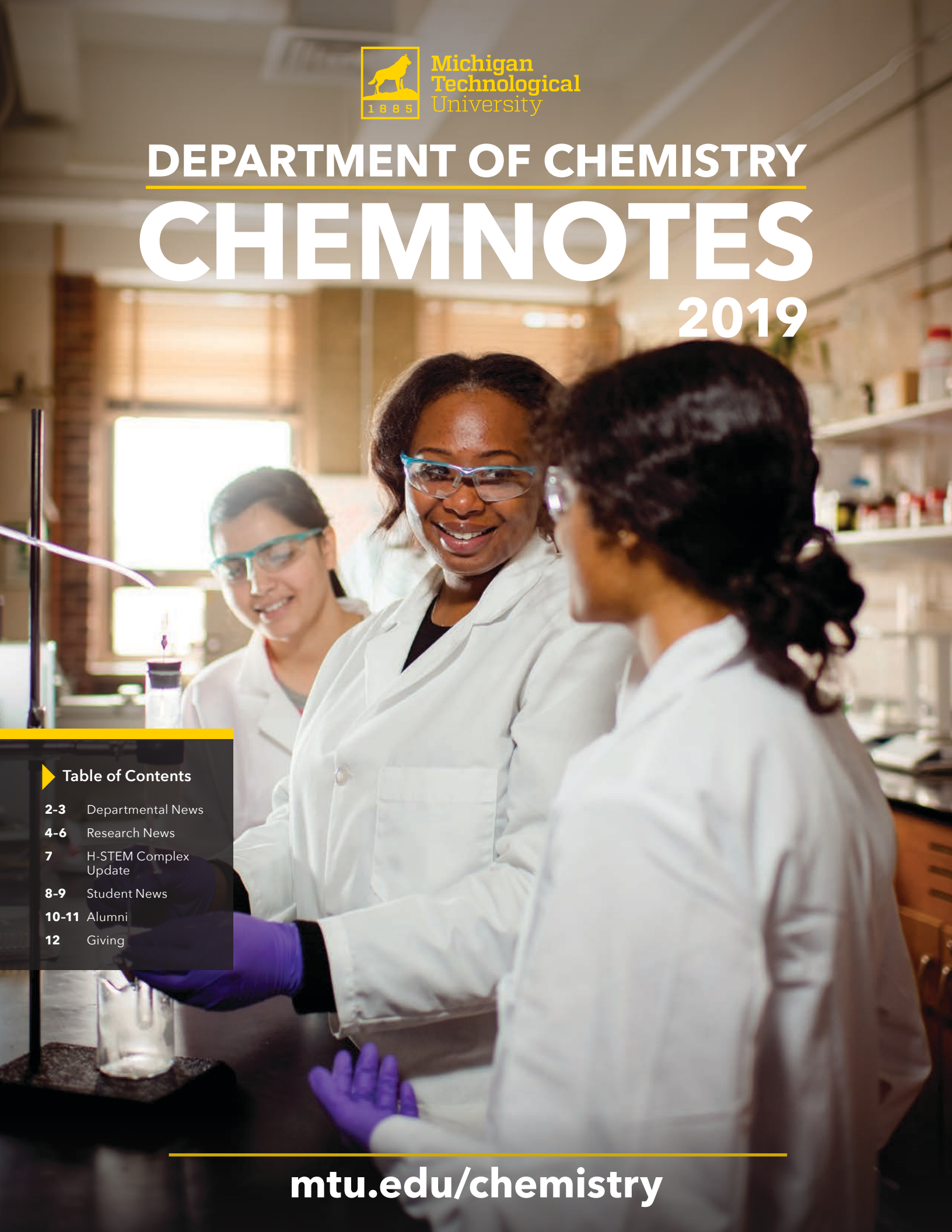
Michigan Technological University

DEPARTMENT OF CHEMISTRY

CHEMNOTES

2019



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FROM THE CHAIR

A lot has happened in the Department of Chemistry over the past year and there is much to brag about! I'd like to introduce some of them, with more details included in the following pages.

A highlight for the department is the annual spring awards program held in April. It was impressive and inspiring to hear the accomplishments of our undergraduate and graduate student award winners as their names were announced, attesting to their excellence in coursework, research, and teaching. A summary of the winners is presented later in the newsletter (page 10). Our featured awards program speaker, Laura Barrientos, who earned her PhD with Pushpa Murthy, shared some of her accomplishments as a scientist and entrepreneur, along with some good advice for the students. We were also delighted to hear from Parag Jog, who earned his PhD with Dallas Bates, and Sonali Jog, who also earned her PhD with Murthy; both are enjoying productive careers in California.

Many thanks to our generous alumni and friends whose donations have allowed us to give a variety of awards to our students including undergraduate and graduate student summer fellowships, provide support for professional development, postdoctoral appointments, and acquisition of some key instrumentation (which we'll highlight in a future newsletter). Your generous support greatly enhances our educational mission and research capabilities.

The department continues to be heavily engaged in research, which includes both our graduate and undergraduate students. I know from visiting with current and prospective undergraduate students that opportunities to do research is a high priority. I am grateful to all of our faculty who regularly mentor students on their research projects. This has been a particularly exciting year in terms of research funding. Since January 2019, five external grants have been awarded (details on page 7). Congratulations to these faculty and their research groups for their hard work and sustained efforts!

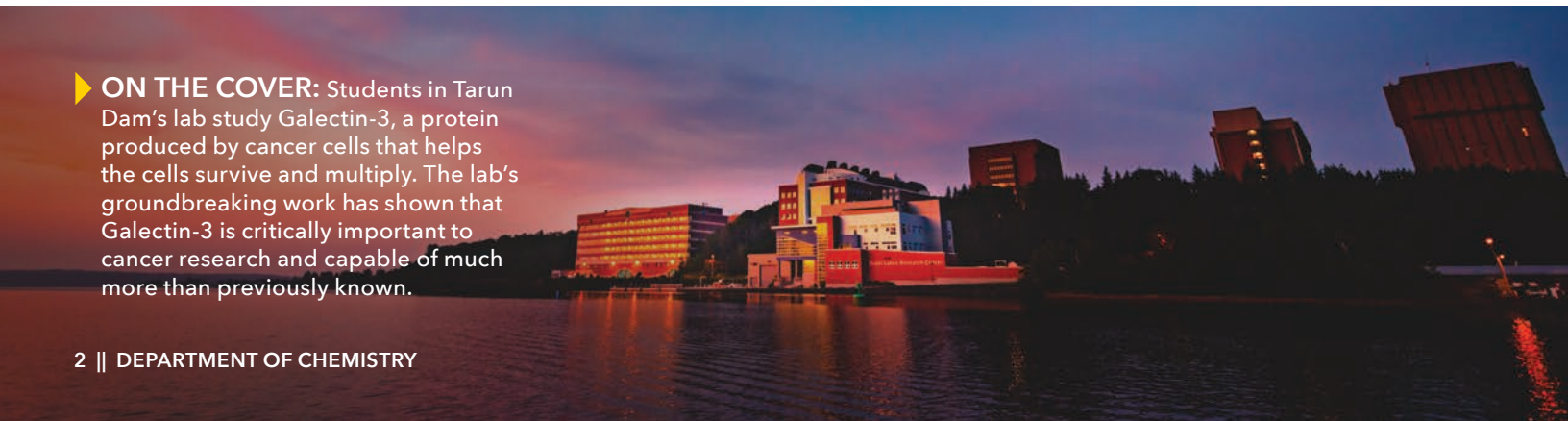
In regard to teaching and learning, we also have much to celebrate. This past spring, Paul Charlesworth was recognized for his outstanding teaching in first-year chemistry through the University's Dean's Teaching Showcase. Congratulations are also due to Andrew Galerneau, who is being promoted from lecturer to senior lecturer. Over the last academic year, three faculty and four students were recognized by the Provost as scoring in the "top 10 percent" of similarly sized classes, University-wide on their student evaluations of instruction. The department continues to work hard to recruit new undergraduate and graduate students to our programs. We are hopeful that we may have over 25 new first-year undergraduate students join us in the fall—the largest class since 2014.

Last year's newsletter announced the opening of the new University Chemical Stores Facility located at the north side of the Chemical Sciences and Engineering building. The project would not have been successful without the skillful direction of Don Wareham, who served as manager of Chem Stores, and retired in January after many years with the University. Well-wishers packed the Chemistry Learning Center on January 10 for a retirement party for Don.

Looking to the future, two important topics come to mind. First, the department will be continuing its search for a new department chair this year. More information will be made available on our webpage as the search develops. Second is the exciting new opportunity for the department and the University over the next several years with planning for the H-STEM building. This has been in the works for quite some time now, and was recently approved for the next steps by the State of Michigan. The building will greatly enhance research infrastructure for health sciences-related research, and the project will also include significant remodeling of the Chemical Sciences and Engineering building, which currently houses the chemistry and chemical engineering departments. A vision document for the project is being prepared and the capital outlay plan approved by the state is available at the following link **mtu.edu/facilities/resources/documents** in case you'd like to have a look.

This is going to be an exciting and productive year. I hope the same will be true for you. Please send us your news, visit our website, or even better, stop by and see the department!

John Jaszczak
Interim Department Chair and Professor
jaszczak@mtu.edu



ON THE COVER: Students in Tarun Dam's lab study Galectin-3, a protein produced by cancer cells that helps the cells survive and multiply. The lab's groundbreaking work has shown that Galectin-3 is critically important to cancer research and capable of much more than previously known.

DEPARTMENT NEWS

Paul Charlesworth: Dean's Teaching Showcase

By John Jaszczak

For many semesters, I have taught University Physics I in Fisher 135 after Charlesworth's back-to-back offerings of University Chemistry I. With enrollments reaching 400 students per section, Charlesworth's fall classes are memorable for the amount of heat generated in that lecture hall, even when he's not blowing something up. Despite the challenges of teaching large-enrollment classes, Charlesworth never tires of finding new ways to engage, challenge, and assist students in learning chemistry. Furthermore, since these are usually first-semester, first-year students, he diligently seeks ways to help them develop skills not only for chemistry but also for their subsequent academic experiences at Michigan Tech. He does this by providing students with a clearly structured curriculum and a wide variety of different opportunities for engagement in learning, including making them easily available on Canvas. In fact, Charlesworth was an early adopter and champion of learning management systems like WebCT and Canvas.

I think the clearest reason for my nominating Charlesworth comes from the suggestion of one of his colleagues. After vising one of Charlesworth's classes for peer evaluation in fall 2018, this fellow faculty member found himself inspired by what he saw. He writes, "My recent visit to Charlesworth's class has changed my perception about overcrowded classes. I found Charlesworth's teaching method simple, gimmick-free, effective, and easy to follow. The level of classroom engagement was evident from the high number of students answering his i-Clicker questions . . . In my opinion, assessing the teaching ability of an instructor based on a single class visit is as logical as writing a review of a motion picture based on its one-minute preview. But sometimes, a single visit is enough to feel the pulse of the class. After visiting Charlesworth's class, I now believe that dissemination of knowledge is possible in an extra-large classroom." If you don't believe it, I invite you to visit one of Charleworth's classes. By the way, if you visit in the fall, hope that the air conditioning is working!

Andrew Galerneau Promotion

Andrew Galerneau has been promoted from lecturer to senior lecturer, effective August 19. According to Interim Department Chair John Jaszczak, Andrew has served the chemistry department in exemplary fashion since he was appointed lecturer in 2013, following several years of service as an instructor. He consistently earns a place in the Provost's Top 10 Percent recognitions based on student teaching evaluations. Among his creative efforts to aid students' learning, he has been experimenting with adding "gamification" to his Organic Chemistry I course, with the goal of deeply engaging students in course material by creating a variety of experiences that subsequently earn them points, level advancements, and various other course-related perks. In addition to Organic Chemistry I, Andrew also regularly teaches University Chemistry II, and supervises the organic chemistry laboratory teaching assistants.

Provost Top 10 Percent Teaching Award

Congratulations to Andrew Galerneau, Vagarshak Begoyan, Jared Edwards, Danielle Langdon, and Charles Schaerer for receiving the Provost's Top 10 Percent Teaching Award in fall 2018, and to **Marina Tanasova, Tarun Dam, Nicholas Newberry, and Jared Edwards**, who received the award in spring 2019. The Provost's Top 10 Percent Teaching Award recognizes instructors who score in the top 10 percent of similarly sized class sections University-wide on the "average of seven dimensions" student-evaluation score (with a response rate of 50 percent or more and a minimum five responses). For fall 2018, only 92 instructors representing 114 sections (out of more than 1,050 evaluations) were recognized. For spring 2019, only 92 instructors representing 73 sections (out of over 858 evaluated) were recognized.

CHEMIST CO-AUTHORS UNITED NATIONS REPORT ON THE ENVIRONMENT

Sarah Green, professor of chemistry, was a scientific reviewer on the United Nation's (UN) Sixth Global Environmental Outlook (GEO-6) report. Green was one of 250 scientists and experts from more than 70 countries who worked on the report. The March 2019 report is a comprehensive and rigorous assessment on the state of the environment completed by the UN in the last five years.

The GEO-6 report shows that a healthy environment is a prerequisite and foundation for economic prosperity, human health, and well-being. It addresses the main challenge of the 2030 Agenda for Sustainable Development, that no one should be left behind, and that all should live healthy, fulfilling lives for the full benefit of all, for present and future generations. "We are not heading that way, however," says Green. "We have many opportunities to reverse that direction and make a difference on the current trends in climate change, biodiversity loss, pollution, and other pressures to restore planetary and human health."

The GEO-6 report highlights the fact that the world has the science, technology, and finance it needs to move toward a more sustainable development pathway; although, sufficient support is still missing from public, business, and political leaders who are clinging to outdated production and development models. "The science is clear. The health and prosperity of humanity is directly tied with the state of our environment," says Joyce Msuya, acting executive director of UN Environment. "This report is an outlook for humanity. We are at a crossroads. Do we continue on our current path, which will lead to a bleak future for humankind, or do we pivot to a more sustainable development pathway? That is the choice our political leaders must make, now."

The projection of a future healthy planet with healthy people is based on a new way of thinking where the "grow now, clean up after" model is changed to the goal of a near-zero-waste economy by 2050. According to the Outlook, green investment of two percent of countries' GDP would deliver long-term growth as high as presently projected but with fewer impacts from climate change, water scarcity, and loss of ecosystems. At present, the world is not on track to meet sustainability goals by 2030 or 2050. Policy interventions that address entire systems—such as energy, food, and waste—rather than individual issues, can be much more effective, according to the authors. "The report shows that policies and technologies already exist to fashion new development pathways that will avoid these risks and lead to health and prosperity for all people," says Joyeeta Gupta and Paul Ekins, co-chairs of the GEO-6 process. "What is currently lacking is the political will to implement policies and technologies at a sufficient speed and scale. The fourth UN Environment Assembly in Nairobi in March needs to be the occasion when policymakers face up to the challenges and grasp the opportunities of a much brighter future for humanity."

Supplemental Instruction and the Chemistry Learning Center

On a cold winter's day in 2003, Lois Blau (whom most will remember as the dynamic director of the Chemistry Learning Center (CLC)) discovered a relatively new and innovative academic support service that would transform the landscape of STEM learning support at Michigan Tech in the months and years to come. The program? **Supplemental Instruction (SI for short).**

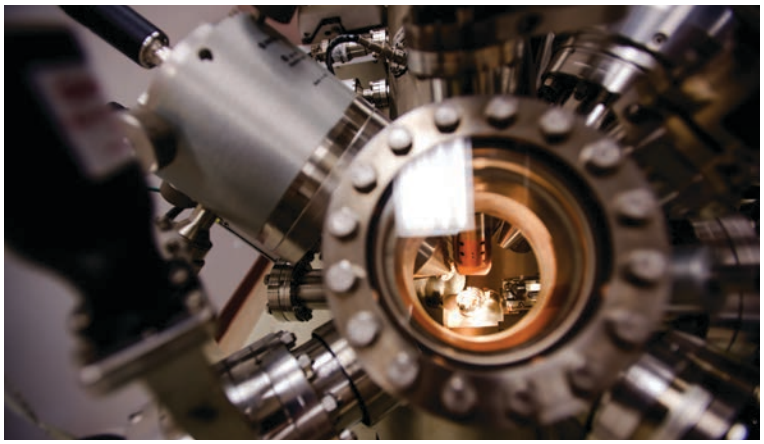
SI is a nontraditional form of tutoring that focuses on collaboration, group study, and interaction for students taking "traditionally difficult" courses. Students are provided a trained peer who has successfully negotiated the course. In 50-minute sessions, students receive course-specific learning and study strategies, note-taking and test-taking skills, and structured study time. SI was first deployed at Tech in general chemistry in fall 2004. After attending formal training in Kansas City, Lois was convinced that the program could make a positive impact on campus. The outcome surpassed her expectations. What started as a support service for one introductory course has blossomed into a sophisticated operation in five foundational first-year and second-year courses.

In fall 2018, the CLC experienced record-breaking attendance with nearly 6,000 student visits throughout the semester. The praise belongs to our amazing team of student SI leaders who worked so hard to help our students succeed. SI leaders go through a relatively involved training process before the start of the academic year and attend development sessions throughout the year. In addition, they faithfully attend every course lecture, take notes right alongside the students, and act as model peers. All this puts SI leaders in the best position to run effective sessions.

What makes SI so successful? The harmonious relationship between teaching and talking. To talk is to teach and to teach is to learn. Since talking requires prerequisite thinking on a critical level, she who talks more learns more.

Is SI working? Yes! We consistently see that students who attend SI are scoring 10 percent above their non-attending counterparts on average. For certain classes, the difference has been as high as 15 percent. One might surmise that the difference in achievement level is more of a correlation effect. It turns out, however, that the International Center for SI in Kansas City has ample data to show that this is not the case. When sorting students by any number of metrics the data show that SI is having a causation effect in the improved student outcomes.

We have room to grow. Eventually we would love to test out SI in P-Chem (typically taken in the third year). In addition to growing the program within the department, Jeremy Brown, director of the CLC, plans to extoll the program's virtues across campus. Michigan Tech is already regarded as a top-notch university, but an active and flourishing SI program could have a propitious effect in aiding our students to learn, thrive, and create the future.



Surface Chemistry Research with Kathryn Perrine

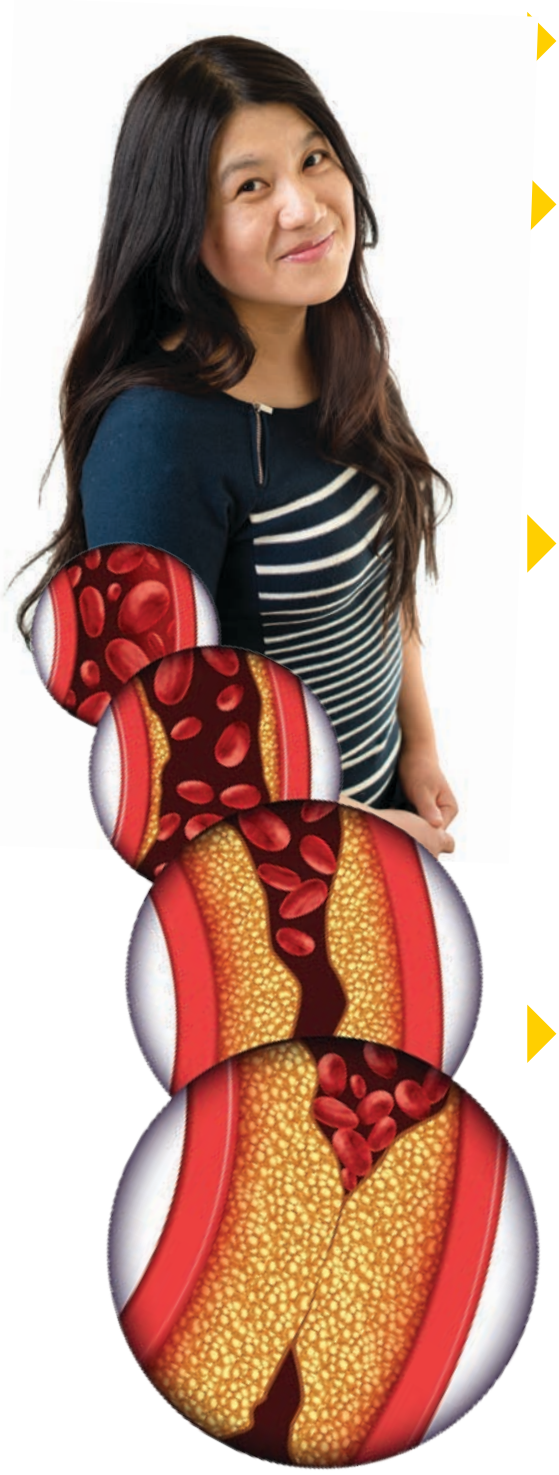
Compelling research is happening on campus with the use of the X-ray photoelectron spectroscopy instrument (PHI 5800 XPS, known as XPS). Kathryn Perrine, assistant professor of chemistry, uses the XPS and other techniques (i.e., infrared spectroscopy) to analyze the surface of materials and how chemicals react on the surface. According to Perrine, examining a material's surface with the XPS helps researchers and students design new technologies like batteries, biomaterials, and electronic devices. The XPS was donated to Michigan Tech by the Army Research Laboratories with help from the Department of Chemistry in 2016. The XPS is housed in the Applied Chemical and Morphological Analysis Laboratory and run by Perrine and Timothy Leftwich, research professor in the materials science and engineering department, both surface scientists.

Currently, Perrine and her research team are studying dichlorination and oxidation reactions on iron surfaces for understanding them as heterogeneous catalysts and their role in water quality. Specifically, Perrine and her team use the XPS to, "understand the oxidation state of the iron, what absorbs to the surface, and what that chemical is," Perrine explains. "Different types of reactions can happen on various sites (i.e., pure iron surfaces or oxidized surfaces). We are working to understand reactions like the liquid-solid interface and how to connect reactions to reactions at the gas-solid interface. At the gas-solid interface, a lot of our research occurs in a vacuum, so we can control water vapor and other chemicals that have a gas-based pressure. Once the chemicals interact with the surface, we can measure under controlled conditions how that reaction occurs. The condensed space offers a more realistic perspective, in terms of aqueous media, how reactions happen in an aqueous environment, and the role of water and oxygen in those reactions."

Perrine also teaches a surface analysis class in which graduate students use the XPS to analyze and interpret data. "I don't just teach about XPS analysis, I teach about all surface processes," she says. Studying the surface helps researchers design materials for potential technologies. "We can analyze elemental composition of coatings, probe film layers using depth profile analysis, and observe surface contamination and functionalization of surfaces. This allows us to design better materials and develop new technologies just by understanding on the molecular level what happened to the surface of a material." Ultimately, XPS is a powerful surface analysis instrument that enables the Michigan Tech community to conduct high-quality research and develop new materials and technologies.

LANRONG BI STUDIES THE HEART OF THE MATTER

Lanrong Bi, associate professor of chemistry, is principal investigator for research funding granted by the American Heart Association (AHA) for two years. Bi explains her sub-cellular level research. According to Bi, studying mitochondria helps with early detection of heart disease and has parallels with philosophy.



Q: What is your AHA research funding for?

A: We proposed to develop a new treatment for myocardial infarction (heart attack). Currently, there is no effective treatment available. We seek to develop a screening to identify compounds to reduce the risk.

Q: What is your process for developing a treatment?

A: Our strategy is to target mitochondria, which are the specialized structures in cells that produce energy and also mediate cell growth and death. We start with cellular models, putting cells in a dish and adding a synthesized compound, to see how the cell respond to drug treatment. Using a high-resolution microscope, we see how mitochondria behave—if they can maintain their normal morphology—when we add certain chemical compounds (test drugs). We try to use cellular models to mimic a myocardial infarction using a process called hypoxia reoxygenation. We start with cellular models, because we want to reduce the use of the animal models (mice). This process will allow us to evaluate if the test drug is better than others.

Q: What's your hypothesis?

A: My hypothesis is that overproduction of free radicals causes cardiac cell damage during myocardial infarction. Free radicals are not bad at a low level, and are naturally occurring even in healthy cells, but if a healthy system overproduces free radicals, it causes damage. We try to catch and neutralize the free radicals to make sure the overall free-radical level is as close as possible to normal. This process is similar to using an acid to try to neutralize a base. Here, we have some test compounds that should catch free radicals to maintain a proper balance for mitochondria dynamics. With balanced mitochondria dynamics, the cells will be healthy, and the patient will also be healthy. Thus, our strategy for treatment is to target cell health at the sub-cellular level. We also hope that this strategy will help deal with disease at an early stage. It's about finding a balance. With cancer treatment, it's the same concept. Treatment is not trying to remove all the cancer cells completely, because that's impossible. To survive with cancer cells, the goal is to keep them under control.

Q: Have you discovered life lessons from studying mitochondria?

A: Yes. If we look at the inside of the cell, we can see that it tries to adjust itself, doing repairing and regeneration, to try to maintain the proper balance inside itself. We need to live in harmony. We want to work with people in harmony. You have to make sure the dialogue inside cells is open. It's just like with people—you need to maintain an open dialogue. The more I learn about cells, the more I see the parallels with philosophy. So, I love reading philosophy, and I see the connections with the work I do. You can see the connection between cardiovascular disease and cancer; they do have similarities if you look at the inside of the cell. If you stop at a superficial level, you don't see connections, but if you go inside the cell you can see the same problems.

H-STEM BUILDING UPDATE

On March 1, 2019, the Michigan Tech Board of Trustees approved initial planning and design expenditures for what is currently referred to as the H-STEM Engineering and Health Technologies Complex (H-STEM Complex). Their vote moved the project forward to the next phase of development.

The University organized a coordinating committee, working group and stakeholder group to oversee design and programming decisions related to the H-STEM Complex. Both the working group and stakeholder group will inform the coordinating committee's decisions on the scope and form of the H-STEM Complex project.

The working and stakeholder groups, as well as the coordinating committee, are visiting and benchmarking analogous, recently constructed projects on other university campuses as well as comparable facilities of industry partners. Members of the groups are also attending professional conferences that deal with recent developments in construction of campus facilities.

Architects and planners were on campus in early July to kick off the planning and design process. The committee and groups expect to complete their planning and design work in April 2020, at which point the University would submit design and construction plans to the Michigan Legislature for approval. It is currently anticipated that construction will begin in 2021, with the goal of completing the project by August 2023.

New Funding

Haiying Liu is principal investigator on a project that has received a $459,000 award from the National Institute of General Medical Sciences of the National Institutes of Health. This new grant is based on a renewal proposal titled "Ratiometric Near-infrared Fluorescent Probes for Sensitive Detection of Lysosomal and Mitochondrial pH changes in Live Cells." Ashutosh Tiwari is co-principal investigator on this project.

Lanrong Bi is principal investigator on a two-year project that has received $154,000 from the American Heart Association. This project is titled: "Molecular Insight and Pharmacological Approach Targeting Mitochondrial Dynamics in Myocardial Ischemia/Reperfusion Injury."

Christo Christov is principal investigator on a project that has received a $179,040 award from the National Science Foundation. This project is titled "Collaborative Research–Ethylene Forming Enzyme."

Marina Tanasova is principal investigator on a project that has received a $446,849 research and development grant from the US Department of Health and Human Services—National Institutes of Health. The project is titled, " Exploiting Cellular Discrimination Through GLUTs with Small-Molecule GLUT-Targeting Probes." Smitha Rao (Biomed Engineering) is co-principal investigator on this potential three-year project.

Ashutosh Tiwari and Kelley Smith were awarded a C2E2 grant in the amount of $5,000 for the acquisition of a Shimadzu Temperature Control Accessory for the Shimadzu Spectrophotometer.

Tyler Leverton: First Accelerated Master's Degree Recipient

Applying for an accelerated master's degree was a relatively easy choice for me. Since I came to the University with a substantial number of AP credits from high school, I had a lot of breathing room in my schedule for my senior year of college. In addition, I knew I did not want to be in school for another four to six years to complete a PhD. Thus, the ability to graduate with a higher-level degree in only one year was really appealing.

With the five-year BS/MS plan set, it actually made my senior year a little busy, since I had to take a few extra classes. However, I was prepared for it and it was rewarding, since the classes I took helped broaden my knowledge in several different areas of chemistry and not just in the area I was doing research. This is a new program and everyone in the department was more than helpful in learning the ropes along with me and ensuring the credits and courses all worked out.

If I could change one thing, I would have begun researching even earlier than I did, so I could have a more solid basis for doing the work required for a thesis. Doing all of the writing, editing, and defense preparations is no joke; it may have been less stressful if I had even an extra year of getting familiar with the laboratory and research setting. Also, there is a reason the suggested timeline recommends defending in the summer—doing coursework on top of a thesis got overwhelming when deadlines approached. Though it was nice to be able to finish in May, the extra semester would be worth the stress it would save. I greatly appreciate all of the help and support that made going through this program possible, because it took a lot more than just getting two years' worth of research done in one—or less!

Bhaskar Halami's Poster Receives First-Place Award

Graduate student Bhaskar Halami's poster "Synthesis of Sensitive Electrophilic Nucleotide Phosphoramidites and their Successful Incorporation into DNAs," was awarded first place at the Upper Peninsula ACS Student Research Symposium. The symposium was held at Northern Michigan University on March 23, 2019. The ACS local section of the Upper Peninsula organizes this annual event for research students from chemistry and allied branches of science. Halami received the certificate of merit along with a cash prize of $150. He presented his poster, as part of the research he has been conducting for the development, of antisense drugs under the guidance of Shiyue Fang. The work presented in the prize-winning poster was highly appreciated by the visitors and attendees. One of the experts, Yu Liu, acknowledged the research presented as "very challenging but demanding." The judges were impressed with the presentation, content, design, and format of the poster.

DEPARTMENTAL STUDENT AWARDS

Undergraduate Student Awards

Outstanding Student in First-Year Chemistry: Andrew Zampaloni

Doc Berry Award: Taylor Johnston

Leslie Leifer Award in Physical Chemistry: Jason Barr

Undergraduate Award in Organic Chemistry: Collette Sarver

Undergraduate Award in Inorganic Chemistry: Jacob Mohar

Undergraduate Award in Analytical Chemistry: Jacob Mohar

Undergraduate Award in Biochemistry: Sam Willard

Outstanding Senior Award: Jacob Mohar

Outstanding Senior Research Award: Sam Willard

Departmental Scholar: Sarah Montgomery

Rebecca Sandretto and Susan Stackhouse Undergraduate Summer Fellowship: Michael Hromada

David J. Pruett and Valeria L. Pruett Undergraduate Summer Research Fellowship: Sarah Montgomery and Peyton Bainbridge

Graduate Awards

Outstanding Lower-Division Chemistry Teaching Assistant Award: Matt Brege and Charles Schaerer

Outstanding Upper-Division Chemistry Teaching Assistant Award: Grace Billman-Benveniste, Nicholas Newberry, and Parya Siahcheshm

Graduate Leadership Award: Christina Welch

Outstanding Graduate Student Fellowship: Vagarshak Begoyan

Alumni Graduate Summer Fellowship: Matt Brege

David J. Pruett and Valeria L. Pruett Graduate Summer Fellowship: Bhaskar Halami, Adikari Mudiyanselage Dhananjani Nisansala Eriyagama, and Shuai Xia

Robert and Kathleen Lane Endowed Fellowship: Shaheen Shahsavari and Bhaskar Halami

Department of Chemistry Ambassador Awards

Grace Billman-Beveniste, Tyler Phillips, Peyton Bainbridge, Jason Barr, Emanuele Bagnasco, Mikhail Trought, Danielle Langdon, Hanna Pickard, Tyler Leverton, and Christina Welch

ACS 2019 SUMMER SCHOOL ON GREEN CHEMISTRY AND SUSTAINABLE ENERGY

By Monica Nyansa

Since 2013, the ACS Summer School on Green Chemistry and Sustainable Energy has brought graduate students and postdoctoral scholars from the United States, Canada, and Latin America to explore scientific solutions to global sustainability challenges through lectures, discussions, case studies, and poster sessions.

The 2019 ACS Summer School on Green Chemistry and Sustainable Energy was held at the Colorado School of Mines in Golden, Colorado, from July 16–23. Approximately 60 young scientists from various chemistry and chemical engineering fields attended.

The week-long program began with a welcome speech and an introductory lecture on the principles and practice of green chemistry delivered by Mary Kirchhoff, director of scientific advancement at ACS. One of the technical highlights of this year's program was the life cycle assessment (LCA) project and lecture by Philip Jessop from Queen's University, Canada. Jessop took the students through some "cradle-to-grave," "cradle-to-cradle," and "gate-to-gate" life cycle assessment of organic synthetic processes. Afterwards the students were put in groups of six to work on the LCA for the synthetic routes of different compounds and to choose the "greenest" route based on least impact to humans and the environment. He further hinted at the necessity of choosing solvents with the least environmental impact (such as global warming and smog formation) when designing synthesis since solvents form the major part of any synthesis.

Jim Hutchison from the University of Oregon gave lectures about systems thinking and its applicability in chemistry. He shared the importance of considering the whole system instead of just the laboratory when it comes to designing greener chemistry experiments. Several great professional development lectures and activities also took place. Nancy Jensen, the program manager and assistant director for the Office of Research Grant and ACS Petroleum Research Fund gave a presentation on grant writing where she provided several tips on writing proposals that have a higher chance of being funded. The participants also had an interactive session with Natalia Martin from ACS on resources for graduate and postdoctoral students, such as the ACS leadership course and Career Consultant services for ACS members. There were poster sessions organized to provide a platform for the participants to showcase and share their research projects. There were experts from industry, academia, and ACS during poster sessions to talk about career opportunities.

On the fun side, there was white-water rafting on Clear Creek. It was a lovely day on the river; the sun was out and it was windy making the water cold. Rafting gave the students the opportunity to enjoy the view of the mountains. A great amount of time was spent after school in downtown Golden, hiking up in the mountains, and touring the Coor's brewery. Overall, the ACS Summer School is a great opportunity to learn more about the practical application of green chemistry and sustainable energy, from choosing greener solvents for synthesis to doing a LCA of every synthetic procedure. It is also a great place to connect and make new friends and acquaintances who are passionate about sustainable chemistry.

2018-19 Graduates

UNDERGRADUATE DEGREES AWARDED

Joe Brouwer
Brian Burtka
Alyssa Cinder
Jeff Galla
Connor Hensley
Savannah Joslin
Danielle Langdon
Jacob Mohar
Tyler Phillips
Elizabeth Rose
Joe Vermeylen
Sam Willard

GRADUATE DEGREES AWARDED

PhD Chemistry

Mingxi Fang
Shanshan Hou
Simeon K. Schum

MS Chemistry

Tyler Allyn Leverton
Charles Logan Schaerer

ALUMNI SHARE ENCOURAGEMENT AT AWARDS PROGRAM

Students got an unexpected treat at the department's annual awards program this year, held on April 24 in the Memorial Union Building's newly remodeled alumni lounge. Three PhD recipients from the department shared some of their experiences, funny stories, and words of wisdom before the student awards were presented.

Special guest of honor was Laura Barrientos, who earned her PhD under the mentorship of Professor Pushpa Murthy in 1995. During her career as a biochemist and structural biologist, she has conducted research at the National Institutes of Health and Centers for Disease Control and Prevention. Currently, she is owner and founder of Premier Drug Screening, LLC, and owner and president of IntelliGenetics, LLC, headquartered in Atlanta, which is the only AABB-accredited DNA-based relationship testing laboratory in Georgia and surrounding areas authorized to perform biological relationship testing for the US State Department.

After sharing stories of her time at Michigan Tech and some of the exciting stops on her career path, Barrientos offered some advice to the students:

- Set your vision
- The career path is yours and unique. Do not compare it with anyone else's
- Always leave the doors open
- Reputation is important–guard it
- Writing skills future-proof your careers; polish this crucial skill while in graduate school
- We are in the 21st Century–remember that! Interacting with technology is no longer a choice. In addition to the skills you are learning in a science program, learn basic computer programming
- When it's time for change, it is an opportunity to test your character and your decision-making skills. After all, what matters the most is what you ended up doing next
- Think forward, never look back

By chance, Parag Jog and Sonali Jog also visited the department that week and were able to attend the awards program, along with their son, and also briefly shared some highlights of their careers after leaving Michigan Tech. Parag and Sonali both earned their PhDs in 2005. Parag, who worked with Professor Dallas Bates, is a project management consultant with Integrated Project Management® in South San Francisco. Sonali, who worked with Professor Pushpa Murthy, is a technical support scientist with bio-techne® in Newark, California.

Alumni Updates

Ni Fan, PhD works as a postdoctoral fellow at the Cancer Center of Albert Einstein College of Medicine, New York. Her postdoctoral research focuses on new therapeutic targets identification to resolve drug resistance, and new combined treatment evaluation in lung cancer therapy. She is also involved in several clinical trials for new drug studies.

Robert Brown, MS currently works as a sustaining product engineer for the Anatomic Pathology Division of Thermo Fisher Scientific in Kalamazoo, Michigan, which manufactures products that are utilized in preparing and analyzing biopsy samples. He is responsible for the ownership of consumable product specifications and supporting processes utilized in the manufacturing of products. He also troubleshoots issues and develops new methods for manufacturing consumables to improve safety, quality, delivery, and cost.

Melanie Talaga, PhD is a tenure-track assistant professor at the College of Saint Scholastica in Duluth, Minnesota. She teaches general chemistry and biochemistry. She also has a small research lab that is driven by undergraduate students on campus. She found her passion for teaching as a graduate teaching assistant at Michigan Tech, and her teaching supervisors provided her with the tools and mentorship needed to be a successful teacher.

FROM TECH TO VASCULAR SURGEON

Sarah Carlson came to Michigan Tech as an aspiring physician and scientist.

"I knew I would get excellent training in chemistry and use that as the foundation for my future academic goals," she says.

The 2003 graduate says Michigan Tech gave her the tools to learn to think analytically and solve problems pragmatically.

Those skills were essential for her career as a vascular surgeon at Boston VA Medical Center and an assistant professor of surgery at Boston University.

"My patients often have diseases of the arteries, such as atherosclerosis (which causes blockage of the arteries) or aneurysms (weakening and dilation of the blood vessels)," she says. "Every patient has unique anatomy, but principles such as fluid dynamics, physics, and basic chemistry inform the solutions to these physiological problems."

After graduating from Tech, Carlson attended medical school and received a master's degree in clinical research from the University of Michigan. She served her residency in general surgery at Beth Israel Deaconess Medical Center. And she completed her fellowship in vascular surgery at Dartmouth in New Hampshire.

During Carlson's residency, she received two National Institutes of Health research grants for her work on omega-3 fatty acids in neurocognitive development and liver metabolism.

The Iron River, Michigan, native was back on Tech's campus last November for 5 Under 35, a Ted Talks-style program with five young alumni. She shared her story and advice with current students.

"They don't need a long list of publications or a CV that shows a lot of experience," says Carlson. "All you really need is enthusiasm, hard work, and hunger for more."

In Memoriam

Lina (Torren) Taskovich passed away June 15, 2019. Lina graduated in 1952 with a bachelor's degree in chemistry and a minor in chemical engineering. She earned her master's in chemistry from the University of Minnesota. Lina pursued a career as a research scientist, first at Stanford University and then at ALZA Corporation as a senior biochemist. She was recognized by Michigan Tech throughout the years as a member of the College of Sciences and Arts Academy and as a recipient of the Distinguished Alumni Award. A lifelong supporter of the University and member of the Dillman Society and the McNair Society, Lina provided financial support to numerous campus programs and established an endowed scholarship to assist international undergraduate students from Ecuador and Italy.

Terry Warrington, Jr. passed away May 3, 2019, in his home in Grayling, Michigan. Terry taught chemistry at Michigan Tech for 30 years. He was also swim coach and Science Olympiad advisor at Hancock High School and mentored the Gaylord swim teams. Professor Sarah Green says, "Terry was my office neighbor during my first years at Michigan Tech. What I remember most was the stream of students coming to his office hours for help with basic chemistry. I was impressed by his technique of having a student work through problems step-by-step on Terry's well-used office blackboard. Many years after Terry had retired, a former student appeared in the department chair's office, which I occupied by then, and explained how his graduation from Tech, and further career, could be traced to hours of personal attention from Terry during his first year of chemistry. I am certain that thousands of other grateful Tech alumni have the same story."

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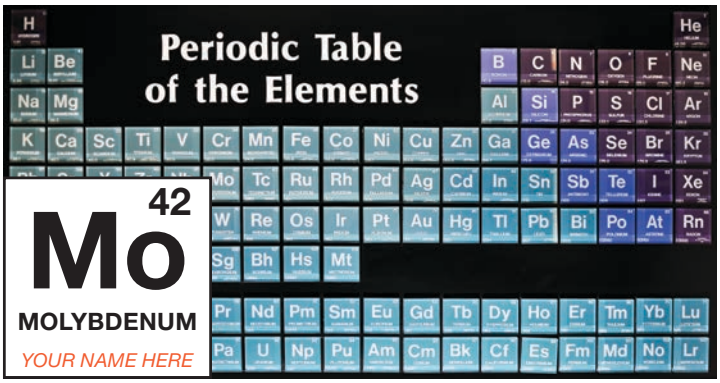
GIVING OPPORTUNITIES



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This year's featured element is Molybdenum. This chemical element does not occur naturally as a free metal on Earth, but is only found in various oxidation states in minerals. Molybdenum forms hard stable carbides in alloys and for this reason most of the world production of the element is used in steel alloys including high-strength alloys and superalloys. Molybdenum disulfide is a layered material that is a promising nanomaterial for new electronic device applications.

Visit **mtu.edu/elements** for the list of sponsored and available elements.

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