhang '17 and Francis Ngure, Ph.D., '13, collect baseline household level health and demographic information in Mweka village near Moshi, Tanzania. Credit: Jeremy Swanson

The Global Health Program

The Global Health Program, run through the Division of Nutritional Sciences, includes course-based and experiential learning opportunities and summer field experience programs in the Dominican Republic, India, Zambia and two in Tanzania (one offered with Weill Cornell Medicine).

Rebecca Stoltzfus, M.S. '88, Ph.D. '92, professor of nutritional sciences, directs the program, which offers field experiences in support of an undergraduate minor and a new major, tackles global health problems from a multidisciplinary approach, and engages new researchers and practitioners to address health problems that transcend national boundaries and disproportionately affect the resource-poor.

The program began in 2008 as a collaboration among faculty in four colleges and with a grant from the National Institutes of Health.

“I see that as one of the fundamental strengths of the program – that it’s multidisciplinary, and its universitywide

framework,” Stoltzfus says. “The faculty planners felt strongly that we wanted students’ classroom learning to be complemented by real-world experience.” The Introduction to Global Health course, a field experience of at least eight weeks and a capstone course upon students’ return were requirements from the start.

“We really wanted students ... to have to navigate life in the setting in which they were immersed,” Stoltzfus explains, “and to do some kind of real work in support of global health,” which can be anything from a mentored internship to a health research project.

Between 50 and 65 students complete the minor every year.

Experiential learning means more than students learning in the field, Stoltzfus says; it means continuing learning and processing the experience on their return. Everything from the preparation course to writing assignments in the field to group discussions in the capstone courses (or conversations late at night in Collegetown, she adds) deepen the experience.

“We really wanted students ... to have to navigate life in the setting in which they were immersed.”

– Rebecca Stoltzfus

Hijab Khan '16 completed the program's Tanzania field experience in 2014, spending two months in East Africa shadowing at a hospital.

Khan, who says she found her niche at Cornell when she discovered the field of global health, says the experience allowed her to nurture her interests in human health and human rights; since that summer, she says, "my passion for those subjects has only grown, and my career goals have shifted from clinical medicine to global health.

"I can no longer consider health without considering its context in the world, and I want to understand how it interacts with other fields like policy, culture and environment before trying to improve it."

The Global Health Program's student advisory board offers leadership roles, additional programming and special projects. Alumni of the program also have input and access through the Global Health and Development Alumni Mentorship Program, where students are paired with an alumni mentor.

Khan has since become more involved in the program as a teaching assistant and student advisory board member "so that I might help other students make that same discovery," she says.

Following her global health field experience in summer 2009 at a rural health clinic in Peru, Lauren Braun '11 came up with the idea for a simple, inexpensive immunization-tracking reminder bracelet for babies. She formed the nonprofit Alma Sana (Spanish for "healthy soul") to manufacture and distribute the bracelets,

"Public health allowed me to help more people in a day, and on a much bigger scale."

— Lauren Braun '11



These are only a handful of the complex, multidisciplinary Cornell programs that have been developed by faculty across campus to offer meaningful international experiences to undergraduate students. Examples of other major programs include the Tata-Cornell Agriculture and Nutrition Initiative, a research program focused on solving problems of poverty, malnutrition and rural development in India; international agriculture and rural development programs that address interdisciplinary issues associated with food systems and rural development in emerging nations; the Cornell-Cuba Research Program, which offers students the opportunity to study and conduct research (in bioacoustics, neuroethology or protein studies) at the University of Havana; and the Cornell in Seville Program, in consortium with the University of Pennsylvania and the University of Michigan, in which students experience life in a Spanish household while they study with local students at the University of Seville.

For more information and resources about international opportunities for students and faculty throughout Cornell's colleges and schools, visit <http://global.cornell.edu>.



Alma Sana founder Lauren Braun '11 with a group of children in Cusco, Peru, while visiting houses of mothers who took part in her vaccine bracelet program. Credit: Eleonore van Wongerghem
Below, the first baby enrolled in the Alma Sana bracelet program in Ecuador shows off his ankle bracelet. Credit: Alex Bozzette

which bypass language barriers and illiteracy by using symbols to show mothers (and public health workers) the vaccinations children need and when they are due. The bracelet is worn by a child from birth to age 4, with the goal that more children will live to age 5.

In 2012 Braun received a \$100,000 Gates Foundation Grand Challenges in Global Health Initiative grant to field test the bracelet. Initial field tests in Peru and Ecuador were completed earlier this year (91 percent of moms said the bracelets helped them, Braun says); now Alma Sana is actively fundraising to conduct additional trials and impact evaluations and to scale their work to multiple countries to help save thousands of children's lives.

Braun, who came to Cornell interested in health care and planned to become a doctor, discovered the field of public health in the College of Human Ecology and had an epiphany, she says. "I had the feeling, this is what I'm supposed to do with my life ... I knew I wanted to work in health care, but work in public health allowed me to help a lot more people in a day, and I could work on a much bigger scale, whether it was in policy or data analysis or something like I'm doing now. I also really wanted to get out and start working."

Listening to the people you're working with was her biggest takeaway from the program, she says.

"That mindset allowed me to be in an open position to receive and value their comments and feedback, and design a product around their needs," she explains, "listening to the problem and immersing myself in it."



Melissa Miles '16, with her homestay family, learns how to grind "mealie-meal" (coarse flour from maize) which then gets boiled in a large pot on a wooden fire outside and made into a traditional drink for the "Matebeto," a traditional Zambian wedding ceremony.





Nathanael Miller, J.D. '13

Family's generosity helps public defender 'afford to do my job'

On a typical day as a public defender in Louisville, Kentucky, Nathanael Miller, J.D. '13, arrives in court at 8:30 or 9 a.m.

"In my morning and afternoon I will represent, say, eight to 14 people charged with anything from not having insurance to various crimes that can carry life sentences," Miller says. He works for the Louisville-Jefferson County Public Defender Corp., a nonprofit that contracts with city and state agencies in Kentucky.

In recent cases, he's helped clients get out of custody, lightened sentences by working out drug treatments and appealed to judges when prosecutors are out of line. He says nothing could have prepared him emotionally for what happens day by day in the courtroom, but intellectually and professionally, Cornell Law School gave him an excellent education.

"The criminal defense professors at Cornell are extremely good," Miller says. In particular, professors John Blum, Sheri Lynn Johnson and Keir Weyble, who work with the Death Penalty Clinic, prepared him to advocate for clients who might be facing the worst situations of their lives.

"Every week produces something that is either heartbreaking or absurd or some combination of the two," he says. "It's nonstop."

Miller plans to continue doing this difficult but rewarding work for a long time; however, he could not have begun without financial assistance from the Alfred, Nicolle and Frederique Rossum Fund, an endowment established by the late Alfred Michael Rossum, J.D. '53. The fund was created to help Cornell Law graduates who are practicing law for nonprofit entities or public-sector employers while paying student loans — a daunting challenge.

"There's a big discrepancy between private-sector salaries for Cornell grads and public sector," says Karen Comstock, assistant dean for public service at Cornell Law School. In 2014, 21 out of 184 Law School graduates went into public service, with low salaries and high student loan debt.

Miller graduated with close to \$125,000 in debt. Annual payments on a 10-year plan would have equaled his take-home salary as a public defender.

"It is no exaggeration for me to say that without the Rossum Fund I could not afford to do my job," Miller wrote in an April 2015 letter to Pierre Descheemaeker, J.D. '73, a Cornell Law alumnus who helped facilitate Rossum's gift — and the only person left for Miller to thank.

Alfred Rossum had a varied career in the U.S., Japan, Great Britain and France. He lost his French wife, Nicolle Ray Rossum, and their daughter, Frederique, a family

medicine doctor who died of leukemia. He planned his estate to benefit a Cornell Law graduate dedicated to public-interest law in their memory.

Descheemaeker, a senior partner with August & Debouzy Avocats, a top firm in Paris, used his expertise in French law to avoid a tax that would have taken 60 percent away from the total gift, severely diminishing support for the student.

"Pierre actually never met Alfred, but felt very honored to work on this gift posthumously, realizing the significant impact of this fund on someone's future," says Catheryn Obern, a member of Cornell's development staff.



Professor Sheri Lynn Johnson, in light blue blazer, shown here with students from the Death Penalty Clinic.

Cornell Law School is further addressing the problem of high student debt preventing graduates from entering low-paying areas of law. Comstock is leading efforts to synchronize private gifts to the school via a 2007 federal law, the College Cost Reduction and Access Act, which has a public-service loan forgiveness provision.

The Law School's goal is to make it so that "if you have federal loans and you go into public-interest law," says Comstock, "law school could be free."

"We're seeking permanent, secure funding for this program," she says. A gift of \$5 million to \$6 million would endow the program. Until that

happens, six individually named loan forgiveness funds, including the Rossum Fund, are supporting six Law School graduates, including Miller. Other sources support about 20 more.

Miller plans to continue working as a public defender until his loans are forgiven in 2023 and possibly beyond. He encourages current and future law students to find a way to go into public-interest law if that is their goal: "We need all the people we can get — all the good, passionate, committed attorneys. It's not an easy job."

— Kate Klein

You can make it happen_{Fall 2015}

Classic casts

The College of Arts and Sciences is restoring Cornell's important collection of 19th-century plaster casts of Grecian, Roman, Egyptian and medieval art. Clean and stabilize a set of plaster casts for display in Klarman Hall **(\$1,000)**, fully restore a damaged cast **(\$5,000)**, mount and display a frieze of casts from an ancient temple, currently in storage **(\$10,000)**, or provide a year's salary for a professionally qualified curatorial assistant to catalog and digitize the collection **(\$25,000)**.



Diversity in computer science

The annual Grace Hopper Conference focuses on the research and career interests of women in computing. The ACM Richard Tapia conference celebrates diversity in computing. Send an undergraduate woman or underrepresented minority computer science major to one of these important conferences. **\$1,500**

Looking deep into sleep

Undergraduate students in the College of Human Ecology are conducting research at Weill Cornell's Center for Sleep Medicine, hoping to improve sleep and reduce sleep disruption for end-of-life patients. Provide a laptop to record and analyze data on patients' sleep-wake cycle. **\$2,100**



Engineering student project team travel

Cover travel costs to competitions for engineering student project teams. Get a robot to California, a health initiatives team member to Central America or a concrete canoe to Cayuga Lake for competition. Transport one student for **\$750** or a team's vehicle for **\$24,000**.

Women's Resource Center

Help the director build a fund to provide programs and essential services that educate, inform, raise issues, change behaviors and positively impact women's lives. **\$15,000**

Not-for-profit interns

Support one Johnson MBA student who chooses to do a summer internship for little or no pay at a leading nonprofit. **\$5,000**

Horse rescue mannequin

Provide a life-size horse mannequin so Cornell veterinary emergency and critical care faculty and students can practice life-saving rescue techniques to save animals injured in trailer accidents or trapped in fires or mud pits. **\$20,000**



Art students in Europe

Send MFA students from the College of Architecture, Art and Planning to a European city, such as Berlin or Rome, for a 10-day intensive study trip. **\$20,000**

Personal genetics

Support voluntary genetic ancestry testing in the popular Personal Genomics and Medicine course in the College of Arts and Sciences' Department of Molecular Biology and Genetics, where undergraduates from across campus gain insight into their own genetic ancestry as a way to bring genetics to life. **\$10,000**

Healthy honeybees

Provide a precision incubator to help a Ph.D. student studying how stress during development affects the brains and behavior of worker bees. **\$11,000**



Plantations intern

Fund one 2016 summer internship at Cornell Plantations, a great opportunity for students to dig into the vast Plantations resources. **\$5,000**, or endow an internship for **\$125,000**.

To make a gift, or for more information about these and other giving opportunities, email MakeItHappen@cornell.edu.



Engineer Bill Riley on team experience, race cars and rockets



Bill Riley '99 designs, builds and tests space-worthy vehicles at SpaceX – a company founded by business magnate Elon Musk – working to enable people to live on other planets. As a senior director of structures engineering, Riley is taking the principles of efficient and elegant design he learned as a leader of Cornell's Formula SAE racing team beyond Earth's atmosphere into the future.

EZRA: What's hot right now at SpaceX?

BILL RILEY: We're working hard to land and recover the first stage of our Falcon 9 launch vehicle. It's designed to be reusable, and I

think will be a real game changer for the industry. We're also upgrading our Dragon spacecraft to soon carry people to the International Space Station and we have started work on our Raptor rocket engine that is designed to power future Mars vehicles.

EZRA: How were you involved in Cornell Racing teams?

RILEY: I joined the team as a sophomore for the 1997 competition year. I worked on suspension, shifter and drivetrain. I was fortunate to have two great advisers, Al George and Brad Anton. The next year I took the role of drivetrain team lead and had my first exposure to design judging. For my senior year I had the position of chassis team leader.

Those skills ended up being really useful, and I used them to land a spot on the Jaguar F1 team when I worked at Ford after school. So I have had a terrific payback on my FSAE years and Cornell and consider it very core to my professional development.

EZRA: How did automotive experience with Cornell Racing translate to space exploration?

RILEY: The experience was not just valuable in the mechanics of how to design, analyze, build and test a race car, but also in lightweight, efficient and elegant design; structural optimization; and project management and team interactions. Race cars and rockets are not that dissimilar, and after years of working at Ford and GM, the SpaceX offer came up and I couldn't say no any longer. I fell in love with the ideas, culture and experience of working with super smart people and helping humanity become a multiplanetary civilization. It also has a certain FSAE feel and harkens back to my days on the team.

EZRA: I understand you hire Cornell engineers at SpaceX specifically for their team experience. What do former team members bring to the job?

RILEY: Elon [Musk] has actually talked about Formula SAE in the press and on Twitter, mentioning how it's a great way to get into SpaceX. First, the project and team experience has a great level of complexity. It takes good organizational skills and highly motivated students to pull it off, but is not so lofty it's impossible. The people who excel and are competitive must have a real love of engineering and winning. Those who do are a great fit for SpaceX. Our culture thrives on self-motivation and great engineers.

EZRA: Are you still engaged with Cornell Racing?

RILEY: The whole FSAE experience, teammates and great advisers really shaped and informed me personally. I have worked with them over the years – from answering rules questions, questions about structural analysis and composites, and anything else they cared to ask. I thoroughly enjoy the experience with the Cornell team and other FSAE teams as design captain. Over the years I have volunteered at more than 25 competitions in various capacities.

I'm the proud owner of the 2005 Cornell car, which I am happily restoring with my two boys, James and William. Maybe I'll even get to watch them compete as a member of the Cornell Racing Class of 2034.



from the collections

Challenging IMPOSSIBILITIES



Applying innovation and the sheer force of will to seemingly insurmountable challenges has been central to the character of Cornell since its inception. Ezra Cornell's abiding faith in the world-changing potential of the telegraph left his family destitute before it made his fortune. His ideas, inventions and investments helped drive the installation of telegraph lines across the Northeast and the Midwest. When his once-bankrupt company merged with a powerful rival to create the Western Union Telegraph Co. in 1855, his new wealth ushered in the focus on philanthropy and education that led him to found the university. This spirit of rigorous problem solving and big ambition was in full evidence some 40 years later, when the College of Civil Engineering set out to harness nature and create, in the words of the college's director and dean, Professor E.A. Fuertes, "a laboratory superior to anything built hitherto in any country." The construction of the Hydraulic Laboratory in Fall Creek was a bold and immense undertaking, intended to create a dam holding 50 million to 70 million gallons of water, with a 500-foot canal blasted through 16 feet of solid rock. The lab, near the foot of Beebe Lake, eventually would become one of the most iconic features on campus and was used as an experiment station for six decades, enabling "researches which heretofore have been considered as absolutely among the impossibilities," according to an 1898 article in The Cornell Daily Sun.

– Melanie Lefkowitz



Clockwise from opposite, top left:

The original telegraph receiver used in Baltimore for the receipt of the first telegraph message on May 24, 1844. The message, "What hath God wrought," took 37 seconds to send and "absolutely changed the world," says Clif Pollock, electrical engineering professor. The receiver was a gift to the College of Engineering and is housed in Cornell University Library's Division of Rare and Manuscript Collections.



"a laboratory superior to anything built hitherto in any country."

– Professor E. A. Fuertes



Parabolic antenna used for trans-horizon communications research project, 1950s, electrical engineering. From left: Professor Nelson Bryant, unidentified, senior research associate Michael Colbert.

A cyanotype of the machine shops in the Sibley College of the Mechanic Arts, ca. 1885.

Construction of the Cornell Hydraulics Laboratory, approx. 1897-98.

Images: From the Division of Rare and Manuscript Collections.

THREE COACHES among Cornell Athletics Hall of Fame inductees

The 2015 Cornell Athletics Hall of Fame class announced in July was honored in September and will be remembered forever in Big Red lore.

Eleven of the greatest names in school history – including three All-Americans, a two-time NCAA champion, and three of the most respected and successful teachers the Big Red sports world has had to offer – will join 576 past greats who already have been inducted.

Lauren May '05 is the Babe Ruth of Ivy League softball and became the school's first All-American in the sport. Sisters **Jessica '05** and **Shonda Brown '05** spearheaded a track and field dominance unprecedented in the Ancient Eight. **Travis Lee '05** won NCAA wrestling titles as a sophomore and senior, captured four Eastern titles and became the first Cornellian to earn All-America honors four times in a sport the Big Red has dominated for decades. Two-time women's lacrosse All-American **Erica Holveck '03** was a key member of the 2002 NCAA semifinalist squad that was the first Cornell women's team to make a Final Four.

Colin Farrell '05 was a three-time member of the U.S. national rowing team after posting the best record for a two-year lightweight stroke by any Cornellian in more than 50 years. **Ka'Ron Barnes '04** was the ninth National Association of Basketball Coaches all-district selection in school history for men's basketball, while **Karen Force '04** set the school's career assist record (men's or women's) and was the first Ivy women's player to record career totals surpassing 1,250 points and 400 assists.

The 38th annual event took place Homecoming Weekend, and included formal induction ceremonies and a recognition ceremony for the 11 greats at halftime of the Cornell-Bucknell football game.

Initiated in 1978, the Cornell Athletics Hall of Fame became a reality



Pete Noyes

through the generosity of the late Ellis H. Robison, Class of 1918, whose devotion, advice and financial support to his alma mater started immediately upon graduation from the university.

Three former coaches also were inducted.

PETE NOYES spent 36 years wearing a variety of hats for Big Red football, engendering a goodwill among generations of Cornell student-athletes – and coaching some of the best defenses the Ivy League has ever seen. Despite never serving as head coach, Noyes is revered by the legions of former student-athletes he recruited and to whom he barked orders.

His overall record vs. Harvard and Yale was 26-15-1 (20-15-1 as a defensive

coordinator), including a school-record 11-game win streak vs. the Crimson (1986-96). During his 21 years of coaching at Cornell, Noyes recruited 18 captains and coached or recruited 25 first-team and 83 total All-Ivy selections. Among his recruits: Cornell Athletic Hall of Fame members Derrick Harmon '84, Scott Malaga '89, Chris Zingo '94 and John McNiff '91. He recruited 10 starters on the 1988 Ivy championship team and 14 starters from the 1990 championship squad. During his 10 years as recruiting coordinator, Cornell played for an Ivy League title three times, winning twice (1988 and 1990) and had an Ivy League record of 39-30-1 and 51-42-2 overall. In 1995, Noyes coached in his fourth Ivy League title game, the most of any Big Red football coach since the formation of the Ancient Eight.

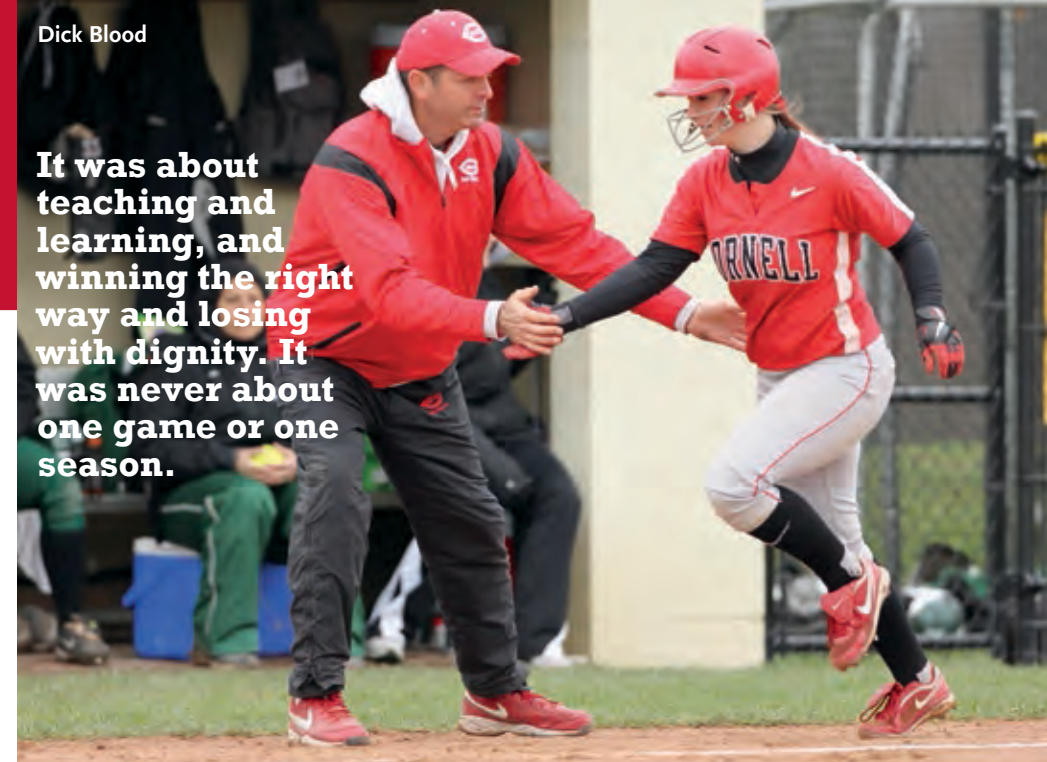


Lou Duesing

One of his most significant contributions to the program came off the field – in the form of his leadership of the Cornell Football Association. He helped the CFA membership rise from 250 to 1,400, while the football program's annual fund grew fivefold. The Ben Mintz/CFA Golf and Tennis Outing he ran grew from 50 to 300 golfers, while funds raised rose by a factor of 40.

LOU DUESING'S tenure as head coach set a precedent for Ivy League and national success for women's cross country and track and field. Duesing's 21 years at the helm of the Big Red women's programs were marked by 26 Heptagonal team championships. In all, he was part of 30 Heps championship teams as an assistant and head coach. He was named USTFCCA Northeast Region Coach of the Year 10 times.

Duesing coached 58 All-Americans in cross country and track and field (45 at Cornell), 209 Heptagonal Champions, three Penn Relays Champions, one



It was about teaching and learning, and winning the right way and losing with dignity. It was never about one game or one season.

NCAA champion and had five individuals place in the top 10 at the NCAA Cross Country championships. Two of his student-athletes, Morgan Uceny '07 (1,500 meters) and Jamie Greubel '06 (2014 bronze medal, bobsled), have been U.S. Olympians, and several others have competed in world championships in both cross country and track and field.

In 1989, Duesing was the head coach of the USA women's cross country team, which won a bronze medal at the IAAF XVII World Championships in Stavanger, Norway. He has also been a coach at the U.S. Olympic Festival.

DICK BLOOD accumulated an impressive 623-347-2 career record at the helm of the softball program, including a 208-113 mark in Ivy play. Though wins and losses weren't the only things that mattered, he signed more winning lineup cards than any softball coach in Ivy League history and posted more triumphs than any other Big

Red coach had compiled in one sport. He saw Niemand*Robison Field built, maintained, renovated and expanded.

Blood's players were named to the All-Ivy first team 48 times, Ivy League Player of the Year four times, Ivy League Rookie of the Year four times and Ivy League Pitcher of the Year three times. Three of his players were named to the Capital One Academic All-America team, 12 earned Academic All-District nods and 20 captured NFCA All-Region accolades.

Blood set an Ivy League softball record 623 wins to go along with five Ivy League titles (1999, 2001, 2004, 2009, 2010). He was one of just three Ivy League coaches to surpass 600 wins in a sport in league history, but for Blood, it was always about the game and the kids. It was about teaching and learning, and winning the right way and losing with dignity. It was never about one game or one season.



NOYES:
36 YEARS WITH BIG RED
18 CAPTAINS RECRUITED
83 TOTAL ALL-IVY SELECTIONS



DUESING:
21 YEARS WITH BIG RED
26 HEPTAGONAL TEAM WINS
58 ALL-AMERICANS COACHED



BLOOD:
623 WINS AN IVY LEAGUE SOFTBALL RECORD
48 PLAYERS NAMED TO THE ALL-IVY FIRST TEAM
5 IVY LEAGUE TITLES

Hockey sticks live again

Alumni twins co-found company using recycled sports equipment

New York Islanders center John Tavares breaks about 100 hockey sticks a year. Add in broken sticks from NHL and college games across the country and you've got a pile of trash each year destined for landfills.

Or a pile of treasure, according to twins Evan '11 and Michael '11 Dremluk, co-founders of Original Stix (www.originalstix.com), a Detroit-based company that turns these sticks into phone accessories.

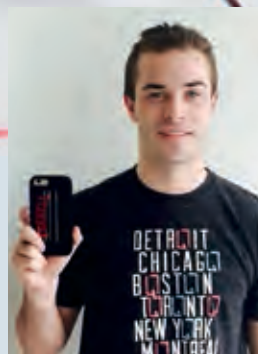
Their partners are three Michigan State students, Andrew Mestdagh, Mario DiMercurio and Terry Johnson, who came up with the idea for the company because of Johnson's love of hockey and his commitment to Detroit and to sustainability. Evan Dremluk met Johnson when they worked for Southern Tide, an apparel company in Greenville, South Carolina. Dremluk and Johnson focused on expanding the company's college marketing program, which became a growth driver for Southern Tide. The company was recognized as the 27th fastest growing company by Forbes Magazine in 2012. Dremluk and Johnson leveraged this experience into their new venture.

"As a sophomore working for Southern Tide, I gained an understanding of how the startup process really works and what drives growth for emerging companies," Evan Dremluk says. "At Cornell, I learned a lot from reading contracts and taking business and finance classes. The entrepreneurial speaker series class really pushed me toward an entrepreneurship route. It was so practical and engaging to hear about the successes of people who took a chance and assumed risk."

Original Stix works with more than 50 teams from the NHL, AHL, NCAA and OHL (including Cornell Big Red hockey), collecting broken, game-used sticks and repurposing them into iPhone and Galaxy phone cases.



Evan Dremluk



Michael Dremluk

Fans can switch out the sticks without purchasing a new case. Cornell cases are, of course, one of their offerings, and they are working on other ways to partner with the university.

"We wanted to provide a unique and authentic piece of the game that you can have with something you use every day," Dremluk says. Fans can buy cases at pro shops and specialty stores throughout the U.S. and Canada, at New York Rangers games and at Originalstix.com.

The Original Stix leaders plan to continue their national and international presence after pitching to Virgin Atlantic's Richard Branson at an event in Detroit this summer; they also recently were granted rights to manufacture NHL-licensed products.

The company's products are made in Detroit; some are assembled by disabled veterans. "We are proud to be part of the rebirth of Detroit, to help disabled veterans and to promote sustainability. It's a win-win for everyone," Michael Dremluk says.

The company has 10 employees who work in Bamboo Detroit, a co-working space. Both Dremluks work on Original Stix on the side, as they both have full-time positions in New York City. Their roles with Original Stix focus on operations, licensing, trademark applications and raising capital.

Original Stix hopes to inspire future entrepreneurs to locate in Detroit and restore its reputation as one of America's leading manufacturing cities.

The company was recently granted rights to manufacture licensed NHL products and plans to expand into other sports, including the NBA, NFL, MLB and NASCAR.

