

THE FULL SPECTRUM

SPRING 2012



HAJIM SCHOOL OF ENGINEERING & APPLIED SCIENCES
UNIVERSITY of ROCHESTER

THE FULL SPECTRUM

DEAN'S MESSAGE	2
GRAD STUDENTS NETWORK	3
NEW OPTICS DIRECTOR	4
MEDIA ARTS	6
STUDY ABROAD	8
ALUMNI AND STUDENTS	10

A MESSAGE FROM THE DEAN



In a recent article in the *Harvard Business Review*, Walter Isaacson quotes Steve Jobs as telling him, “I always thought of myself as a humanities person as a kid, but I liked electronics, then I read something that one of my heroes, Edwin Land of Polaroid, said about the importance of people who could stand at the intersection of humanities and sciences, and I decided that’s what I wanted to do.” Our challenge at great research universities is to help our students to explore these intersections. And today that requires more than classrooms; it requires “exploratories,” where students can utilize technology across multiple disciplines in what might be characterized as a 21st-century studio for arts and engineering.

Much of this newsletter is devoted to just such an exploratory—our planned media arts and innovation center, which among other things will be home to a “fab lab”—a fabrication facility where students from all disciplines can explore their creative passions in building and assembling hardware. In addition, the technology required for video production, recording, and post-production studios, coupled with necessary computational and graphics support will all be integrated into one connected space. This new technology playground will be abuzz with activity!

The center will also help support two exciting new majors. The first is a BA program in digital media studies that will analyze and create digital media from the perspectives of both technology and the arts. The second is a BA and BS degree option in Audio and Music Engineering, a fascinating new signature program that will be supported by our outstanding music programs in the Eastman School of Music and on the River Campus and by our Department of Electrical and Computer Engineering.

Technology and the language of engineering are increasingly an essential part of the humanities and of a liberal arts education. We have been supporting this need by pioneering a series of courses in engineering that are open to students from all disciplines. Like many discoveries, this one was made by accident. Mechanical engineers must complete a course in computer-aided design to graduate, and the course has limited enrollment opportunities. By mistake, the registrar listed the course for open enrollment, and within days, the registration filled with students from arts and sciences, leaving no open seats for the mechanical engineering students. How did we address this problem of excess demand? We created another section of the course, which met the need of both the mechanical engineering students and also the many students from arts and sciences.

These are just the latest in our efforts to bring students together across the undergraduate college here at the University of Rochester. While the traditional college education is structured around disciplines and majors, our students continually push the boundaries. In fact, they don’t even see the boundaries.

Having opened with a quote from Steve Jobs, it seems appropriate to also close with a quote from the innovator who often saw opportunities where others saw only boundaries.

Innovation distinguishes between a leader and a follower.—Steve Jobs

At the Hajim School of Engineering and Applied Sciences, we are dedicated to creating an environment that will train those future innovators—and leaders.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rob Clark', written in a cursive style.

Rob Clark

Professor and Dean, Hajim School of Engineering and Applied Sciences



Xi-Cheng Zhang

NEWLY APPOINTED DIRECTOR OF THE INSTITUTE OF OPTICS

Xi-Cheng Zhang, the newly appointed director of the Institute of Optics at the Hajim School, came to the University of Rochester with a plan. When asked about his vision for the Institute, he smiles humbly and says that he simply wants to help make its programs revolutionary.

Previously, Zhang served as the director of the Center for Terahertz and acting head of the Department of Physics, Applied Physics and Astronomy Research at Rensselaer Polytechnic Institute. He has received some 30 honors and awards during his career and has been awarded 26 U.S. patents. He has authored or coauthored 19 books and more than 350 scientific papers.

Zhang succeeded Wayne Knox, another visionary at the Hajim School who has taken on new responsibilities as associate dean of education and new initiatives. Zhang is an internationally recognized scientist in the field of optics who appreciates the great tradition of the Institute and looks forward to steering it to even greater successes in the future.

Zhang's vision to create a revolutionary program focuses on playing to the strengths that already exist within the Institute and finding opportunities for growth. With exceedingly high educational standards already in place, he hopes to attract a larger undergraduate population

for a top-notch education in optics. In addition, considering the large percentage of international students in the programs, he aims to increase international learning opportunities and industry connections. Among many other areas, he hopes to provide focus on research opportunities for students and faculty per the overarching goals of the Hajim School.

Zhang aims to sustain the momentum of the Institute based on its longstanding tradition and rich history as well as by bringing in new strategies to make the program the best it can be.

Paul Ampadu

Paul Ampadu, associate professor of electrical and computer engineering, was elevated to a senior member of the Institute of Electrical and Electronics Engineers (IEEE), a group constituting only 8 percent of IEEE members.

Julie Bentley

Julie Bentley, professor of optics, was elected a SPIE Fellow for her work developing new courses in lens design with real-world student projects.

Riccardo Betti

Riccardo Betti, professor of mechanical engineering and physics, was named winner of the 2011 Ernest Orlando Lawrence Award for outstanding contributions in research and development supporting the Department of Energy.

Jeff Bigham

Jeff Bigham, assistant professor of computer science, was awarded the NSF CAREER Award for his research combining technology with human intelligence to provide support for people with disabilities.

Diane Dalecki

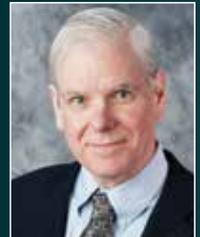
Diane Dalecki, director of the Rochester Center for Biomedical Ultrasound and professor of biomedical engineering, has been elected to serve as a member of the AIUM (American Institute of Ultrasound Medicine) Bioeffects Committee.

James Fienup

James Fienup, the Robert E. Hopkins Professor of Optics, was elected to the National Academy of Engineering for his work in the development and application of phase retrieval algorithms.

Richard Waugh

Richard Waugh, professor and chair of biomedical engineering, was elected a fellow of the American Association for the Advancement of Science (AAAS) for his distinguished contributions to the study of cell and membrane mechanics and for leadership in biomedical engineering.



MEDIA ARTS

AND INNOVATION CENTER AND TWO NEW MAJORS

Over the next two years, the Hajim School will help make two major contributions to Rochester's long history of groundbreaking innovations and multidisciplinary research and learning. It will be launching new majors in digital media studies and also in audio and music engineering, and it will be spearheading the creation of a multimillion-dollar media arts and innovation center on campus that will serve as their home.

"The new majors will blend in well with the philosophy behind Rochester's curriculum—that students learn best when they have the freedom to study what they love, structured of course with appropriate learning outcomes," said Rob Clark, Dean of the Hajim School of Engineering and Applied Sciences.

"Through talking with students over the past few years, we've seen a shift in the way they view learning,"

explained Thomas DiPiero, dean for Humanities and Interdisciplinary Studies and a partner in the efforts. "When asked what their ideal curriculum would be, Rochester students expressed their interests in studying both art and science/engineering. They want to be technologically proficient and at the same time have an understanding of the history, theory, and technology that created the context behind their work."

Discussions with students also revealed their desire to work collaboratively, to build technology, and have exposure to video production and multiple career paths.

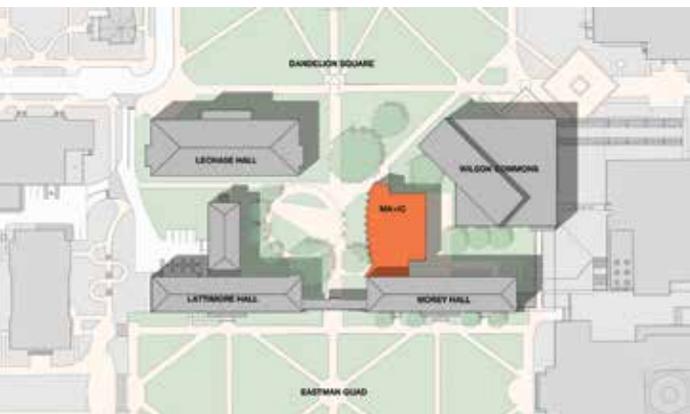
The new audio and music engineering major, which is in the final stages of review, will be a signature program supported by the Department of Electrical and Computer Engineering and by the music programs on the River Campus and in the Eastman School of Music.

Mark Bocko, professor and chair of electrical and computer engineering, described the new major as "a great way to combine science and engineering with something else that many Rochester students love—music." He added that the new

major is designed to help Rochester graduates become "the gold standard" in the growing fields of audio, acoustic, and musical technologies. "Creating, managing, and distributing audio content has become a huge industry," he explained. "There may be more MP3 files out there than any other type of data, and that means real career opportunities for students who gain this kind of education."

John Covach, professor and chair of the College music department and professor of theory at the Eastman School, says that the new major and facilities will help meet the increasing demand in recent years for music courses and performance. "The interest in music among Rochester students is really remarkable," Covach explained. "We have hundreds of students from all across the University taking our courses in popular music and playing in our ensembles. It's terrific that we can now join with our colleagues in the Hajim School to respond to the students' enthusiasm. I think the new major and the new facility will be in instant demand and fantastically popular."

The new major in digital media studies was designed by faculty from nine disciplines within Arts, Sciences & Engineering. It will focus on the analysis and production of digital media—or new media—from two perspectives simultaneously: 1) science and technol-



ogy and 2) art and humanities. Students graduating with a Bachelor of Arts in digital media studies will be well versed in both principal components, since they will study equal part arts and humanities and science and technology.

As part of the program, students will participate in a collaborative workshop to complete a capstone project in which they will work together to create a digital media object.

Ground is expected to be broken on the new media arts and innovation center later this year. It will be home to the new majors, and it will also contain a fabrication center, or Fab Lab, where students across the arts, sciences, and engineering will be able to interact and engage in cross-collaborative, cross-disciplinary design and learning. Designed to spark creative and innovative thinking among students, the new building will soon rise between Morey Hall and Wilson Commons on the River Campus.

“Engineering is about making things,” according to Professor James Zavislan of the Institute of Optics. “This fab lab will allow us to ‘front load’ our curriculum with courses and workshops to develop the skills needed for construction. This is often the most enjoyable part of engineering and science and

vital for the students’ senior design projects.

“For students who come here with a background in engineering fabrication, it will be a great place to further enhance their abilities,” he said. “And for the increasing number of students who have not had the opportunity to build things from scratch, it will be a safe and supportive environment in which to develop those skills.”

According to Clark, the new center and majors will share tools and develop novel uses for them through collaboration. Computational tools developed for design and engineering, for example, will inspire artists seeking new means for rendering their ideas. Engineers will implement those tools in new ways while collaborating with artists to address both form and function.

“Students at Rochester are less interested in academic boundaries and disciplines. The media arts and innovation center will be a place for them to assemble the tools they need to express themselves in that pursuit,” said Clark.

For additional information on digital media studies, visit www.rochester.edu/college/msc/digitalmedia.html.



STUDY ABROAD

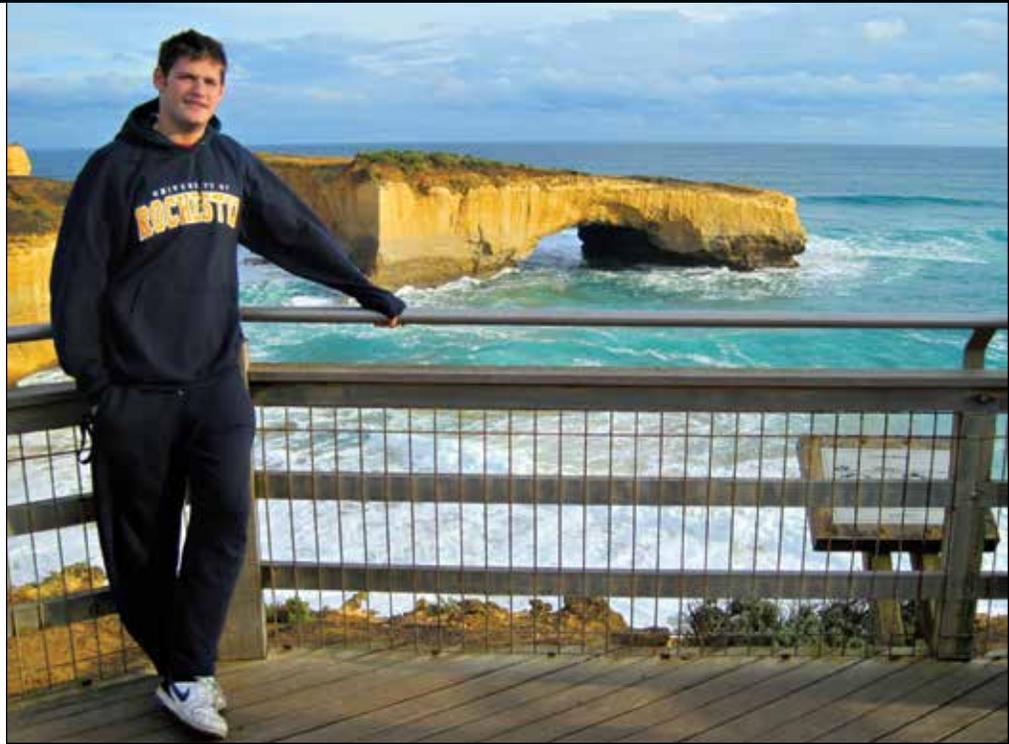
Study Abroad by the Numbers

In this increasingly global economy, the importance of cultural understanding and experience has never been so important for our future workforce. With this increased focus on engineering around the world, study abroad and other international opportunities have been brought to the forefront of the Hajim School student experience.

The Hajim School hopes to see 25 percent of its students studying abroad. As noted in the table below, we are rapidly approaching the desired target.

Class of 2007	10.9%
Class of 2008	10.8%
Class of 2009	14.6%
Class of 2010	14.6%
Class of 2011	12.9%
Class of 2012	16.6%

It is anticipated that about 18 percent of the class of 2013 will study abroad.



David Narrow

How did you benefit from the study abroad program?

I went to Sydney, Australia, my sophomore year. It was a great way to gain independence in a new setting. It also opened my mind to meeting different people every day and being part of a new culture.

Why is it important for students to study outside this country?

Studying abroad gives students a fresh perspective. By getting out of the Rochester routine and into a new learning atmosphere, students gain an eye-opening insight into other lifestyles, cultures, and personalities.

Along with the significant change in weather, I was immersed in a completely different way of life that made me more excited about everything I did.

Are you pleased with Hajim's emphasis on study abroad?

At the time I went to Australia, there was not much emphasis from the Hajim School on studying abroad. Luckily, I had a few motivated friends that were as willing as I was to do whatever it took to make study abroad a reality. By now, the Hajim School has made studying abroad a more welcomed activity.

Steven Trambert

In what ways did studying in Africa help you as an engineering student?

I found many opportunities to gain hands-on experience while studying in Botswana. I toured the Jwaneng diamond mine, met with engineers of a multinational firm, and worked at a small gravel mine north of the capital. Overall, I feel that I left Botswana with a greater understanding of how engineering is practiced in emerging markets, particularly in southern Africa.

What factors did you consider in deciding where to study abroad?

I hoped to study in a developing country where there would be a significant number of engineering works in progress.

Botswana is one of Africa's rising stars. It's a stable democracy with a lot of exciting infrastructure projects currently under way. The University of Botswana also offered an impressive number of engineering courses.

How did your experience in Africa compare to your expectations?

I was very pleasantly surprised by the number of opportunities that I had for professional development.

I met a University of Botswana alumnus who invited me to spend a weekend observing operations at a gravel mine that he ran in Serowe. I spent the weekend learning how they worked and even had the opportunity to climb inside stone processing machinery to troubleshoot malfunctions.



ANDREW AND KARA BOSCO

Class of 1991
Mechanical Engineering

The mechanical engineering undergraduate class of 1991 from the University of Rochester is a diverse and talented group of individuals. We are privileged to be a part of it. While receiving a fantastic education from faculty and curriculum, we also gained strength and knowledge from our classmates.

A favorite was certainly the Fluids laboratory course taught by Professor Gans where we both participated in and viewed many exciting and challenging projects producing real results. This gave us a chance to see the curriculum jump off the page and into practice. Tons of fun for engineers!

Neither one of us would be where we are today without the educational, cultural, and social experiences we had at Rochester. It prepared us well for all that life has to offer.

Andrew went on to complete a master's in engineering at Stanford University, followed by another master's in engineering from Rochester. He started as a summer intern with General Motors as an undergraduate and today is an executive with GM, working as a chief engineer on the exciting technology of fuel cells for vehicles.

Kara began working for Xerox as a summer intern. She returned to the University part time for a master's in engineering and a Simon MBA in the Executive Development Program. Today, she manages a line of business at Xerox.



CATHERINE MARANDO '12

As a young girl, there was one thing Catherine Marando knew without a doubt: She would not pursue engineering like her mom but would carve out her own path instead.

That all changed after the Long Island native was accepted at the University of Rochester four years ago. As Catherine was poring over the requisite pamphlets, she realized that engineering encompassed her academic passions of biology, physics, math, and chemistry. That's when she decided to major in biomedical engineering; it was a decision that has served her well.

Catherine has appeared on the Dean's List all seven of her semesters, earned the Dean's Scholarship, and became a member of the Tau Beta Pi Engineering Honor Society. While her studies are her top priority, she also finds time to get involved.

One organization that has meant a great deal to Catherine is the Society of Women Engineers (SWE), whose mission is to "stimulate women to achieve full potential in careers as engineers and leaders." Catherine is currently serving as president. It was at an early age

that Catherine got a hint of the importance of the organization's mission.

Her mom, an electrical engineer, finished her studies after Catherine was born and often took her daughter to school. That's when Catherine noticed that the classes—along with the profession—were almost entirely made up of men.

"Boys and girls are equally interested in science," said Catherine. "But after high school, the number of females studying the sciences drops off significantly, indicating that society is influencing their decisions in some way." Catherine wants to make sure girls and women are free to pursue the fields they are truly interested in. That's why she has organized workshops on campus for Girl Scouts to help them get excited about the possibilities in engineering.

As a senior, Catherine is currently very much focused on her own future. She's applying to medical schools in New York State with the hope of one day working in long-term pediatric pulmonary care.

She may have conceded her early objection to engineering as a career, but she truly is carving out her own path.



SUPPORTING THE HAJIM SCHOOL

Thanks to hundreds of supporters, students in the Hajim School learn firsthand how engineering technology plays out in everyday life. Each year student teams tackle real-life problems. Working with area hospitals and companies for example, biomedical engineering students have invented devices aimed at specific health needs around the world. But the real-world lesson doesn't end there; students get a taste for business as they patent their intellectual property and move the devices out into the market.

In fact, engineering students know better than most the satisfaction of seeing the real-world results of their work. The Hajim School Annual Fund supports the kinds of experiences that let students put theory into practice. The Hajim School Annual Fund also helps the school develop cutting-edge programs and courses; it increases hands-on experiences in the classroom and laboratories; it helps keep our equipment current in the fast-paced environment of ever-changing technology; it facilitates collaborative multidisciplinary initiatives; and it supports a variety

of student-led organizations that compete nationally and internationally such as our computational science teams, the Mini Baja team, and our solar splash team.

The Annual Fund also makes possible numerous shoulder-to-shoulder collaborations between faculty and students in the University's various research centers. Career fairs and networking opportunities also receive Annual Fund support and are more popular than ever with students and alumni.

When you are called or receive a letter in regard to the Hajim School Annual Fund, please consider our students, the leaders of tomorrow, and make your gift.

For more information about the Hajim School Annual Fund, to make a gift of securities, or to discuss including the Hajim School in your estate plans, please contact Eric Brandt at (585) 273-5901 or ebrandt@alumni.rochester.edu.



Meliora Moments

How do you strive to be ever better? *Meliora* is not only the University of Rochester's motto, it's an ethic that we share as a community, a way of life that unites us in a common bond, and a powerful description of who we are and what we value. Share your own *Meliora* Moment, just like George Landberg.

Visit meliora.rochester.edu



301 Lattimore Hall
P.O. Box 270076
Rochester, NY 14627-0076

Return Service Requested

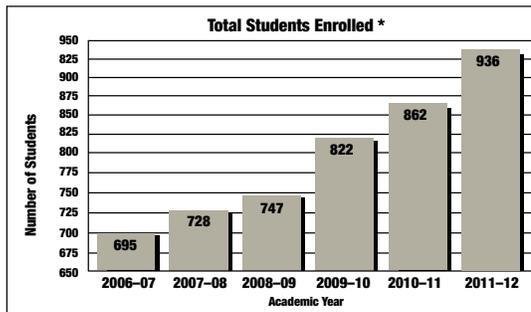
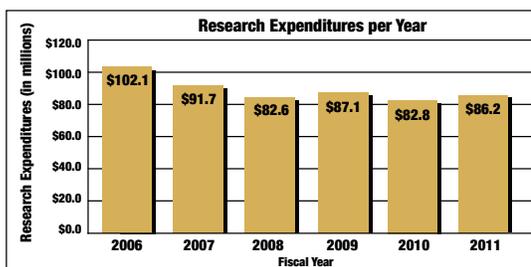
HAJIM SCHOOL BY THE NUMBERS

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 master's degrees awarded to women by school: **Ranked 7th @ 35.2%**
- Percentage of doctoral degrees awarded to women by school: **Ranked 9th @ 34.1%**

AWARD COUNTS

- 12** NSF CAREER Awards
- 1** PECASE Award (from Department of Defense)
- 4** National Academy memberships
- 101** Fellows
- 43** Fellowships accepted
- 5** Presidential Young Investigator Awards
- 2** Alexander von Humboldt Fellows
- 5** Alexander von Humboldt Awards
- 4** Fulbright Fellowships
- 5** IBM Fellowships
- 1** Willis E. Lamb Award for Laser Science and Quantum Optics
- 1** ONR (Office of Naval Research) Young Investigator Award
- 1** NIH Director's Innovator Award
- 1** Wolf Prize in Chemistry
- 1** Ernest Orlando Lawrence Award
- 9** American Association for the Advancement of Science (AAAS) Fellows



* full-time undergraduates