Eva Hansen ’18 of biomedical engineering helped Engineers Without Borders provide clean water for a school these children attend in the Dominican Republic. Her experience is helping her qualify as a Grand Challenges Scholar. (See page 4.)
Message from the Dean

A COMMUNITY MOVING FORWARD

Please go to rochester.edu/respect/ to read more about the University’s efforts to cultivate a culture of respect.

Much of our attention at the Hajim School this semester, and rightly so, has been focused on what we must do as a community to heal and move forward in the wake of the complaint filed against the University with the U.S. Equal Employment Opportunity Commission.

The release of the report of an independent investigation into the complaint, the resignation of President Joel Seligman, and our appointment of Richard Feldman as interim president were all important first steps in that process.

The report of the independent investigation made some excellent recommendations for improving our policies, processes, and procedures for dealing with instances of alleged sexual harassment.

We need to do even more, however, to ensure greater sensitivity and transparency on campus.

Healing takes time. There is a lot of hard work to be done. But I have reason to be confident. This issue has galvanized faculty, staff, and students more so than any other since I joined the University 18 years ago.

As your dean, I want to assure you that my goal is to ensure that our departments, our school, and our University are places where all are respected and valued for the contributions that they bring and that no one is mistreated. We cannot and will not accept anything less.

In the meantime, you will find ample evidence in this Full Spectrum of how Hajim School students, faculty, and staff strive to be “ever better.”

For example, eight students who have enrolled in our new Grand Challenges Scholars Program are focusing their research, internships, global experiences, entrepreneurship, community-engaged learning, and interdisciplinary studies around one of 14 key challenges identified by the National Academy of Engineering. This will help prepare them to make the world a better place for us all.

We pay tribute to the teaching-track faculty members who contribute so much to our school and students, including the insights many of them bring from past industrial experience and the sheer passion they have for teaching. We list the awards of other faculty members and profile a valued member of our senior leadership team, whose tireless efforts support our research portfolio.

And what could be more in the spirit of Meliora than adapting battery-operated toys so children with special needs can activate them—and be motivated by them? As you will read, our Toys for All Tots student project recently benefited from a generous contribution by the Mattel Company.

Clearly, we have an abundance of talent, enough to meet any challenge.

Your dean,

Wendi Heinzelman

CINDY GARY KEY TO ROBUST RESEARCH PORTFOLIO

This is the first in a series of articles profiling Hajim School Senior Leadership Team members.

“It’s hard to think of any staff member who has done more to help me out or been a more essential resource in my time at the University so far.”
—Douglas Kelly, assistant professor of mechanical engineering

“She has been a unique resource, giving me both valuable feedback and insight.”
—Hussien Alavi, assistant professor of mechanical engineering

“Frankly, after working with Cindy for a few years now, I don’t know how we got along without her.”
—Mark Bicko, chair of electrical and computer engineering

Is it any wonder that Cindy Gary, the Hajim School assistant dean for grants and contracts, was the 2017 recipient of the Edmund A. Hajim Outstanding Staff Award?

Gary, who joined the school in 2012, is responsible for helping the school maintain a robust research portfolio in what has been a tough climate for federal funding. She works closely with Debra Haring, Dale Hess, and Paula Losey as part of the AS&E Research Team, which received a 2017 Melissa Award.

“As dean of the Hajim School, I have seen how effective Cindy is at encouraging, supporting, and managing proposals, from individual PI proposals to very large multidisciplinary, multicenter submissions,” says Hajim dean Wendi Heinzelman.

Here’s how Gary helps individual investigators:

• Sends out a weekly memo identifying grant opportunities of special interest to engineering faculty, culled from scores of federal agencies. This is “super helpful,” says Ethan Hoque, assistant professor of computer science and the Aiasso-Biggar (T’92) Family Fellow in Data Science.
• Organizes sessions, especially for younger faculty, that provide grant-writing tips. “The yearly CAREER boot camp she holds is immensely helpful,” says Mark Buckley, assistant professor of biomedical engineering.
• Works one on one with investigators to refine their individual submissions. “It is very rewarding to have a fresh pair of eyes meticulously looking through each item of a proposal during the crunch time of submitting a grant,” says Hoque.
• She’s a valuable resource for the grant administrators in individual departments and has even filled in when a vacancy occurs.

She serves the school and University by helping organize the big, multi-investigator, multidisciplinary, multicenter proposals—such as AIM Photonics—that are now a top priority in a tight funding environment.

“It’s not easy to coordinate a large group of people around an activity like that. Everybody works at a different pace, but she’s able to juggle all that in a way that people enjoy working with her,” says Rob Clark, former Hajim dean and current University provost.

Gary came to the Hajim School well-versed in grantmanship and project development. She previously served at RIT for 12 years in sponsored research supporting engineering and as the assistant director for research programs at RIT’s Center for Integrated Manufacturing Studies. Before that she served as program director at high Tech Rochester for eight years.

Gary says she likes her job because “it is different every day, and I really like the people I have the privilege to work with at every level.”

Gary and her husband, Chris Koscievicz, have twin daughters Erin, a senior in industrial and systems engineering at RIT, and Emily, a senior in business and finance at the University of Rochester, and a son Michael, a freshman at Brighton High School. In her spare time, Gary enjoys being outdoors—especially kayaking, hiking, and swimming. “She also likes going to the Rochester Public Market year-round.”

Read more about Dean Heinzelman at the Hajim website hajim.rochester.edu/about_dean_heinzelman.html.
Students tackle grand challenges
NAE scholars program lets them ‘take ownership’ of their education

For Eva Hansen and Raymond Chin, the quest is nearly finished.

For Andrew Balogh, Shannon Lue Chee Lip, Emma Luke, Madhavan Murali, Warish Orko, and Sang Pak, the quest has just begun.

The eight students—seven from the Hajim School—are the first to seek recognition as Grand Challenges Scholars at the University of Rochester. Students are asked to come up with their own combinations of research, interdisciplinary scholarship, entrepreneurship, global experiences, and community-engaged learning to explore one of 14 grand challenges identified by the NAE.

Lissa Norwood, the Hajim School assistant dean of undergraduate studies, is in charge of the program here. “One of the reasons NAE started this is because all of the people in NAE are my age or older,” she told students at an introductory meeting. “We’re not going to be solving these problems. It’s going to be those of you in the next generation.”

Even before they knew about the program, Hansen and Chin, both seniors in biomedical engineering, were engaged in experiential learning that could be applied toward the requirements of the Grand Challenges program.

“I see participation as a ‘capstone’ to my experiences in Engineers Without Borders (EWB),” says Hansen, who explored the challenge of providing access to clean water while serving with the University’s EWB chapter all four years as an undergraduate.

The initiative is aimed at educating the next generation of engineers to tackle some of the most pressing issues facing society in the 21st century. Students are asked to come up with their own combinations of research, interdisciplinary scholarship, entrepreneurship, global experiences, and community-engaged learning to explore one of 14 grand challenges identified by the NAE. Students who meet the requirements are listed on the Grand Challenges website and receive a medal at graduation.

“This is a great way for students to take ownership of their education here and gain an edge when applying for graduate school or jobs,” says Wendi Heinzelman, dean of the Hajim School.

“We have a number of faculty across the University with interests in virtually every one of the NAE Grand Challenges,” she adds, “from biomedical research in our Department of Biomedical Engineering and at our School of Medicine and Dentistry; to fusion research at the Laboratory for Laser Energetics; to novel educational models developed at the Warner School; and to the research that occurs within our Goergen Institute for Data Science, our Augmented and Virtual Reality initiative, and our Center for Energy and the Environment.”

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**Intersections**

**Hajim’s nontraditional majors**

Sidney Duquette ’18 knew he wanted to concentrate on biology and engineering—with a healthy dose of chemistry. A major in biomedical engineering was tempting. But Duquette didn’t think he would enjoy some of the required core classes, such as signals, systems, and imaging or biosystems and circuits.

“Why not take out those classes and put in more bio and chem classes that I would enjoy?” Duquette asked himself. So he switched to interdepartmental engineering and, in effect, designed his own major. Undergraduates in the Hajim School can also opt for two other interdisciplinary majors: engineering science and geomechanics.

“These three degrees give students options and give them flexibility,” says Lisa Norwood, the assistant dean of undergraduate studies. “These are for students who want to do engineering in a nontraditional way.”

**Geomechanics**

Juliana Conley ’20 is starting anew, after a bicycle accident interrupted her undergraduate studies at Northern Arizona University seven years ago. Her experiences since then have given her the 29-year-old a very clear idea of what she wants from her collegiate experience at Rochester.

Conley is pursuing geomechanics—jointly offered by the Department of Mechanical Engineering and Earth and Environmental Sciences—because it allows her flexiblity in choosing courses that will prepare her to model wildfires or other impacts of global warming. Atmospheric geochemistry, for example, is offered through earth and environmental sciences. Heat transfer is offered through mechanical engineering.

“Geomechanics is the closest we have to a civil engineering degree program,” says Norwood, who earned the degree herself as a Rochester undergraduate. Three other students are currently pursuing this major.

Conley initially enrolled in mechanical engineering at Northern Arizona but shifted her focus to forestry after witnessing the devastation caused by western wildfires.

Later, as a volunteer with Friends of the Santa Fe National Forest in New Mexico, she “spent a lot of time at public meetings, seeing what land management looked like up close. I enjoyed this nonprofit work but also realized that if I were going to go back into trying to solve forestry problems, I would want to do it with a more quantitative approach.”

At Rochester, she is reveling in the experience of being at a smaller campus, talking with professors and advisors who seem truly involved, and not feeling lost in a crowd. The University’s orientation for incoming first-year students—a weeklong embrace of expos, job fairs, games, concerts, and advising—helped set the tone, she says. “I feel like I belong here.”

**Engineering Science**

Mack Cummings ’18 planned to major in biomedical engineering, with a possible focus in robotics. But by the end of his sophomore year, he felt “conflicted.”

“There are so many aspects of science, such as biology and physics as well as mechanical, electrical, and audio engineering, that are interesting to me,” Cummings says. He took time off to consider his wide range of interests that connected to engineering in a nonconventional way. Now, with guidance from Norwood, he is pursuing a major in engineering science along with 26 other students. “I realized that this degree would offer me the best opportunity to explore many areas of engineering along with a minor in business,” Cummings says.

Engineering science is a good choice for “students who want exposure to engineering but don’t necessarily want to be design engineers—students who need a technical background for whatever else they might be interested in doing,” Norwood explains. “It’s our liberal arts major. It’s designed to be more flexible than the traditional engineering majors.”

That flexibility has enabled Cummings to explore a range of topics. He’s learned about acoustics, signal flow, and song compression—and used that knowledge to “creatively capture audio and the essence of a track from a band.” He’s also learned the principles of mechanics—and seen how they are applied to the design of gears in an industrial setting. Marketing classes have taught him how companies create products and target audiences to develop their brands.

**Interdepartmental Engineering**

Sidney Duquette ’18 calls it biomolecular engineering. “Duquette says of the interdepartmental engineering (IDE) major he crafted for himself. “I looked at the website for Yale’s biomolecular engineering program and selected University of Rochester classes that were the same or similar.”

IDE “is designed for students who want to do design engineering but can’t find their niche in one of the traditional engineering degree programs,” Norwood says. “The students have to come up with their own curriculum and articulate why the major they’re proposing differs from the majors we already offer, and why those majors won’t get them where they want to be.”

Students complete three sequences of technical courses of their own choosing and an independent study project, culminating in a written senior thesis or design project.

Duquette’s project, in the lab of Minsoo Kim, professor of microbiology and immunology, involves measuring how the levels of C1q expression relate to mortality rates due to sepsis.

Students in traditional engineering majors are more likely to take the same sequences of courses with the same classmates throughout their undergraduate years. That makes it easier for them to get to know each other and work together on problem sets and projects. “In each of the classes I’m taking, I’m associating with people from different majors,” Duquette says. “But at the same time, I think that’s very fruitful. That’s what the program is: interdepartmental. And in the future, when you’re out in the workplace, you’re going to be having conversations and working with people who may not have the same background as you.”
Among them, Chris Muir, Julie Bentley, and F. Douglas Kelley have nearly 60 years of experience in industry. In addition to their PhDs, they’ve also received at least two teacher-of-the-year awards from the Student Association and a Goergen Award for Excellence in Undergraduate Teaching. It’s not hard to see why. Engineering students, most of whom end up working in industry, appreciate the “real world” savvy and insights that these “teachers of practice” bring to their lectures, labs, and the senior design projects they supervise.

“We’re extremely useful in giving students that real-world ‘yes, I’ve done this, yes, you can do this’ perspective that you don’t get out of a textbook,” says Bentley, who was an optical designer and managed a division in industry, in addition to her PhDs; they’ve also worked in industry, in addition to their PhDs; they’ve also “professor of the year” by BME students the same year. And Vats was chosen “professor of the year” by BME students the same year. “Our teaching-track faculty are vital to the educational mission of the Hajim School,” says Wendi Heinzelman, dean of the school. “We want the best possible academic experience for our students, and these faculty help provide that with their passion and creativity as instructors and with the insights many of them can provide based on their experiences in industry. This is especially valuable in advising students on senior design projects and career opportunities.”

The contributions of instructional track faculty extend beyond course load alone.

Vats, for example, teaches two hands-on courses—biomedical technology and nanotechnology—to interested high school students participating in the University’s summer Research Scholars Program.

George Ferguson, in addition to teaching two classes a semester of about 150 students each, serves as coeditor of the undergraduate program in the Department of Computer Science. This involves myriad responsibilities—such as serving on the undergraduate education committee, choosing and managing undergraduate teaching assistants, finding last-minute substitutes to teach a course, and signing off on students’ transfer credits and cluster exceptions.

At the Goergen Institute for Data Science, Ajay Anand, who has 12 years’ experience in industry with Carestream and Philips Research, supervises the data science senior capstone and master’s practicum projects and teaches data mining. As the institute’s deputy director in charge of education activities, he leads curriculum development, academic advising and outreach initiatives. Working with the institute director, Anand also manages the day-to-day operations for the institute.

Muir supervises senior design projects in mechanical engineering, helped lead an archaeological field trip to Ghana last summer, and is faculty advisor for the Baja SAF team. Kelley, like Muir, supervises senior design projects in chemical engineering and also oversees the long-overdue renovation of the department’s teaching labs.

Bentley, the go-to person for senior design teams seeking help with lens design, also helps teach a Photon Camp for high school students and a summer school for optics company employees. In addition, she plays a leadership role in SPIE and chairs its Optifab conference. North America’s largest optical manufacturing conference and exhibition.

Her colleague Jennifer Kruschwitz is the only member of the optics faculty with a background in optical interference coatings (based on her industry experience with Itek and Bausch & Lomb) and in color science (based on her PhD at MIT). She has developed courses for both undergraduate and graduate students and faculty. Grad students and faculty members will come to me if they need a specific kind of interference coating in their optical system, and then I will help their students design what they need. I will recommend certain vendors here in Rochester that they can go to. And if they need to know ‘well how much do you think this will cost? I can give them some kind of estimate.”

She, too, has given presentations at the summer school and Photon Camp.

[Jennifer Kruschwitz]

Jennifer Kruschwitz, an associate professor of optics, caught the “teaching bug” when she taught an optical coatings class at the institute as an adjunct. It made her realize, she says, that those who were “averaged students who were like me to be able to participate and understand.” Now, as assistant professor, she likes to “see the enthusiasm when students are able to ‘get it’ for the first time and see the fire in their eyes; I’ve had about a 10 percent gain of students who get into coatings because they’ve taken my class.” She describes a resident of her lab, doctoral student Angela Marakos, at left, and Taylor Page.

Photo by Bob Marcotte

[George Ferguson]

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Ming-Lun Lee, an instructional-track assistant professor, exemplifies the interdisciplinary nature of the dual role in mechanical engineering program. He has a PhD in historical musicology and music theory as well as master’s degrees in electrical engineering and musicology. He can draw on his background in computer science, physics, and psychology to teach his students about programming computer languages and digital audio synthesis, and he has also developed courses on musical theory and design. His students have described his teaching style as “inspiring” and “engaging.”

At the Goergen Institute for Data Science, Julie Bentley, associate professor (instruction), Jennifer Kruschwitz, assistant professor (instruction), Laura Slane, assistant professor (instruction) starting July 1
**CONTRIBUTIONS**

**Gift from Carstensen family supports Center for Biomedical Ultrasound**

A generous gift from the family of the late Edwin L. Carstensen, a renowned scientist and founder of the Rochester Center for Biomedical Ultrasound (RCBU), will enable the Center to invite a leading expert from the field to the University of Rochester campus each year to present a seminar, interact with faculty, and deliver a distinguished Carstensen Lecture.

“[Our intent is] to grow the fund so that eventually it will support a full biomedical ultrasound symposium day, kicking off with the distinguished Carstensen lecture but also featuring a series of local speakers, student poster sessions, and interactions with local industry, all related to biomedical ultrasound,” says Professor Diane Dalecki, current director of the center and chair of the Department of Biomedical Engineering. “Over time, we'd like to support student scholarships as well.”

Carstensen was the Arthur Gould Stites Professor Emeritus of Engineering and Senior Scientist in Electrical and Computer Engineering at the University of Rochester. His illustrious career, spanning nearly 50 years, was celebrated during a special session at the annual conference of the Acoustical Society of America in June. Students and colleagues celebrated his life and work in acoustics, especially as applied to biomedical acoustics, physical acoustics, and selected problems in underwater sound.

The Edwin and Pam Carstensen Family Fund was announced during the special session. The fund will help advance the RCBU’s goal to provide a unique, collaborative environment for engineering, medical, and applied science professionals in the Rochester area to investigate the use of high-frequency sound waves in medical and industrial applications.

“Ed Carstensen was a pioneer in the field of ultrasound and the development of biomedical engineering as a field,” Professor Dalecki says. “He was a wonderful mentor to many students and was a valued colleague, not only at Rochester but also across the world. This fund will help ensure that his legacy endures,” she says.

**Contributions to the Edwin and Pam Carstensen Family Fund can be made by contacting Eric Brandt at (585) 273-5901 or eric.brandt@rochester.edu.**

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**Mattel donation enables a gift of play for special needs children**

Toys that quiver. Toys that light up and sing. Toys that spit out bubbles. And all of them adapted for children with special needs.

The sight was almost too good to be true for parents who arrived at a University of Rochester Medical Center clinic with children who are limited in their ability to reach for a toy or activate one because of cerebral palsy or other disorders.

“This is awesome,” said Shanithika Rivers, who placed a succession of toys in front of her daughter Jeneshika, age 2, before choosing a Tickle Me Elmo to take home with them.

The toys had been adapted with special switches by Toys for All Tots (hajim.rochester.edu/undergraduate/toys-for-all-tots/index.html)—a University of Rochester student project that got a big boost from Mattel. The company donated 28 of its toys to help get the project started.

“At Mattel, we believe in the power of play and the crucial link between play and a child’s learning and development” said Nancy Molenda, manager of the Mattel Children’s Foundation. “With this toy donation investment, the UR Toys for All Tots team was able to give children with disabilities the opportunity to enhance their experience and unlock their potential through play. We are thrilled to have been able to help you make a difference in these children’s lives!”

Hannah Peak, a pediatric occupational therapist at the University of Rochester Medical Center, said, “We know that play is how children learn, and that toys are crucial for children in development. This is giving these children the ability to use a toy to its full potential!”

The project was spearheaded by Rachel Morford, lecturer and senior technical associate in the Department of Chemical Engineering, after she learned about Toys for All Tots at Ohio State University. Students, most of them from the Hajim School, adapted a total of 33 toys last semester.

Adapted toys are expensive and hard to find. So a goal of the project is to eventually adapt enough toys to stock a library, where families can check out toys, try them out to see which best meet the special needs of their children, then return them when then children outgrow them or are ready to try a different one.

In the meantime, Rebecca Perez, who brought her 13-year-old son, Jacob, to the clinic, appreciated this first step.

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**FACULTY AWARDS**

Niay Abdourahim, assistant professor of mechanical engineering, received the Young Leaders Professional Development Award from the Functional Materials Division of the Minerals, Metals & Materials Society.

Radhha Bahukutumbi, senior scientist at the Laboratory for Laser Energetics, was named a fellow of the American Physical Society.

Thomas Brown, professor of optics, received the Goergen Award for Excellence in Undergraduate Teaching.

Bryan Distinguished Engineering Award from the University of Maine.

Christian Stoeckl, senior scientist at the Laboratory for Laser Energetics, was elected a fellow of the Optical Society (OSA).

Dustin Frealso, senior scientist at the Laboratory for Laser Energetics, was named a fellow of the American Physical Society.

Molina said the Mattel Children’s Foundation and Corporate Philanthropy is dedicated to the wellbeing of children through play. “We have a global commitment to children’s engagement, interaction, and development through play,” We customize our investments in organizations that share this commitment across their programs and activities.

“Through our partners, funding, volunteers, toy donation investments, brand campaigns, and consumer activation, we are addressing the barriers to play by providing children time to play, places to play, tools to play, and an advocate for play in their lives.”

This support’s Mattel’s goal of “inspiring wonder in the next generation to shape a brighter tomorrow.”

Molina’s promise is to create the experiences that capture kids hearts, open their minds and unlock their potential through play.

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**10 Scientists to Watch**

Nia Abdourahim, assistant professor of mechanical engineering, received the Young Leaders Professional Development Award from the Functional Materials Division of the Minerals, Metals & Materials Society.

Ehsan Hoque, assistant professor of computer science, interim director of the Goergen Institute for Data Science, and the Aaroo-Biggar ’92 Family Fellow in Data Science, was named to the Science News “10 Scientists to Watch” list for 2017.

Wayne Knox, professor of optics, was elected a fellow of the National Academy of Inventors.

Duncan Moore, the Rudolf and Hilda Kingslake Professor in Optical Engineering Science, received the Edward T. Bryant Distinguished Engineering Award from the University of Maine.

Nick Vamivakas, associate professor of quantum optics and quantum physics, was elected a fellow of the Optical Society (OSA).

Xi-Cheng Zhang, the M. Parker Givens Professor of Laser Energetics, was elected a fellow of the Optical Society (OSA).

Wyatt Tenhaeff, assistant professor of chemical engineering, was co-recipient of an R&D100 award from R&D Magazine.

Ching Tang, professor emeritus of chemical engineering, was inducted into the National Inventors Hall of Fame.

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Jeneshika Rivers, 2, of Rochester, held by her grandmother Lyka Ortiz, receives an Elmo doll from Toys for All Tots, a student organization at the University of Rochester that distributes battery-operated toys they adapted for use by special needs children. Photos by J. Adam Fenster.

This support’s Mattel’s goal of “inspiring wonder in the next generation to shape a brighter tomorrow.”

Molina’s promise is to create the experiences that capture kids hearts, open their minds and unlock their potential through play.
FAST FACTS

• The Hajim School’s undergraduate enrollment has more than doubled since 2009–10.

• Of current Hajim School undergraduates, 31 percent are female, 27 percent are international, and 11 percent are underrepresented minorities.

• Contributions to the Hajim School Annual Fund increased from $158,357 in 2009–10 to $817,720 in 2016–17.