MESSAGE FROM THE DEAN

Even as you read this, a University search committee is engaged in finding the next dean for the Hajim School of Engineering & Applied Sciences. When I move on to become provost of the University of Rochester starting July 1, I will be ever mindful of my indebtedness to the faculty, staff, students, alumni, and friends of the Hajim School for the remarkable things we have achieved together. It has been a memorable eight years. We have grown not only in size, but also in stature. We have launched exciting new instructional programs and expanded others to ensure that our students have access to a full spectrum of opportunities to learn and experience. This issue highlights some of those programs.

This past year, for example, we awarded 13 of our new International Experience Scholarships to help Hajim School students defray the costs of studying abroad. “What I gained from this experience is priceless,” says Jean Brownell ’17 of chemical engineering, who received one of those scholarships to attend the San Martino Archaeological Field School in Italy. “Being immersed in an area with a different way of life and different language than you’re used to is an incredible experience.” Our goal is 25 percent student participation in study abroad. As more of our students come back with these kinds of experiences, we have an emotional attachment to making a living,” notes Mark Bocko, chair of the Department of Electrical and Computer Engineering. The new audio and music engineering program that Bocko spearheaded addresses both of those needs, which helps explain why its enrollment is growing by leaps and bounds. As you will read, a talented group of faculty members are preparing our students for careers in such rapidly emerging areas as management of musical content, music information retrieval, and sound design for video games.

Talk about preparing for the real world: Master’s students in our Center for Medical Technology and Innovation program spent this past summer literally looking over the shoulders of doctors and medical-surgical team members, watching heart transplants and spinal and reconstructive surgeries in order to get a better understanding of how to design medical devices. Greg Gdowski, executive director of the program, shares his ideas for expanding this exciting new program.

Edmund Hajim has been a tremendous benefactor for the Hajim School and for me personally. He played an instrumental part in bringing me here as dean eight years ago. So it was gratifying that I could be present when Ed, as reported herein, was inducted recently into Tau Beta Pi, the engineering honor society, as an eminent engineer. We have all benefited from his “consistent passion for engineering, dedication to engineering education, and exemplary character.”

Please join me in saluting him.

Rob Clark

THE NEW WEGMANS HALL

Means Changes for Three Departments

The new Wegmans Hall symbolizes the University of Rochester’s $100 million commitment to being a leader in the field of data science. It also will enable much needed consolidation and renovation of facilities for the Edmund A. Hajim School of Engineering & Applied Sciences.

- Wegmans Hall, new home of the Goergen Institute for Data Science, will also house the Department of Computer Science (now in the Computer Studies Building) and offices of the Department of Chemical Engineering, to be completed December 2016 or January 2017.
- The Department of Electrical and Computer Engineering’s offices and labs now in Hopeman Engineering Building will be consolidated with the rest of the department in the Computer Studies Building after the Department of Computer Science moves, to be completed December 2017 or January 2018.
- The third and fourth floors of the Hopeman Engineering Building will be converted into research labs for chemical engineering (now at Gavett Hall) after electrical and computer engineering leaves, to be completed December 2018 or January 2019.
- Gavett Hall will be converted into undergraduate classrooms and teaching labs.

Dean Rob Clark with Edmund Hajim at the Hajim School Commencement Ceremony last spring

Melors, Rob Clark

Biomedical Engineering
Chemical Engineering
Computer Science
Electrical and Computer Engineering
Institute for Data Science
Institute of Optics
Mechanical Engineering
Undergraduate Teaching/ Classes/Labs
In Kenworthy’s 18, who has played violin since first grade, it's intriguing that musical recordings never quite match the live sounds they attempt to capture.

“There’s a concept that there’s no such thing as the perfect recording of the live sound, and I’m interested in trying to get as close to that as possible.”

That is the kind of challenge relished by Kenworthy and other students enrolled in the Hajim School’s new audio and music engineering program. Since the BS degree was first offered three years ago, enrollment has grown with leaps and bounds, from 26 to 46 to 76.

“It looks like we picked the right area,” says Mark Bocko, chair of the Department of Electrical and Computer Engineering, who spearheaded the program. “People have an emotional attachment to music, but at the same time they have an emotional attachment to making a living. The AME program addresses both of these.”

Nicholas Bruno ’17, for example, transferred from Clarkson University during his sophomore year after hearing about the new program from a family friend. “I wanted to do something in engineering because I’ve always been good at science and math, but I’ve also always loved music. Usually you have to pick whether you want to focus more on the engineering or on the music. This is the first time I’ve found a really good blend of both.”

Audio and music engineering—at the intersection of science, engineering, and music—combines technical skill and artistic creativity. Once dominated by traditional audio recording engineers in professional recording studios, the field now encompasses sonic media engineers in such rapidly emerging areas as management of musical content, music information retrieval, and music recommendation engines (such as Spotify). Audio and music engineers work for computer and Internet companies; they produce and distribute online and live music; do sound design for video games; design musical and audio equipment; and develop core audio technologies and electronics.

The program graduates its first full cohort of students this spring. Bocko is confident they will find jobs. At a recent Audio Engineering Society meeting in New York City, for example, most of the colleges represented at an academic fair touted programs that train students to be traditional recording engineers. However, most of the job openings posted at the other end of the hall “were all for people in digital signal processing and related fields that are emphasized in our programs,” Bocko noted. “That seems to be a pretty clear indication that we’re on the right track.”

Besides, he added, a pre-existing master’s program here emphasizing audio engineering has been landing graduates in positions at Harman, Dolby, Bose, Apple, Microsoft, and Facebook for the last 10 years.

The curriculum emphasizes hands-on projects and an interdisciplinary approach. Students have access to a state-of-the-art recording studio in Rettner Hall and other recording and sound design facilities in the Computer Studies Building. A large recording studio with adjacent classroom is scheduled to open this fall in Gavett Hall. Classes are taught by faculty members with an array of relevant industry backgrounds and academic training.

Lecturer Stephen Roessner, for example, is a Grammy-winning audio engineer who has operated his own recording studio for 15 years, toured the globe as a drummer for a rock band, and freelanced on guitar, bass, vocals, keyboard, and bass. A recipient of a master’s degree in electrical engineering in 2012 from the University, Roessner is now working on his PhD.

In AME 191: The Art and Technology of Recording, he demonstrates all the technical tricks of the trade—using compression to compensate when a guitar slide up the neck gets lost in translation, for example. But he also shares hard-earned insights about audio engineering that he has picked up over the years—like kicking musicians out of the studio for at least an hour when he starts to mix tracks.

“I don’t want the bass player coming up five minutes into my mix, saying ‘Where’s my bass? You’ve got to bring the bass up,’” he tells his students. “You get too many questions, and you get distracted.”

Assistant Professor Ming-Lun Lee’s combined background in electrical engineering (master’s degree) and musicology and music theory (PhD degree) enables him to incorporate some basic music theory in AME 196: Interactive Music Programming. He also teaches students how to use ChucK audio programming language and such devices as Wimotes and MIDI controllers to manipulate sounds in creative ways.

About half his students last semester were from other majors. Tallis Polashenski ’18, a digital media studies major, enrolled to learn coding and programming “because I had never done that.” She ended up writing 100 lines of code for her final project—and was inspired to sign up for a double major in computer science.

The proximity of the University’s renowned Eastman School of Music has also helped fuel the success of audio and music engineering. Roessner’s AME 191 students record and mix five-minute musical performances for their final projects; most have no problem finding Eastman students willing to perform.

Eastman students, in turn, are attracted to AME class offerings to explore emerging applications. “This is very exciting and very cool to be learning a coding language that is easy to use but also relevant to musicians and programmers who are interested in music,” says Benjamin Kronk, a junior at the Eastman School, who took AME 196 last semester. When students demonstrated their final projects during a Sonic Showcase at Rettner Hall, Kronk waved the audience with his violin performance of the “Meditation” from French composer Jules Massenet’s opera Thais, while classmate Aleem Griffiths embellished the sounds with a joystick.

“I highly value the collaborative aspect of music,” Kronk says. “I really want to see technology engage with music in a way that’s easy to use.”

Hemisphere speakers and MIDI controllers abound as students in AME 196: Interactive Music Programming prepare to rehearse their final projects.
Mohammad Almagweshi ‘18 of chemical engineering, shown here at the Great Wall of China, spent last summer in Beijing as part of the Beijing Summer Language Intensive program. “I learned more about the people of China, the different ethnicities, the environmental challenges, and the Chinese Dream,” Mohammad said. “And, eventually, I fell in love with the culture. I discovered that half of my previous perceptions were imprecise and inaccurate.”

Lance Floto ’17 of computer science studied abroad in Budapest, Hungary, last spring for two reasons: to experience a different culture and to take classes that could count toward completing his major. He accomplished all that—and more—at the Aquincum Institute of Technology (AIT). Four of the five classes he took satisfied requirements here. He visited 18 countries. And, through AIT, Floto learned about a summer internship at a Budapest startup called oppio.

“Guess who ended up spending the summer, as well, in Budapest?” Mohammad said. “There is only one other engineer, a designer, and the CEO, and it has been a great experience to work on a small team,” Floto related at the time. “I have learned so much in just a few months!”

The Hajim School wants at least 25 percent of its students to benefit from overseas learning experiences like Floto’s before they graduate. Why?

• Students who study abroad gain an appreciation for other cultures; they are better global citizens in an increasingly global economy. And that’s a big plus with employers, who look favorably at study abroad on a résumé. Engineers, especially, can expect at some point in their careers to work with overseas projects or partners.

• Students who study abroad also gain self-confidence and decision-making skills. “Moving to a completely new country, not knowing anyone or the language, might seem intimidating at first, but it surely did push me out of my comfort zone and made me grow as a person,” wrote Florence Yip ’17 of mechanical engineering, who spent last summer in Zena, Germany, as a DAAD-Rise scholar.

• During his fall 2014 semester at the University of Sydney, Zachary Jenkins ‘16 overcame his fear of heights to climb 459 feet to the top of Sydney Harbour Bridge. The biomedical engineering major also enjoyed underwater encounters with sharks at a marine life sanctuary. “Every choice you make, you really feel like it is your own decision,” he said. “When I did something and enjoyed it, there was the added satisfaction of knowing it wasn’t someone else’s success but almost entirely my own.”

To help meet its 25 percent goal, the Hajim School
• awarded its first International Experience Scholarships of up to $1,000 to 13 students last year to help defray travel and other costs associated with study abroad.
• hired advisor Rohan Palma two years ago to serve as the “go-to” person for Hajim students interested in learning about study abroad options.

With help from Palma, for example, Jenkins identified four engineering courses to take during his semester in Sydney. Two satisfied requirements for his biomedical engineering degree; the other two counted toward his minor in chemical engineering.

The rest of the preparation “just became a piece of cake,” he said.

One of the best ways for Hajim School students to immerse themselves in another culture is to spend an entire fall or spring semester with a host family overseas. But there are other ways for Hajim students to obtain overseas learning experiences.

Of the 24 Hajim School undergraduates who studied abroad last summer, for example, seven were DAAD-Rise scholars like Yip, who spent three months doing research with doctoral students at top German universities and research institutions.

Six Institute of Optics students attended a 19-day Summer School on Photonics at St. Petersburg’s National Research University of Information Technologies, Mechanics and Optics in Russia. They engaged in cutting-edge research, such as generating and detecting terahertz waves using femtosecond-laser-induced plasma and graphene. It was also an opportunity to explore the culture of an overseas city rich in history and art.

Sze Wah Lee ’18 said her most memorable experience was a midnight boat tour to watch the raising and lowering of bridges to let ships pass in and out of the Baltic Sea into the Volga-Baltic waterway system.

“The sun had just set, the clouds were turning from creamy orange to misty blue,” she wrote. “Lights accented the exterior of historical buildings along the waterway, creating shadows that gave them a mysterious and sly character. The slow movement of the lights on the fences of the bridge signaled the beginning of the opening. … That night was the first time I felt so overwhelmed with beauty—the beauty of Saint Petersburg.”

To learn more, visit www.hajim.rochester.edu/studyabroad.
MEDICAL DEVICE STUDENTS BECOME PART OF THE CLINICAL TEAM

Immersion in clinical settings is a key feature of the Center for Medical and Technical Innovation program. It gives students ideas for the devices they will design and prototype for their capstone projects.

If you’re a student interested in working in the medical device industry, wouldn’t it be advantageous to experience firsthand what happens in an operating room and other clinical settings—to find out what physicians, anesthesiologists, and nurses really need?

That’s what master’s students in the Center for Medical Technology and Innovation (CMTI) program do each summer. Working in teams, they walk less than five minutes from the River Campus to the University of Rochester Medical Center to look over the shoulders of doctors and medical-surgical team members. Last summer, for example, they watched heart transplants and spinal and reconstructive surgeries. They witnessed high-tech 3D mapping and targeting of potentially life-threatening heart rhythms and implantation of pacemakers and cardiac resynchronization devices with wireless monitoring capabilities.

“The surgeries they saw were phenomenal,” says Greg Gdowski, executive director of the program. Andrew Zecola, for example, was intrigued to see a left ventricle assist device on a heart removed during a transplant operation. “We learned about that (device) in class, and to see it in that kind of setting was pretty awesome,” Zecola said.

Erica Marron, and her teammate observed spinal procedures. “Our clinician was really good about calling us over at a crucial point in the procedure to let us look over them at what they were doing or stand on a stool at the head of the table.”

“By the time the students graduate, they’ll also
- receive hands-on training in 3D printing, machine shop, basics of electronic design, solid works, and additive manufacturing
- learn about navigating the regulatory process and intellectual property issues
- take a course on technical entrepreneurship
- serve as mentors for biomedical engineering seniors working on their own capstone projects
- visit medical device companies

“The ability of the CMTI program to supply us with such diverse skills in a short period of time is what makes it unique and a great experience,” says Mohammad Musleh ‘14 who now works as a development engineer at Bausch + Lomb—and credits the CMTI program as “a very large reason for the opportunity.”

Gdowski is eager to increase the CMTI’s enrollment to 20, even 30 students. “The more students we have, the more teams we can have. Businesses would be more likely to become involved in sponsor- ing teams. And we would be able to work with more clinicians at the Medical Center,” he says. “That’s one of our biggest challenges. We have more requests from the Medical Center than we can actually support.”

Gdowski is now recruiting students from all branches of engineering. “We feel we can provide the biology background (for students not coming out of biomedical engineering),” he says.

The recruiting pitch includes the close proximity of Goergen Hall on the University’s River Campus—where the students take many of their classes—to the Medical Center, where they work with clinicians. Students in similar programs elsewhere may have to drive back and forth from a university to a medical center a half hour or more away, he says.

At the University of Rochester, that distance is a mere 981 feet, according to Gdowski’s precise measurements. “It’s less than a five-minute walk,” Gdowski says. “… between classes, there may be time to walk over to the Medical Center and interview a surgeon or visit the operating room.”

Erica Marron, a 2014 CMTI graduate, now works as a medical optics application engineer for Corning Inc. “I am the initial technical point of contact for our existing and future customers, the clinical experience I gained through the CMTI program has immeasurably helped me discuss, discover, and relate to the most pressing clinical needs Coming’s technologies are most apt to solve.”

The CMTI program as “a very large reason for the opportunity.”

Erica Marron takes a turn at a Smithy 3-in-1 machine in the fabrication shop at Rettner Hall, as CMTI students are exposed to the basics of a machine shop. Jim Alkins, the senior laboratory engineer, provides instruction.

Jayne Gavrity demonstrates an electro-mechanical device developed by her team to measure stiffness of finger joints as a marker of arthritis progression.

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Danielle Benoit, associate professor of bio-medical engineering, was recognized as one of 11 CMU Young Innovators for 2015 by the Cellular and Molecular Bioengineering journal.

Mark Bocko, distinguished professor and chair of the Department of Electrical and Computer Engineering, received the Hajim School Lifetime Achievement Award.

Robert Boyd, professor of optics, is this year’s recipient of the Arthur L. Schawlow Prize in Laser Science from the American Physical Society (APS).

Greg Godowski, associate professor of biomedical engineering and the Rochester IEEE Section chair, received the IEEE award for Regional Professional Leadership.

Wendi Heinzelman, professor of electrical and computer engineering and dean of graduate studies for Arts, Sciences & Engineering, was named a fellow of IEEE.

Henry Kautz, the Robin and Tim Wentworth Director of the Goergen Institute for Data Science and professor of computer science, was chosen chair-elect of the Section on Information, Computing and Communication for the American Association for the Advancement of Science.

Catherine K. Kuo, associate professor of biomedical engineering, received an Award for Innovation in Research at the GoLife in Orthopaedics Conference in Gothenburg, Sweden.

Duncan Moore, the Rudolf and Hilda Kingslake Professor in Optical Engineering Science, received the Leadership Award from the Rochester Regional Photonics Cluster.

Nick Vamivakas, assistant professor of quantum optics and quantum physics, received a Faculty Early Career Development (CAREER) award from the National Science Foundation.

Mary Boyce, associate professor of biomaterials science and engineering, received the William Procter Prize for New Initiatives.

Mark Neifeld, assistant professor of electrical and computer engineering, was inducted into the inaugural class of the University of Rochester’s new mechanical engineering honor society, on Dec. 4, 2015.

The election was based on his consistent passion for engineering, dedication to engineering education, and exemplary character.

“The University of Rochester New York Kappa Chapter of Tau Beta Pi is extremely happy to welcome Mr. Hajim as a member of Tau Beta Pi. We also would like to thank him for everything that he has done for the school; we all have experienced his passion for and contributions to engineering education,” said chapter president Dan Mangino ’16 of mechanical engineering.

In 2008, Hajim announced he was giving $30 million to the School of Engineering & Applied Sciences to support scholarships for students with significant financial need as well as for the school’s endowment. It is the largest single gift commitment in the University’s history. The engineering school was renamed in Hajim’s honor the following year.

Thirty-seven Hajim School juniors and seniors were also inducted alongside Hajim into Tau Beta Pi, which holds an initiation ceremony each semester. Robert Clark, dean of the Hajim School, James Zaviljan, the school’s associate dean of education and new initiatives; several faculty members; and about 10 current members of Tau Beta Pi also attended.

Thanks go to the Hajim School’s many supporters, who have contributed $79.1 million to date toward The Melors Challenge, the University’s largest-ever campaign. Though the campaign continues until June 30, the school has already exceeded its goal by more than $4 million.

The Hajim School topped its goal when several members of its Dean’s Advisory Committee provided gifts to create scholarships at a University leadership retreat at Amelia Island last spring.

John Major ’67, chairman of the committee, and his wife, Susan, funded one of those scholarships.

“A university education at a school like Hajim is priceless, but it is also very expensive,” Major said. “Susan and I feel strongly that we want to do all that we can to ensure that those who want a Hajim education can get one; scholarships are a great way to do that. “We’re just one couple. If we all participate, we can help many more students. We hope this will also help get the word out.”

The considerable talents of Professor Emeritus Nicholas George of the Institute of Optics inspired one of the Hajim School’s new endowed professorships that were established as a result of the campaign.

From left to right: Institute of Optics Director Xi-Cheng Zhang, President Joel Seligman, Professor Nicholas George, Carol George, Milton Chang, and Professor Duncan Moore at the announcement of the endowed professorship in optics recognizing Professor George.

George, a pioneering researcher in holography and other fields, advised more than 50 graduate students. Milton Chang, one of George’s students at the California Institute of Technology, provided a gift to help create the Nicholas George Endowed Professorship in Optics. Additional support is being provided by Joseph Goodman, the William Ayer Professor Emeritus at Stanford University.

Chang described George as a “role model” who taught him not only theory, but also practical engineering skills and, above all, encouraged him to think critically and independently.

By honoring his role model, Chang helped ensure that the Hajim School will be able to attract and retain the best and brightest faculty members who, in turn, will be role models to future generations of Hajim School students.

For more information about making a gift at any level, please contact Eric Brandt, executive director for Advancement for the Hajim School at (585) 273-5901 or eric.brandt@rochester.edu.

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FAST FACTS

• The Hajim School’s undergraduate enrollment has more than doubled since 2008–09.

• The number of master’s students enrolled in the Hajim School increased from 63 in fall 2004 to 310 in fall 2015.

• Thirty-one percent of the Hajim School’s undergraduate students are female. The Department of Biomedical Engineering leads with 48 percent female enrollment followed by the Department of Chemical Engineering with 45 percent.