

THE FULL SPECTRUM

AT THE UNIVERSITY OF ROCHESTER



HAJIM
SCHOOL OF ENGINEERING
& APPLIED SCIENCES
UNIVERSITY OF ROCHESTER

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A MESSAGE FROM THE DEAN



At our diploma ceremony this spring, Wendi Heinzelman, our dean of graduate studies and a professor of electrical and computer engineering, talked about visiting a U.S. Navy aircraft carrier the weekend before.

"The technology on board that ship was just incredible," she said, adding that every field of engineering had contributed to the ship's various weapons, communications, and health systems. "And while many of us will never have the opportunity to serve our country the way these sailors do every day," Wendi noted, "we do all have the opportunity to use our skills in engineering . . . to continue pushing the envelope of these technologies."

How do we "push the envelope"? It starts with research. In this issue of *Full Spectrum* we'll explore some of the reasons why the Hajim School is a great place to not only conduct research but also translate it into technologies, goods, and services that better our lives and keep our country secure.

Let's start with the Laboratory for Laser Energetics. I recently suggested to Bob McCrory, LLE's esteemed director, that his lab is the "Big Bertha" in our University's golf bag. It is a magnet for attracting federal research funding, top faculty and students, and visiting scholars. And the Hajim School has certainly benefited in those respects from its close relationship with the LLE. The lab is, above all, a one-of-a-kind place to conduct research for many of our Hajim School faculty and students.

Thirty of our undergraduates worked on projects there this past school year. As our newsletter relates, the opportunity to do so can profoundly influence a student's subsequent career. Just ask Lee Feinberg '87 (optics), now optical telescope element manager for the James Webb space telescope project at NASA's Goddard Space Flight Center.

The research experiences of our Hajim School undergraduates often strengthen their resolve to attend graduate school or even pursue academic careers of their own. It inspires others to become entrepreneurs. When Felix Kim '14 came across some interesting technology at the Flaum Eye Institute, he organized a business team of fellow undergraduates and grad students at the Institute of Optics to make some important modifications. The Ovitz team is now well on its way to marketing a hand-held device that could transform the way we test vision. The Ovitz saga, also related in this newsletter, is a great example of how research can be translated to better our world—thanks to the entrepreneurial climate we foster. Our TEAM master's degree program, offered through the Center for Entrepreneurship, is one of the ways we do that.

Research opportunities for Hajim students are not limited to our campus. The Industrial Associates program at the Institute of Optics is one of many avenues for Hajim School students to connect with outside companies to further their research or apply it with internships and, eventually, careers. I am pleased to see the steps, outlined in this newsletter, that IA is taking to maintain its robust relationship with the optics industry.

When we talk about the Hajim School offering its students a full spectrum of opportunities, research participation is high on the list.

As Jack Carmola '77, recipient of our 2014 Distinguished Alumnus Award, told our graduates during Commencement, "You're getting much more than an engineering degree from a great school. You've received the technical base and foundation from which you can do anything you want to do."

And you can read more about Jack's award in this newsletter as well.

Meliora!

A handwritten signature in black ink, appearing to read "Rob Clark". The signature is stylized and cursive.

Rob Clark



The Industrial Associates program, which connects companies with Institute of Optics faculty, students, and research, invites new members.

Evolving Industrial Associates Program Turns 40



Jay Eastman '70

The optics industry continues to evolve, and the Industrial Associates program is evolving with it. The IA program, which connects companies with

Institute of Optics faculty, students, and research, celebrates its 40th anniversary this fall. The program is

- rolling out new levels of membership that will make it easier for more companies to participate
- creating a formal advisory committee, which will include representatives of member companies that join at the highest level
- increasing the opportunities for member companies to engage institute students through internships and a co-op program
- changing the format of IA's biannual meetings to increase the number of student presentations.

Jay Eastman '70 (PhD '74 optics), a serial entrepreneur and most recently founder and CEO of Optel, Inc., his fourth start-up, will serve as an advisor and administrator and help implement the new initiatives.

The changes will help the institute maintain its leadership role in an industry that has seen many new corporate players emerge, large and small, especially since the telecom era of the late 1990s.

"We have a strong, historical program that is now addressing different company constituents in a different environment," says Jim Zavislan, associate dean of the Hajim School and an associate professor of optics who has worked closely with the IA program.

Membership has averaged about 30 companies in recent years; to increase that, an entry-level membership will be offered to local companies in the Rochester Regional Photonics Cluster in recognition of their contributions to the community and engagement with University of Rochester students.

IA is also creating a new strategic, or highest level, of membership that includes

membership on the advisory committee, assignment of a faculty "champion" and a graduate student advocate, and additional opportunities to engage with students for internships and co-op programs.

The changes coincide with plans to increase to 40 the number of institute master's degree students, who are in high demand.

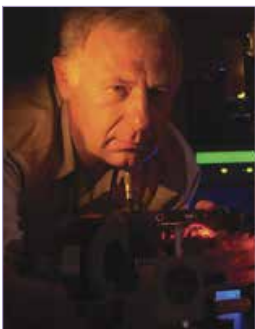
Institute-hosted, three-day Industrial Associate meetings are held in fall and spring (the next one will be Oct. 12–14). They are an opportunity for member companies to recruit students, meet faculty, catch up on Institute of Optics research, and talk about their own products and programs.

"Businesses engage with the institute not only because of students, faculty, and research, but also for the opportunities to engage with other like-minded companies," Zavislan notes. "Even in the Internet age, having high-value personal contacts and connections has value."

For more information, contact jeastman@rochester.edu.



LLE an 'Incredible Resource' for the Hajim School



Roman Sobolewski

When the Department of Electrical and Computer Engineering hosts a high-profile seminar speaker or a particularly promising faculty candidate, it is not unusual for

Professor Roman Sobolewski to take that person to see the Laboratory for Laser Energetics.

"It is always very high on the agenda," Sobolewski notes.

And well it should be. LLE is not only impressive in its own right but also has a special importance for the Hajim School of Engineering & Applied Sciences.

"The lab is an incredibly important part of our University, and it is an incredible resource for engineering," says Robert Clark, dean of the Hajim School and the University's senior vice president for research.

For example, funding through LLE accounted for about 73 percent of Hajim School research expenditures during FY 2013.

At least 17 Hajim School faculty members are also listed as scientists at LLE. This includes tenured professors, like Sobolewski, who are also LLE senior scientists or scientists and spend much, if not most, of their time at LLE. It also includes scientists from LLE who teach classes at the River Campus. Robert McCrory, CEO and director of LLE, is also professor of mechanical engineering and of physics.

Several Hajim School graduate students are supported each year with federally funded Frank Horton Fellowships in Laser Energetics awarded by LLE. In 2009, for example, 21 of 39 fellowships went to students in mechanical engineering, electrical and computer engineering, chemical engineering, and optics.

Thirty Hajim School undergraduates this past school year worked at LLE on a variety of projects.

This should come as no surprise. The LLE's missions—including, first and foremost, the pursuit of inertial confinement fusion as a source of energy—involve engineering challenges, both theoretical and applied, that overlap nicely with the research interests of Hajim School faculty.

The ties can be traced back to the very beginning of LLE. Initial research on high-power lasers by Michael Hercher, a doctoral student and later faculty member at the Institute of Optics, showed that a ruby laser could be focused in air and create a huge spark. Moshe Lubin, who joined the Department of Mechanical and Aerospace Sciences (now the Department of Mechanical Engineering) in 1965, realized the laser approach was an ideal way to make and study plasma as well as other high-energy-density phenomena. By 1970, Lubin (who later became LLE's founding director) and his colleagues concluded that lasers could ignite thermonuclear reactions.

During the early 1980s, optics and electrical engineering faculty members and graduate students played an important role in the Ultrafast Sciences Group. The group "contributed many firsts to LLE's long list of innovations"—including the technology that enabled the development of femtosecond petawatt lasers now used in the investigation of high-energy-density science.

Ongoing collaborations with University faculty and students, including those from the Hajim School, "benefit LLE in two ways:

As part of their PhD training as Horton Fellows at the Laboratory for Laser Energetics, Hajim School graduate students Kaitlin Wozniak (optics) and Debbie Saulnier (chemical engineering) tour the Omega EP sources bay with senior scientist Christophe Dorrier and Brittany Taylor, an engineer in the Materials Technologies Group. All collaborate with senior scientist Stephen Jacobs, professor of optics and of chemical engineering, and research chemist Kenneth Marshall on the development of liquid crystal optics for use on the Omega laser facility. *Photo by: Eugene Kowaluk/LLE*

by adding to LLE's base of expertise and by providing LLE with access to graduate and undergraduate students," notes the lab's 40th anniversary report, published in 2010. For many students, the opportunity to do research at LLE has proved invaluable to their later careers. For example, Lee Feinberg '87 (optics) worked at LLE during his sophomore and junior years, helping to solve a problem that developed when the fusion energy lab switched from red to blue laser.

"That lab experience helped me to understand how interferometers and optical design software really work, which gave me great insight into commercial products used today," Feinberg notes. "That experience has been the key to helping me along my way."

He is now optical telescope element manager for the James Webb space telescope project at NASA's Goddard Space Flight Center.

LLE also helps attract top graduate students and faculty to the Hajim School. Riccardo Betti, professor of mechanical engineering and of physics, is a perfect example. His desire to perform fusion research brought him to Rochester. "Fusion experiments are very expensive, and the scale of the experiments usually is outside the normal scale of a university experiment," Betti says. "So there are only very few places that have fusion experiments of this scale and that are associated with a university." In Rochester, Betti says, he could find both.

And both LLE and Hajim have benefited. Betti, recipient of the school's Lifetime Achievement Award last year, was installed earlier this year as the Robert L. McCrory Professor at LLE. He has received the Ernest Orlando Award from the U.S. Department of Energy for a series of theo-

retical discoveries he made in the physics of inertial confinement fusion and the Edward Teller Medal from the American Nuclear Society. He has been a frequent advisor to the federal government on the future of fusion.

LLE's mission also includes developing new laser and materials technologies, so it can support research in those areas as well.

For example, Sobolewski and the three PhD students, three master's students, and five undergraduates in his lab work on single photon detectors—which have applications for quantum cryptography and quantum computing—and with terahertz radiation, which has multiple applications, including the ability to scan packages for airport security.

Though Sobolewski maintains office hours at 425 Computer Studies Building, his main office, his labs, and all of his graduate students are based at LLE. Except on the days he teaches two electrical and computer engineering classes at River Campus each fall, he spends most of his time at LLE. And he and his students like it that way.

"My students are very proud to be part of LLE because it has such national recognition. They have no problem finding jobs. They advertise themselves as working at LLE. It really helps," Sobolewski says.

"Another reason I really like my research group there is that there's a large number of very, very smart scientists there to interact with. There's a lot of brainpower and a lot of advanced equipment that I can share or borrow . . . and that's very important."

"I'm very proud of being part of LLE," Sobolewski says. "It is an important part of the Hajim School and of the entire University. It is truly one of the gems."



Ovitz's

Student Entrepreneurs

Rise to Top with Their EyeProfiler

When Joung Yoon (Felix) Kim '14 looked for team members to help him launch his company, he did what many savvy CEOs do: He looked for people "smarter than I am" in key areas of expertise.

He didn't pay that much attention to their GPAs, though initially all were fellow students at the Institute of Optics or in the TEAM (Technical Entrepreneurship and Management) master's program. Instead, he asked them what they liked doing *before* they came to the University of Rochester.

If the software candidate said he'd worked with computers since

he was a teen, for example, or if the presentation candidate said he enjoyed debating in high school, Kim picked them.

That's how he knew they really loved what they were doing. That's how he knew it was "in their blood."

So far, Kim's intuition—about his team, about the portable EyeProfiler device they plan to market next spring—is paying off.

The Ovitz team's string of success in local and state business plan competitions culminated in May with a first-place finish at the Rochester Regional Business Plan Contest. The prize included \$25,000 in cash; a year of incubation services and office space from High Tech Rochester, which sponsored the contest; and services worth \$2,500 from

a Rochester marketing, advertising, and public relations company.

This fall the Ovitz team will begin final product development of the EyeProfiler. When pointed at someone's eyes, this hand-held device can produce, in a matter of seconds, an accurate prescription for glasses or lenses. The potential applications are staggering.

Ovitz will initially market the device for testing nonverbal infants or aging individuals who have trouble providing feedback

necessary for the testing now used. As the company becomes established and starts generating sufficient revenue, Kim says, the plan is to donate devices to improve vision care in underdeveloped countries.

Ultimately, the EyeProfiler could streamline vision testing in optometrists' offices around the world and perhaps be used in telemedicine.

Though the Ovitz saga is still unfolding, it highlights many of the advantages the University of Rochester and the Hajim School can offer to students, including

- opportunities to engage in multidisciplinary research, even as undergraduates, with talented faculty, many of whom are pioneers in their field

- encouragement and support for entrepreneurially inclined students like Kim to translate research to the marketplace.

The EyeProfiler is based, in part, on a design developed by Geunyoung Yoon, associate professor of ophthalmology, in the Center for Visual Science, and of optics. Kim and his team made several modifications to come up with a more compact, accurate device.

Ovitz has since hired Joseph Rosenshein as vice president and CTO. Rosenshein has nearly 30 years of experience in ophthalmological research, development, and clinical research. Walter Rusnak, an advisory board member, brings a similar wealth of experience in financial management and corporate governance. Other members of the team are still undergraduates—and relishing the "real-world" insights they are gaining.

"You learn a lot about building companies by actually doing it," says Nick Brown '15, who designs and programs the software algorithms used in the device and also handles Ovitz's IT. "I've gained a lot of knowledge about the link between the business world and technical world, which is very valuable for solving applied problems."

The diverse team that has resulted from the addition of more senior members is also a plus, he says. "Everyone, young and older, has learned from each other and push each other with everything we do," Brown says. "It's both a great opportunity to work on an engaging project with your peers and also



Ovitz will initially market the EyeProfilers for testing nonverbal infants or aging individuals who have trouble providing feedback necessary for the vision testing now used. As the company becomes established and starts generating sufficient revenue, the plan is to donate devices to improve vision care in underdeveloped countries.

Left to right: Pedro Vallejo-Ramirez, Felix Kim, Samuel Steven, Len Zheleznyak, Aizhong Zhang (no longer with the team), and Nicholas Brown.) Photo by: J. Adam Fenster

interact with people outside of the normal student demographic.”

Pedro Vallejo-Ramirez '16, the youngest member of the team who does marketing and relations, said he's learned a lot from his more experienced partners, "listening to their life stories, their work habits, and their advice." He's learned to make productive use of his time but also to relax. He's also learned the value "of fostering close friendships and of building a network of individuals you trust."

"Ovitz has helped me become more conscious of those around me; it makes me focus less on myself and more on my interactions with others. It has made me a little more reckless, a little more relaxed, and a whole lot more passionate about optics, business, and innovation."

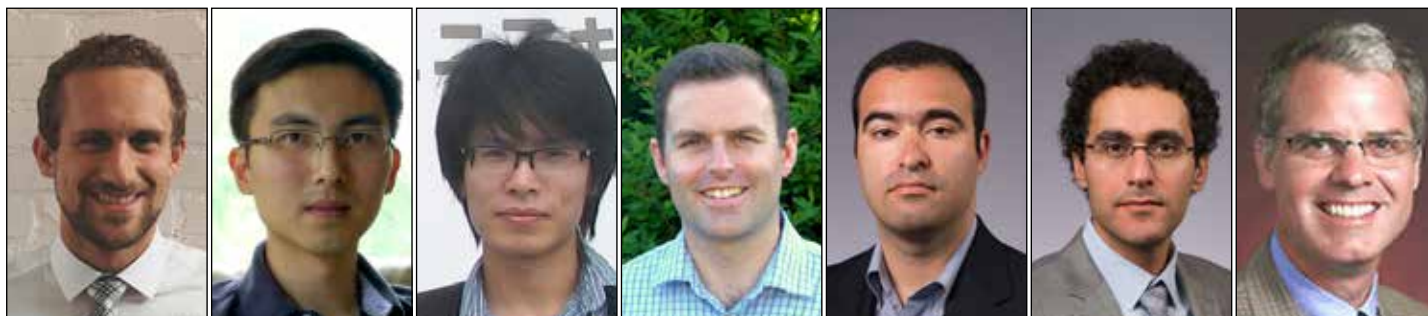
Other members of the team are Samuel Steven '13 ('14 TEAM) and Len Zheleznyak '05 ('06 MS, '14 PhD).

Kim says the team's youthfulness is to its advantage. "We want to be the student pioneers—brave enough, creative enough, and crazy enough to do this." They are certainly off to a good start.

"Ovitz was able to effectively demonstrate that its portable ophthalmic equipment can achieve higher accuracy at a faster rate and cheaper price than current equipment used in an optometrist's office," says Theresa Mazzullo, CEO of Excell Partners Inc., and one of the three judges at the Rochester Regional Business Plan Contest. "The team was represented by a good balance of young scientists and seasoned businessmen. All in all, the judges saw an

exciting new technology with a balanced management team and a large addressable market."

"It was the one presentation where it seemed the judges had to think a bit longer to come up with a question, since they had received such a thorough explanation of the company and plan," adds Susanna Virgilio, marketing specialist and program manager with the Center for Entrepreneurship, who attended the team's presentation.



Andrew White

Philip Guo

Ji Liu

Thomas Howard

Gonzalo Mateos

Hussein Aluie

Christopher Muir

New Faculty Members Bring Computational Skills

The Hajim School welcomes eight new faculty members this academic year. They bring diverse research interests and strong backgrounds in computational science, consistent with the University's commitment to data science.

CHEMICAL ENGINEERING

Andrew White, a postdoctoral fellow at the University of Chicago, starts in January. His research involves computer-aided design of materials. "I hope to make an impact on materials for energy and biomedical materials," White says. "This interdisciplinary research means I'll need to collaborate with other researchers on campus, especially through the Data Science Initiative and the Center for Integrated Research Computing." His PhD is from the University of Washington, where he worked on applying computational modeling to the discovery of new biomaterials and understanding how nature interacts with biomaterials. At Chicago he is working on developing new methods for combining simulations and experiments for applications in biochemistry and materials science.

COMPUTER SCIENCE

John Criswell, a 2014 PhD graduate of the University of Illinois at Urbana-Champaign, was also a research programmer there, with interests in computer security and automatic compiler transformations for enforcing security policies on commodity software. His primary work was on the Secure Virtual Architecture (SVA), which enforces memory safety on commodity operating system kernels. He said he's looking forward to working at the University of Rochester. "The computer science department faculty are all quality researchers, and I like how the systems faculty tend to collaborate."

Philip Guo, who completed postdoctoral research earlier this year with the User Interface Design Group at MIT, earned his PhD in computer science from Stanford University. His main research interests are in human-computer interaction (HCI), especially building tools for informal learning and online education. "One example is advancing the state of digital textbooks. We have such vibrant technologies available on the Web today, yet so many students are still learning either from traditional paper books or from PDF e-books that are essentially scanned versions of paper books," Guo says. "There's a lot of potential for improvement here!"

Ji Liu is a 2014 PhD graduate in computer sciences from the University of Wisconsin–Madison, where he was supervised by Professor Stephen J. Wright. His research interests include optimization and machine learning and their applications in computer vision, biomedical image analysis, and bioinformatics. His projects have included designing efficient parallel optimization algorithms to solve Big Data learning and analysis problems and extracting the key patterns from a large volume of *Drosophila* images with an efficient CCD algorithm.

ELECTRICAL AND COMPUTER ENGINEERING

Thomas Howard joins the Departments of Electrical and Computer Engineering and Computer Science in January with a secondary appointment in biomedical engineering. He is a research scientist at MIT's Robust Robotics Group. A University of Rochester engineering alumnus (BS, electrical and computer engineering, mechanical engineering '04), Howard earned a PhD (2009) in robotics from Carnegie Mellon University. His research spans artificial intelligence, robotics, natural language understanding, model-predictive control, optimization, state estimation, signal processing, machine vision, and autonomous exploration. He has applied his research on planetary rovers, autonomous automobiles, mobile manipulators, robotic torsos, and unmanned aerial vehicles.

Gonzalo Mateos, a visiting scholar this past year with the Computer Science Department at Carnegie Mellon University, received his PhD in electrical engineering from the University of Minnesota (2012). Previously, he worked as a systems engineer, Automation Technologies Division at ABB, Uruguay. His research interests are statistical learning from Big Data, network science, wireless communications, and signal

processing, focusing on algorithms, analysis, and application of statistical signal processing tools to dynamic network health monitoring, social networks, the power grid, and Big Data analytics.

MECHANICAL ENGINEERING

Hussein Aluie joins the University from Los Alamos National Laboratory, where he was a postdoctoral research associate. His research involves novel approaches to the computation and analysis of complex flows as a way to understand such phenomenon as ocean circulation and its impact on our climate and the turbulence encountered by aircraft. Two areas of his work—magnetized plasmas and shock-driven flows—“stand to benefit greatly from the cutting-edge resources available at the Laboratory for Laser Energetics and the pioneering work in fusion energy research being done there,” he says. Aluie earned his PhD from John Hopkins University in 2009.

Christopher Muir, principal engineer at Kodak since 1996, joins the department as associate professor as part of the teaching faculty. Muir, who received a PhD in mechanical engineering from Lehigh University in 1996, holds or shares eight patents and is skilled in such areas as design of experiments, design for manufacturing, engineering management, and research and development. He has taught part time in the department the past eight years.

Faculty Awards



Riccardo Betti



Robert Boyd

Riccardo Betti, professor of mechanical engineering and of physics and astronomy and assistant director for academic affairs at the Laboratory for Laser Energetics, was named the inaugural Robert L. McCrory Professor at the Laboratory for Laser Energetics.

Robert Boyd, professor of optics and of physics, was elected a fellow of SPIE, the international society for optics and photonics. He also received an honorary doctorate from Glasgow University.



Suxing Hu



Engin Ipek

Suxing Hu, senior scientist in the Theory Division of the Laboratory for Laser Energetics, was named a fellow of the American Physical Society.

Engin Ipek, assistant professor of electrical and computer engineering and of computer science, received the 2014 IEEE TCCA Young Computer Architect Award.



F. Douglas Kelley



Robert L. McCrory

F. Douglas Kelley, associate professor of chemical engineering, was chosen as the Engineering Professor of the Year by the Students' Association.

Robert L. McCrory, director of the Laboratory for Laser Energetics, vice president and vice provost, and professor of mechanical engineering and of physics and astronomy, was appointed a University Professor.

Jannick Rolland, the Brian J. Thompson Professor of Optical Engineering and director of the Center for Freeform Optics (CeFO) and of the R. E. Hopkins Center, was named the 2014 recipient of the David Richardson Medal from the Optical Society (OSA).



Jannick Rolland



David Williams

David Williams, the William G. Allyn Professor of Medical Optics; professor of optics, of brain and cognitive sciences, of ophthalmology, and of biomedical engineering; and the dean for research for Arts, Sciences & Engineering, was named a member of the National Academy of Sciences.

‘Find Your Passion,’ Advises Alumnus Who Helped Transform Goodrich



Jack Carmola delivers the commencement address at the Hajim School's Diploma ceremony.

Back during his sophomore year at the University of Rochester, Jack Carmola '77 would not have believed it if you told him he would one day receive the Distinguished Alumnus Award from the Hajim School.

At that point Carmola wasn't even sure engineering was in his future.

"I had a particularly unimpressive semester, and I was thinking that maybe engineering was not for me. Maybe I couldn't get through the engineering curriculum," Carmola says.

He met with Professor Al Clark, his advisor for all four years at Rochester, who was also the chair of the Department of Mechanical Engineering at the time. "He said 'Jack, why don't you quit worrying about whether the curriculum is right for you or not. Enroll in the engineering school, see how the first semester goes, and then we'll talk.' And everything turned out well. I loved my engineering classes. I finished with an engineering

degree (mechanical and aerospace engineering), and everything worked well from there."

"What a tremendous teacher and advisor he was for me."

Carmola eventually became president of the Actuation and Landing Systems Segment of Goodrich Corporation. He was responsible for \$3.5 billion in sales, 8,000 people, and 60 facilities with plants and customers all over the world. He was a key member of the executive team that increased the market value of Goodrich from \$1.5 billion in 2003 to \$18.6 billion in 2011 when it was acquired by United Technologies.

But Carmola's career might have taken a far different path without some sage advice from another professor.

As his senior year came to an end, Carmola had several job offers in hand. One was from GE to enter its corporate training and development program. "I knew they had an aircraft engine business, and

I really wanted to work in the aerospace industry," Carmola notes.

Another offer he was considering was in a more traditional engineering role with twice the salary. "Like many college graduates, I wanted a new car, I wanted to pay off my loans, and I wanted a nice place to live. I couldn't imagine turning this money down that the other company had offered."

"Which job do you want, which one are you passionate about—which one really fits best for you," asked Ronald Yeaple, a University professor of business administration who taught one of Carmola's classes.

"GE," Carmola replied.

"Take it," Yeaple replied without hesitation. "You've got the rest of your life to make money and get where you want to be in the corporate world."

Carmola spent nearly 20 rewarding, productive years at GE before moving on to Goodrich.

In his commencement address to Hajim School graduates this spring, Carmola stressed three key points:

- 1. The technical degree and education you have received allows you to go in any direction you want. Be flexible in your career path. Find your passion. "It may not be your first job, but when you find it, you'll be best at it, and everything else will fall in place."**
- 2. Whatever you decide to do next, find an organization with the right culture. The right culture equals high-performing employees and a high-performing organization.**
- 3. Maintain a good work-life balance. "You may be tempted to get into 50, 60, 70, 80 hours a week. That's okay in the short term but it isn't okay in the long term." Finding time for family, your other interests, and community service "is critical to making you more successful. When you find that balance you will be a better leader, a better employee, a better contributor."**

Carmola, now retired, remains active on the boards of public companies and nonprofit organizations. He resides in Charlotte, N.C., with his wife, Cindy. He is a member of the University's George Eastman Circle. He also serves on the Hajim School Dean's Advisory Committee. It's a perfect vantage point from which to not only advise the school but also to witness its progress.

"The transformation this school has made in the last few years is truly, truly incredible," Carmola says.

Major Succeeds Bruning as Chairman of Dean's Advisory Committee



John Major



John Bruning

John Major '67 (mechanical and aerospace engineering) is the new chairman of the Hajim School Dean's Advisory Committee, replacing John Bruning, a University trustee and former president and CEO of Corning Tropel Corp., who will continue to serve as a member.

The 17 members of the advisory committee meet twice a year to advise and counsel Dean Robert Clark and his staff on key aspects of the school's management. They also provide leadership in garnering financial support for the school.

Major, considered a pioneer of the wireless industry, is the founder/president of MTSG (Technologies Solutions Group) in Rancho Santa Fe, Calif., an investment, consulting, operations, and governance practice that is primarily focused on the telecommunications industry. With more than 30 years of mobile computing experience, Major holds 11 patents and serves as advisor to some of the largest wireless communications companies in the world.

Major served as a member of the Trustee's Alumni Council of the College. He received the Hajim School Distinguished Alumnus Award in 2010. He and his wife, Susan, are members of the George Eastman Circle.

Bruning has served as chairman since the DAC was created in 2008 after Clark became dean. "As inaugural chair of the DAC, John Bruning was and remains a key advisor to this group, as well as to the University's Board of Trustees," Clark says. "He was instrumental in helping me and the DAC grow and bring many initiatives to fruition over the past several years. I know he, as well as John Major, will both play pivotal roles in the ongoing growth and continued development of the Hajim School.

"If I recall, it was a conversation between both Bruning and Major that led to our 'Full Spectrum' tagline during our initial DAC meeting!"



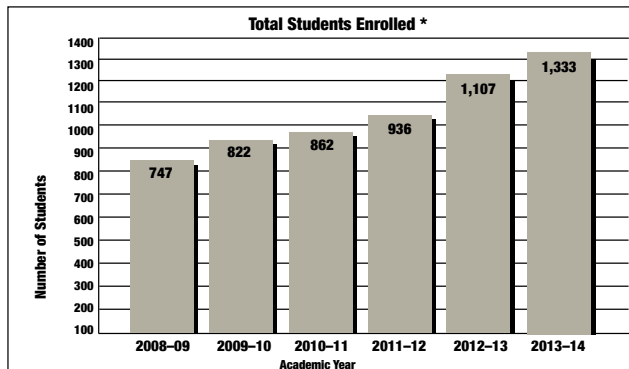
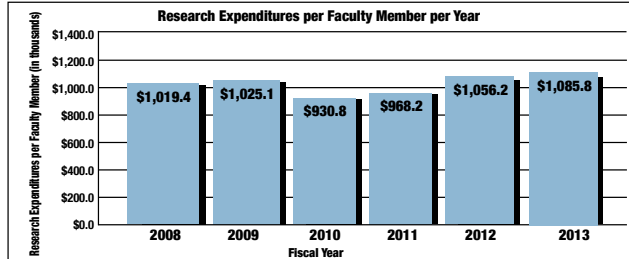
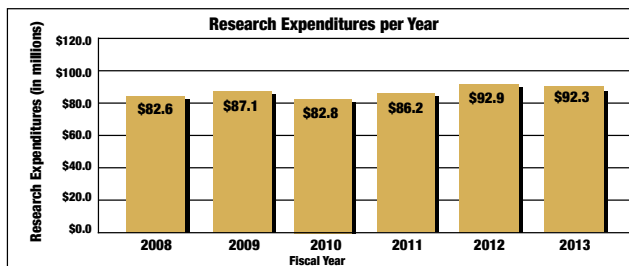
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Front cover: A technician maneuvers a diagnostic outside the target chamber of the Omega EP laser at the Laboratory for Laser Energetics. (Photo by J. Adam Fenster, University of Rochester)

FAST FACTS

- The Hajim School's undergraduate enrollment has nearly doubled since 2008–09, exceeding—by a factor of 10—President Obama's challenge of increasing engineering enrollments nationally by 10 percent.
- The number of master's students enrolled in the Hajim School increased from 61 in fall 2004 to 268 in fall 2013.
- The Hajim School STEM Gems program helped retain 95 percent of first-generation, low income, and under-represented minority freshman engineering students during the 2012–13 academic year.
- The percentage of Hajim students studying abroad has increased from 10.1 percent in 2007 to 18.0 percent in 2013.



* full-time undergraduates