Dean’s Message 2
ChemE Lab on the Move 3
Introducing CMTI 4
Audio and Music Engineering 6
Pre-College Engineering Program 7
Hajim Visiting Committee 8
Students, Post-Docs Key in Research 10
Faculty Awards 11
The process of continuous improvement is a challenge faced by all organizations. Assessment is a critical component that informs us of success, and the advisory committees play a significant role in this process. Here in the Hajim School, we are fortunate to have a very active Visiting Committee, in addition to the Dean’s Advisory Committee, whose members take seriously their charge.

The current newsletter focuses on a mix of new programs, new construction, and renovations that are all part of our efforts toward continuous improvement, which at the University of Rochester is best described as Meliora! In two brief years, we have evolved our pilot graduate program in cardiovascular device design into the newly formed Center for Medical Technology and Innovation, which spans our Medical Center and Hajim School. It represents a partnership with the School of Medicine and Dentistry on a campus where students in Hajim School classrooms and labs are never more than a five-minute walk from the Medical Center. Through this exciting new program, we will better prepare our students to work in biomedical research and development and enhance our connectivity to industry.

In parallel, we have been developing new programs in audio and music engineering and digital media studies in collaboration with the School of Arts & Sciences. In addition to the newly established programs of study, we have a new building, the Rettner Hall for Media Arts and Innovation, scheduled to open in September. This 15,000-square-foot building holds no offices. It is a playground for students to learn, discover, and create at a scale not possible prior. The building will be open 24/7 and afford seamless interaction between students of all disciplines and all ages!

It is also nice to find a new or better use for an existing facility, which is what we have done in Gavett Hall. The undergraduate laboratory for chemical engineering has undergone a complete refurbishing. New mobile stations will allow experiments to be moved in and out so other classes don’t have to work around them. This will give students additional hands-on experience. I also believe—as does new department chair Matthew Yates—that the newly renovated lab is going to be a great selling point in attracting top students.

Our primary objective is to provide our students with the skills needed to succeed. This is at the core of our efforts toward continuous improvement, and in a dynamic economic and global landscape, it is a critical focus. I am grateful to the alumni, students, faculty, staff, and friends of the Hajim School who make us Meliora—Ever Better—Every Day!

Sincerely

Rob Clark
Professor and Dean, Hajim School of Engineering and Applied Sciences
For Eldred Chimowitz, recent chair of the Department of Chemical Engineering, enough was enough. He asked Robert Clark, dean of the Hajim School of Engineering and Applied Sciences, to authorize the renovation of the department’s large undergraduate lab.

Clark’s response was immediate. “OK.”

“The lab had been neglected far too long for being part of such a highly rated program,” says Chimowitz. “The facility was rundown, and the equipment was old and irrelevant in today’s world.”

The upgrade began in May, not long after the approvals were given. Chimowitz felt the department was fortunate to have someone on staff with the right experience for managing the work. That person was F. Douglas Kelley, associate professor and a former Kodak engineer.

Kelley said the concept was to make the 2,600-square-foot lab a flexible workspace capable of meeting the different demands of the junior and senior classes.

In the past, students would have to work around experiments that were set up for other classes, something that seriously restricted hands-on experience. The solution was to create mobile stations that could be moved in and out for the appropriate class. “Our students are supposed to be problem solvers who make things,” says Kelley. “This new lab will make it possible for them to get the experience they need.”

Along with accommodating students’ lab work, the room’s flexibility allows faculty to set up demonstration and instruction space to complement classroom lectures.

While the mobile workstations are a highlight of the renovated lab, it wasn’t the only change. Old equipment pits were filled, a new drain trench was dug, and floor tiles installed; the plumbing and electrical connections, along with the air-handling system, were upgraded; the walls were painted; and new equipment was purchased. The end result is a lab that is modern, flexible, safer, and better reflects a professional workplace environment.

Matthew Yates, chair of chemical engineering, points out that the benefits of the lab reach beyond the University’s current crop of students. “The old lab made the department a difficult sell for prospective students,” he says. “The renovations should make a difference in attracting top engineering students.”
NEW CENTER WILL TRANSLATE GOOD IDEAS INTO CLINICAL REALITIES

A clinician at the University of Rochester Medical Center envisions a new technology that would help patients—but lacks the time, resources, and wherewithal to make it happen.

A company might be able to produce the device the clinician has in mind—but has never met the clinician and may have engineering staff with little experience and knowledge of the surgical or clinical application.

An engineering student has the talent to create technology—but has never been in an operating room, much less dealt with regulatory hurdles or intellectual property and patent issues.

The goal of the newly created Center for Medical Technology and Innovation (CMTI) is to connect that clinician, company, and student—by fostering collaboration between businesses and the University’s medical and engineering disciplines. Everyone benefits when that happens, but patients clearly reap the largest rewards in terms of improvements to health care.
At the core of this collaboration between Rob Clark, dean of the Hajim School, and Mark Taubman, MD, dean of the School of Medicine and Dentistry, is an innovative master’s degree program in biomedical engineering. It immerses engineering students for eight weeks in actual clinical settings such as operating rooms and intensive care units to better understand where unmet needs in health care delivery exist. The students learn how to evaluate unmet needs with respect to potential commercial opportunity. During the design phase, the students develop solid grounding in the regulatory, reimbursement, and manufacturing aspects of a project.

Greg Gdowski, CMTI’s executive director, is no stranger to the University—or to the process of taking an idea from the drawing board to the marketplace. He was associate professor in the Departments of Biomedical Engineering and Neurobiology and Anatomy at Rochester from 2001 to 2010 before joining Blue Highway, a medical device incubator located at Syracuse University.

At Blue Highway, he coordinated the development of breakthrough technology from the academic community into the product line of Welch Allyn, a leading manufacturer of diagnostic equipment for the primary care clinician. Gdowski helped to evaluate more than 500 potential ideas from across the globe, ranging from early detection of diabetic retinopathy and Alzheimer’s disease to noninvasive blood glucose monitoring. Of the 500 promising projects that were reviewed, only a few dozen were pursued, of which only three or four were expected to make it to market. The ones most likely to succeed are those that fit within an existing product and make it better—for example, by providing additional diagnostic measures that allow it to gain an edge over competitors.

He gained valuable insights from the experience. “Many people think it is the Research and Development team that drives a company’s development, but it is more frequently the marketing team, which knows the needs of the marketplace, that drives the R&D engine. Engineers rarely interact directly with the customer,” Gdowski says. Above all, he adds, “I learned what it is that companies will likely expect from the CMTI as it evolves. I follow the motto—build what the customer wants,” Gdowski says.

Companies are interested in working with CMTI because of the potential in identifying new technology or product concepts that they could commercialize. More importantly, they are looking to hire the best future employees who will help the companies advance their own technologies. CMTI gives students the preparation and training that give them an edge/advantage over other prospective employees.

Students will work in clinical areas related to participating companies—gaining insight into the clinical and surgical procedures and knowledge of the intellectual property, regulatory issues, and adoption principles within that product space. “New hires fresh from college rarely come with clinical contacts in hand or with experience specific to a company’s product line,” Gdowski notes. “This will make our students highly valued by our sponsors and more competitive for jobs in the marketplace.”

The program also directly benefits the University of Rochester community. Some projects might be kept in house. CMTI would match up Medical Center clinicians and other providers with engineering faculty and students to create devices or procedures that would become intellectual property that the University could sell or license. Alternatively, the center might directly link up a company, which has already identified a project, with University students, faculty, and health care providers who have expertise in the area of the product line.

The master’s program has already had remarkable success. For example, one of its first graduates, Rachel Rakvica, developed a novel approach to close arteries when medical devices are inserted through blood vessels. The University has obtained a provisional patent, with the hope of further developing the technology. This success attracted the attention of W. L. Gore Associates, which includes biomedical fabrics in its product line. Gore hired Rakvica immediately after graduation and has entered a three-year agreement to further support the activities of CMTI.

During its first five years, Gdowski says, the center will focus on medical technology. He would like to see the master’s program enroll 20 to 30 students a year, working on projects in groups of two to three students. Eventually, Gdowski sees CMTI expanding its efforts into nonmedical disciplines such as chemical and electrical engineering, physics, and optics. A master’s degree in technology innovation for nonengineering majors might eventually be offered.

Collaboration with Rochester’s Technical Entrepreneurship and Management (TEAM) program, which gives engineering students entrepreneurial skills, is also a goal. “Ideally, if you were to start up a company, you would like to marry two individuals together, one with significant business experience, such as TEAM develops, and one with technical skills, such as CMTI develops. The business-person interacts with customers to learn the market and what the customer wants. The technical person executes that plan and builds the device.”

“Learn, Discover, Heal, Create—And Make the World Ever Better” is the University’s mission. “The University is very good at discovering,” Gdowski says. “Our goal is to help the University be just as good at creating and making the world ever better.”
The final pieces are falling into place as the University launches a new major to prepare students for careers in the field of audio and music technology.

A framework of steel girders, erected behind Morey Hall and adjacent to Wilson Commons, will house Ronald Rettner Hall for Media Arts and Innovation, where students will be able to use state-of-the-art recording studios starting this fall. New York State has officially certified the new curriculum.

“I am very excited about it finally being approved,” says Kedar Shashidhar ’15, a sophomore who plans to pursue a BS degree in the new program.

“The field of audio and music technology is rapidly changing,” observes Mark Bocko, chair of the Department of Electrical and Computer Engineering. “More and more musicians are producing high-quality audio CDs at home, causing a decline in employment opportunities in traditional recording studios. But the industry that builds the audio equipment and software is booming, as are a number of audio-related industries. So instead of focusing on traditional audio recording, we chose to address the technological demands of the entire field.”

Students enrolled in audio and music engineering will develop their knowledge and skills in recording and sound design, acoustics, electronics, digital signal processing, and computer programming, preparing them for any field that incorporates audio and giving them an edge with a wide range of employers, from industry giants like Apple, Google, and Microsoft, to law enforcement.

Shashidhar has already been taking classes that will count toward his degree: Introduction to Sound Design, for example, and Critical Listening for Audio Production.

“They’re all fantastic courses,” Shashidhar says. “The professors teaching the classes are not just academic professors but people who have had industry experience. They give you real-world applications for what they’re teaching.”

Rettner Hall will also contain a fabrication center and high-end hardware and software for graphics, animation, 3-D printers, and other computer-processing tasks. Students pursuing audio and music engineering and digital media studies will have 24-hour-a-day access to the building, named for Ronald Rettner, the University trustee and philanthropist who provided the lead gift that enabled construction to begin.
High school students have the opportunity this summer to enroll in the Hajim Pre-College Engineering Program. For three weeks in July, rising 9th through 12th graders can take engineering courses tailored for them and use the resources of the Hajim School.

This is the first year that the engineering program will be offered, and it builds on the experience of other successful pre-college programs that have been offered in previous years.

The coursework is designed to be fun but rigorous. The program places an emphasis on hands-on activities, but the students will also attend lectures given by University professors. The classes will have no more than 20 students and will cover material from three disciplines—optics, biomedical engineering, and audio and music engineering.

Some examples of the activities they will experience are engineering design, including competing in an egg-drop contest from the balconies of Goergen Hall; learning about basic acoustics; becoming familiar with sophisticated recording studio equipment; and learning about optics and lasers. The students will also have the opportunity to take laboratory tours and take part in Q&A sessions that will expose them to career possibilities in engineering.

The program will allow the students to get a preview of the college residential experience. Many students will reside and enjoy meals on campus. It is also a chance for students to build relationships with peers who have similar academic and personal interests and to receive tips and advice from admissions counselors.

The students will get to enjoy the beautiful Rochester summer and can make the most of what the area has to offer, from the George Eastman House and the Laboratory for Laser Energetics to parks and walks along the river.

For more information, visit: http://enrollment.rochester.edu/admissions/precollege.
Last October, as alumni and parents began arriving for Meliora Weekend on a brisk but increasingly sunny day, members of the Hajim Visiting Committee gathered in the stately boardroom of the University Alumni and Advancement Center.

From mid morning until mid afternoon, they took the pulse of the Hajim School. They viewed bar charts showing everything from school-wide and departmental enrollment increases to the percentage of Hajim alumni who donate compared to peer institutions.

They learned about new initiatives: a Center for Medical Technology and Innovation, a major in audio and music engineering, a Center for FreeForm Optics, and a course on networking and communications skills to help Hajim students find jobs.

They responded with probing questions and perceptive observations:

- Is it realistic to expect master’s students in medical technology innovation to produce a patented medical device during just a year or year and a half of study?
- How much time do you expect faculty members to spend writing grant proposals?
- Oh, and don’t forget effective voice mails when you teach upperclassmen those communications skills for job searching!

The committee’s 30 members meet in fall and spring to hear what’s new at the school, give their feedback, and then spread the news. As with the Dean’s Advisory Committee, the Visiting Committee is a way to engage alumni. Members host events in their homes, for example, “helping to open doors for other alumni” to become involved, says Eric Brandt, Hajim’s senior director of development. They also interact with students through Skype events and other activities.

Dean Rob Clark, who increased the Visiting Committee’s membership from about a dozen when he arrived at the school, would like to see its membership increase even more. In addition to the input members provide on curriculum and other programs, the Visiting Committee “is a big part of building our Hajim community to support our fundraising activities,” says Clark. Most of the Visiting Committee members are themselves members of the George Eastman Circle.

Dick Schwartz ’63, a former Xerox employee who earned a master’s degree from the Institute of Optics in 1966, views his membership on the committee as an opportunity to “provide the perspective of someone who graduated almost 50 years ago.

Also, the more knowledgeable I am about the current state of the Hajim School, the more I can discuss with alumni and friends what is happening today and where the school is headed.”

Jeff Parker, an ’87 optics graduate who also has a certificate in management studies from Rochester, is vice president and general manager at Newport Corp. He likes the structured agenda of the Visiting Committee meetings . . .

“where we can weigh in to provide feedback on developments within the Hajim School. Dean Clark and his team actively listen and then act on the feedback.”

His job, Parker adds, takes him “around the world to spend time meeting with members of industry or other universities, so by knowing what is happening at the Hajim School, I can be an ambassador of sorts.”

Mario Simpson ’99 (EE), a systems engineer with a start-up company in Washington, D.C., was approached to be a member after a visit from Advancement staff. He is especially pleased to see the greater emphasis on study abroad—“that’s a huge step, especially for engineers”—and the more flexible, multidisciplinary course offerings compared to his undergraduate days.

“That’s a huge plus. When I was in electrical engineering, the feeling was ‘You’re in EE, and those are the courses you take,’” Simpson says.

Andrew Bosco ’91 (MechE), a GM chief engineer who also serves on the mechanical engineering department’s advisory board, was also pleased about the emphasis on study abroad and the new initiative on communications skills.
Both will help “differentiate” Hajim students from other engineering grads when they enter the job market, Bosco says.

As the October session wound down, Clark used an application called Explain Everything to sketch an engineering diagram on his iPad, talking as he did so, while committee members watched it all unfold on a big screen.

Moments later, Clark stopped and instantly replayed what he had just done.

It was a convincing illustration of how easy it would be for a professor to tape lectures in advance for students to view online, freeing the professor to spend more quality time with students one on one or in small groups.

But that’s a topic for the next Visiting Committee meeting this spring—technology in the classroom.

In the meantime, based on what he saw in October, Parker is impressed with the direction the Hajim School is headed. “They are putting in place programs to develop and graduate engineering students with relevant and marketable skills . . . from soft skills of networking and communication to encouraging students to enroll in international studies.”

Adds Schwartz: “I sense the engineering school is vibrant, exciting, and meeting its overall objectives.”

Bosco concurs: “It’s a school on the move. It’s always fun to be part of something that has a strong leader.”
James McGrath, associate professor of biomedical engineering, envisions big things from ultrathin silicon membranes. The nanomembranes are one molecule thick and act as filters that quickly separate particles that are close in size. McGrath is in the process of refining the membranes for use in lab-on-a-chip technologies and other biomedical applications. That kind of sophisticated work takes more than the expertise of highly trained faculty—it takes students.

"Students and post-docs are really the ones who make the science happen," says McGrath. "Like many faculty with significant teaching and administrative responsibilities, I simply don’t have the time to work in the lab myself."

McGrath wants—make that requires—every PhD student to bring something new to the lab. Henry Hung Li Chung took that requirement to heart by initiating the lab’s device-making project.

"I basically established the platform for all device making in the McGrath Lab," says Chung. "That included making the mold for shaping a device and creating the right adaptors to connect a device to different tubings."

Chung’s work was instrumental to Greg Madejski, who came up with a fluidic micro-system that tracks the passage of drugs across cell barriers or, in simpler terms, a screening tool.

"Drugs need to get to specific cells in the body," says Madejski. "This device produces a barrier to make sure the drugs work as intended."

In Madejski’s micro-system, tightly packed cells that mimic human tissue are grown on the silicon membranes. The drugs are then injected into a stream of fluid that passes over the membrane. If the drugs do not make it through the cells and membrane, the researchers know they need to abandon that line of research, which can save considerable money that would have gone toward more advanced testing.

Since McGrath can no longer spend a great deal of time in the lab, he sees his job as directing students to solve countless unanticipated problems.

"After working with a dozen students over 10 years, I’m surprised every time by how much the students accomplish and grow through this process," says McGrath. "Because of the risk and challenges that must be overcome, success is very satisfying for the student and for me."
Chunlei Guo, professor of optics, has been named an American Physical Society (APS) fellow for pioneering contributions in laser-matter interactions and applications, including the discoveries of the black and colored metals and exploring their wide range of applications.

Mark Bocko, Distinguished Professor and chair of electrical and computer engineering, professor of physics and astronomy, technical director of the Center for Future Health, and director of the Center for Emerging and Innovative Sciences (CEIS), was one of three 2012 recipients of the University of Rochester Goergen Award for Excellence in Undergraduate Teaching.

Wendi Heinzelman, professor of electrical and computer engineering and dean of graduate studies for Arts, Sciences & Engineering, was named a Distinguished Scientist by the Association for Computing Machinery (ACM), the world’s largest educational and scientific computing society. Heinzelman was recognized for designing and implementing “cutting-edge networking, communication, and signal-processing techniques for a wide array of applications running over wireless sensor networks, mobile ad hoc networks, and heterogeneous networks.”

Gaurav Sharma, associate professor of electrical and computer engineering, was named a fellow of the Institute of Electrical and Electronics Engineers (IEEE), the highest grade of membership, for contributions to electronic imaging and media security.

Govind Agrawal, professor of optics and professor of physics, will receive the 2013 William H. Riker University Award for Excellence in Graduate Teaching at the 2013 Doctoral Commencement in May.

We would like to hear from you!
In our last edition, we highlighted members of the Dean’s Advisory Committee. In this newsletter, we’ve shared with you a little about our Visiting Committee members. In the future, we want to share news of you, our alumni and friends. So please, take a moment to send us a quick note on what you are doing today and your field of interest along with your contact information. You can simply email your note to Eric Brandt (ebrandt@alumni.rochester.edu) or use the envelope provided in this newsletter. We want to know what you are up to these days!
FAST FACTS

• Home to the Institute of Optics: founded as the first optics education program in the United States in 1929 through a grant from Kodak and Bausch & Lomb

• Laboratory for Laser Energetics, a national resource for research in inertial confinement fusion, is led by Robert McCrory, a mechanical engineering faculty member.

• Advantageous undergraduate student to faculty ratio of approximately 10:1

• Percentage of bachelor’s degrees awarded to women by school: Ranked 19th @ 31.3%

• The percentage of Hajim students studying abroad has increased from 10.1 percent in 2007 to 16.0 percent in 2012.