College of Science: Global Connections through Education and Research

Vikas Chandhoke  
Dean, College of Science

On behalf of the College of Science, I am very excited to present the inaugural issue of Periodic Elements, an e-newsletter created to highlight our programs and people. Twice a year, dynamic articles will feature different departments and themes and bring stories and images into focus.

In this first issue, we look at how our students and faculty are connecting with other nations to make positive contributions to global issues of disease, climate, poverty, health care, and sustainability.

In the brief history of the college, we have made amazing discoveries, welcomed some of the world’s foremost researchers and educators to our faculty, and have graduated a new generation of scientific leaders and thinkers. But we are reminded every day that the world is a small place, and technology and travel make it smaller each year.

As a result, scientific inquiry, discovery, and collaboration must happen beyond the campuses of George Mason University. By connecting with the world, we advance our research, help others, and find ways to foster global peace and security.

I hope that the stories presented in this issue will help you see how your involvement with the College of Science makes you part of the global story, as well.

Your comments and suggestions are encouraged and welcomed.

Global warming, climate change, and their effects on the planet are important areas of research. Here at Mason, scientists are gathering data to help better understand how global weather and temperature patterns are changing. But it’s a huge undertaking and one where the more eyes and ears that participate, the more accurate the results.

In October 2008, the College of Science (COS) entered into a partnership with Tsinghua University and China’s Ministry of Water Resources (MWR) to form the Environmental Science and Technology Center (ESTC). The Center’s joint U.S.-China mission is to focus on the fields of global environmental and climate monitoring, global carbon measuring, flood forecasting and defense, water resources management, ecological protection and restoration, and Earth observations.

“Our partnership allows us to monitor larger areas of the planet,” says COS professor and ESTC researcher Xianjun Hao. Mason has access to satellite meteorological data, and scientists at Tsinghua provide extensive field data. The two data sets provide a comprehensive view of particular areas. Hao explains, “It’s essential to have data that cover long periods of time. That type of field research is difficult for us to do. Our partnership with China helps us as they have more researchers and government funding for extensive data collection.”

Issues of weather and climate are important as they can help countries monitor precipitation and measure the size and expansion of wetlands and deserts over many seasons. This continuous data stream helps researchers predict potential areas of drought that can impact crops and livestock, as well as predict areas susceptible to fire.

Mason plans to host a workshop with scientists from Nanjing Hydraulic Research Institute later this fall. For more information on the Center and to keep an eye on upcoming events, visit online at http://estc.gmu.edu.
Alessandra Luchini was working on her doctorate in her native country of Italy in 2005 when she heard about a pioneering research program between Mason and the Instituto Superiore di Sanità in Rome that focused on the application of proteomics to clinical needs in cancer. She applied for a program fellowship and became part of the first team of Italian scientists to travel to Mason to study and collaborate with CAPMM scientists.

Luchini’s excitement about the potential of proteomics — the study of the structure and function of proteins in cells and how they interact — quickly sealed her decision to stay in the United States when an opportunity to join the Mason faculty became available in fall 2007.

Earlier this year, Luchini captured the inaugural Premio Award for the top Italian woman scientist in North America, an honor bestowed by Bridges to Italy, an international business association, and the Italian Women Inventors and Innovators Network. She was voted the winner from a pool of more than 40 Italian women scientists working in the fields of life sciences, nanotechnology, or alternative energy and the environment.

Luchini was honored for her contributions to the development of smart hydrogel nanoparticles that mix with a patient’s blood or urine sample to identify molecules that signal the presence of a tumor.

“My invention is a technology that relates to the war against cancer,” Luchini explains. “We all have relatives or friends suffering from the disease. It is recognized that early diagnosis can save lives, so it is important to detect cancer when it is a small lesion and prior to metastasis.”

The nanoparticles are being used to identify biomarkers for cancer and other diseases, and their potential use in a urine-based anti-doping test to detect human growth hormone also is under study. Ceres Nanosciences LLLP, a Virginia-based biotechnology company, has commercialized the invention as the Nanotrap™.

“I really hope to bring the results of my research to benefit patients,” she says. “My goal is to continue my laboratory work and continue to work in close collaboration with physicians to help them better face the challenges of personalized medicine.”

The Premio award was a great opportunity to shed some light on research efforts at Mason in the field of nanotechnology applied to proteomics, notes Luchini. “I was very proud to represent our extraordinary group of fellows and researchers and tell people about the accomplishments we obtained together.”

Luchini also understands how important it is that women’s roles in research are recognized and celebrated. “I’ve met strong women in research who have been role models for me,” she says, “so I am honored when young women approach me and ask for help.”

Outside of her lab, Luchini enjoys classical music and attending concerts and art exhibitions. “Being Italian, I also love to cook and enjoy food and wine,” she says. “All, of course, in the company of good friends.”

Luchini is Mason’s own Italian Renaissance master: She combines an intense interest in scientific discovery with a passion for arts and life.
Making a World of Difference One Student and One Scientist at a Time

Students and scientists interested in conservation know that the world is a classroom. This is especially true here in Virginia where Mason students and faculty working alongside researchers from the Smithsonian Institution’s National Zoological Park come together in Front Royal to learn about conservation.

The zoo’s 3,200-acre Conservation and Research Center (CRC), nestled in the mountains next to the Shenandoah National Park, is home to a variety of endangered species from around the world. CRC also houses a unique semester-long residential program for students interested in conservation and biodiversity. Part of a unique partnership between the university and the Smithsonian, the program is offered through the Mason Center for Conservation Studies (MCCS).

The program is like a study abroad semester, says Chris Jones, MCCS director and College of Science (COS) professor. Although the program is available to both undergraduate and graduate students in major, Jones adds that most students are biology majors or conservationists who are interested in learning how people affect the world’s habit.

In this hands-on learning environment, students study with Mason professors and renowned research scientists and conservationists from around the world in a community designed to provide an unprecedented education in conservation studies. Undergraduates take five courses, and two- to three-week courses are available for graduate students and other professionals interested in earning a graduate certificate.

Field research opportunities take students to many corners of the world. Mason doctoral students are studying big cats in India, and other students are at research sites in Gabon and Peru. Closer to home, students were on birth watch last spring at CRC when a clouded leopard delivered two cubs. CRC also has received funding from the U.S. Fish and Wildlife Service to establish a captive population of the Virginia big-eared bat to study white nose syndrome, a disease that is killing native bat populations.

“This is a comprehensive hands-on program,” says Jones. “Students completing the semester have taken their experiences directly into the field and are making a difference in conservation.”

MCCS currently is accepting applications for spring enrollment. More information is available at http://mccs.gmu.edu/.

U.S.-Italy Collaboration, from page 2

the United States and Italy through training and mentoring young Italian scientists in new technologies and biomedical translational research. To date, 22 post-doctoral Italian scientists have been trained in CAPMM labs, and technologies developed in the labs have been transferred to Italy for key platforms that support future Italian research.

In addition, 12 patent applications have been filed, and intellectual property has been licensed to two biotechnology companies founded on the groundbreaking research.

ISS, the primary scientific arm of the Italian National Health Service, is one of the most prestigious health institutions in Europe and comprises a large number of high-profile cancer research centers that participate in the oncoproteomics program. Working with CAPMM scientists, a network of 17 ISS centers and university hospitals have established the National Serum Bank, a world-class biospecimen repository for cancer research that will serve as an international resource. The bank has collected approximately 5,000 serum and tissue samples from a variety of tumors, representing 50 percent of the program goal for specimen collection.

“Our research, as well as that of scientists around the world, will be enhanced by access to priceless, large clinical data sets of tissue and blood,” Petricoin says.

The most ambitious goal of this unique international collaboration — testing novel diagnostic and therapeutic strategies in clinical research trials — is being realized through trials in breast cancer, colorectal cancer, multiple myeloma, and general cancer tumor studies. The trials currently are implemented in partnership with physicians at Inova Fairfax Hospital Cancer Center and Fairfax-Northern Virginia Hematology Oncology.

“We are very proud of this collaboration,” says ISS president Enrico Garaci. “This kind of agreement usually means a long wait for results, but we already see results. It represents strong cooperation between Italy and the United States.”

– Patty Snellings
New Science Leadership Scholarship Program

The Science Leadership Scholarship and Leadership Seminars established during the 2008-2009 academic year through a gift from College of Science (COS) Advisory Board member Heather Burns aims to assist COS students who show leadership potential, high academic performance, and financial need.

The scholarship, established by Burns after she retired from a 30-year career as a business leader, covers tuition and living expenses for one academic year. In addition to the monetary gift, students attend a series of seminars designed to develop their leadership skills. Recipients also meet regularly with a faculty mentor who provides academic and career advice.

“I am excited by the chance to work with such remarkable young leaders,” Burns says. “I want to give these students the help that will allow them to move on to achieve their dreams of improving the lives of others.”

While the scholarships are available to men and women, seven of the eight recipients in this first year were women. It was also a diverse group, with recipients coming from six different countries.

Burns says these students are very serious about their education. “They have a lot of demands on their time, but they are very focused on using their education to make a difference in the world.”

Science Leadership Scholarship Helps a Life That Will Help Others

Syeda Mansur, BS Biology ’09, knew from an early age that she would work in medicine. As a child, the Bangladeshi native traveled around the world with her mother, a doctor who worked for a Swiss nonprofit agency. Mansur often went to work with her mother and was impressed by her compassion for her patients. “I’m glad that I was able to witness this type of patient-physician relationship,” says Mansur. “I don’t think I would have gone into this if I hadn’t witnessed [those relationships].”

To get from that moment to graduating from Mason was a long road.

When she was 12, Mansur’s family planned to move to the United States. But on the eve of their departure, her father had a stroke. Mansur’s mother made the decision to send her on to the United States, placing her in the legal custody of her brother. Mansur never saw her father again; he died after three years of ill health.

When Dr. Mansur eventually joined her daughter, glaucoma had badly deteriorated her eyesight, preventing her from practicing medicine. At age 19, Mansur took on the responsibility of providing for herself and her mother and found work in a hospital as a patient transporter. She later worked as a patient care technician in a cardiovascular intensive care unit and as an emergency room registrar.

After witnessing her grandmother’s suffering through terminal cancer three years ago, Mansur decided it was time to make changes in her life and refocus on her education. She enrolled at Mason as a biology major but then faced tuition payments and a family to feed. In a short time, she racked up nearly $15,000 in living expenses on her credit cards.

When Mansur received the Science Leadership Scholarship last year, it was, in her words, “a lifesaver.” She was a perfect candidate for the scholarship.

In addition to her life as a student, mother, and breadwinner, Mansur founded the Ya-Waris Foundation, which raises and distributes funds to improve socioeconomic conditions in developing nations. Among its programs, the foundation aims to assist at least one family per year to rise above the poverty level. This year, the foundation paid living and tuition expenses for a Bangladeshi family with just $700. The parents received vital job training, and their 10-year-old son was able to attend school.

“You may think that I myself am in need, how am I doing this?” she reflects. “But the amount to make a difference there is quite small. It’s doable.”

Mansur’s goal is to eventually establish free clinics through Ya-Waris. But first, she is focusing on the next step in her academic career — medical school, and hopes to choose a school this fall.

– Corey Jenkins Schaut, MPA ’07

Syeda Mansur
Every summer, hundreds of professionals and students in the field of geoinformatics gather to discuss current trends in the field, hear about the latest research, and network with other professionals at the International Conference on Geoinformatics. This year, George Mason University played host from August 12-14, and was officially placed “on the international map as the frontrunner in geoinformatics research and education,” says conference chair Liping Di, director of the Center for Spatial Information Science and Systems (CSISS).

Organized by Di, Aijuen Chen, and other CSISS scientists, the conference drew more than 300 professionals and students from 34 countries and regions.

“The selection of Mason as the conference site means that the university has been recognized as one of the important players in the research and education of geoinformatics and geoinformation science in the world,” Di says. “The selection also provided Mason an opportunity to introduce itself to professionals and students from all over the world.”

“Mason researchers benefitted from exchanging their ideas with their peers,” Di says. “The conference also provided a great opportunity for Mason graduate students. Many from the Department of Geography and Geoinformation Science and the Department of Computer Science made their first professional presentations and did so before some of the best-known researchers in the geoinformatical field.”


Speakers prepare to open the 2009 International Geoinformatics Conference.

Mason Hosts 2009 International Geoinformatics Conference

COS Facts and Figures (Fall 2009)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total enrollment</td>
<td>2,965</td>
</tr>
<tr>
<td>Average age</td>
<td>27</td>
</tr>
<tr>
<td>Women</td>
<td>53%</td>
</tr>
<tr>
<td>Full-time instructional faculty</td>
<td>179</td>
</tr>
<tr>
<td>Full-time research faculty</td>
<td>94</td>
</tr>
<tr>
<td>Part-time faculty</td>
<td>75</td>
</tr>
<tr>
<td>Graduate assistants</td>
<td>136</td>
</tr>
<tr>
<td>Women</td>
<td>30%</td>
</tr>
<tr>
<td>28% of students and 44% of faculty members are from diverse ethnic backgrounds</td>
<td></td>
</tr>
<tr>
<td>Degree programs offered</td>
<td>40</td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>15</td>
</tr>
<tr>
<td>Master’s</td>
<td>10</td>
</tr>
<tr>
<td>Accelerated BS/MS</td>
<td>4</td>
</tr>
<tr>
<td>Doctoral</td>
<td>11</td>
</tr>
<tr>
<td>Annual research expenditures</td>
<td>$36 million</td>
</tr>
<tr>
<td>Nearly 200 research sponsors over the past decade</td>
<td></td>
</tr>
</tbody>
</table>
NanoNotes

Elements of distinction about the College of Science, its faculty, staff, and students.

George Mason University/College of Science, has been accepted as a member of the prestigious University Corporation for Atmospheric Research (UCAR), a consortium of North American universities and other nonprofit corporations dedicated to promoting an understanding of atmospheric and related sciences. The eight-year renewable membership offer was based on a comprehensive site visit and other stringent criteria, including an integrated program of academic studies and research at the doctoral level; demonstration of significant faculty research in the atmospheric sciences; and a commitment to participation in UCAR activities.

Stephen Harlan, Atmospheric, Oceanic and Earth Sciences, is serving as a program director in the Deep Earth Processes Section of the Geosciences Directorate of the National Science Foundation.

Jim Kinter, Atmospheric, Oceanic and Earth Sciences, was elected a fellow of the American Meteorological Society.

Susie Crate, Environmental Science and Policy, and two graduate students received the International Award for Excellence in the area of Climate Change: Impacts and Responses. The award was presented to them by Common Ground Publishing for their paper titled “Social Capital as a Source of Adaptive Capacity to Climate Change in Developing Countries.” Crate and the students were also invited to present a plenary session at the second International Conference on Climate Change: Impacts and Responses, which will be held at the University of Queensland in Australia in July 2010, when the award will be formally presented.

Nicole Darnall, Environmental Science and Policy, was named the 2010 Erasmus Mundus International Scholar by the European Commission’s Erasmus Mundus Programme in Environmental Sciences, Policy and Management. The award will fund her research at the International Institute for Industrial Environmental Economics at Lund University in Sweden and Central European University in Budapest.

Dann Sklarew, Environmental Science and Policy, was appointed a Virginia representative to the Interstate Commission on the Potomac River Basin by Gov. Timothy Kaine. Sklarew also serves as Virginia’s academic representative to the Climate, Energy and Environmental Policy Committee of the Metropolitan Washington Council of Governments.

Cynthia Smith, Dann Sklarew, R. Christian Jones and Robert Johnson, Environmental Science and Policy, were among the leaders of a watershed stewardship workshop for sixth grade science teachers, the first part of a Mason-led partnership to provide significant watershed educational experiences to more than 16,000 students in Prince William County schools.

Monique van Hoek, Molecular and Microbiology, and two of her graduate students published “Francisella novicida Forms In Vitro Biofilms Mediated by an Orphan Response Regulator” in the online edition of Microbial Ecology.

Jessica Rosenberg, Physics and Astronomy, received a National Science Foundation CAREER Award. The $869,000 award will support her galaxy research.

Michael Summers, Physics and Astronomy, serves on the newly created Suborbital Applications Researchers Group, a coordination and advisory committee of the Commercial Spaceflight Federation, dedicated to furthering the research and education potential of suborbital reusable launch vehicles under development by the commercial spaceflight sector.

Teachers teaching teachers. Dann Sklarew (far left), Environmental Science and Policy, tours a wetland at the Occoquan Bay National Wildlife Refuge with a group of Prince William County science teachers.

Faculty and staff are encouraged to send their NanoNotes to cosnews@gmu.edu.
In Memoriam: Klaus Fischer, Chair, Department of Mathematical Sciences

This summer, the College of Science said a sad goodbye to Klaus Fischer, longtime friend, professor, and chair of the Department of Mathematical Sciences. Fischer died on July 2 from respiratory failure associated with amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig’s Disease. He was 65.

A member of the Mason faculty since 1973, Fischer was a man of many passions: champion of mathematics education; avid sports enthusiast; music; and carpentry.

Those close to him say one of his most significant contributions was that he always saw the lighter side of darker events and provided comic relief at needed times.

Fischer is survived by his wife of 34 years, Eva Thorp; their son, Eric; and daughter and son-in-law, Kathryn and Juan de Chamie.

– Patty Snellings

Jagadish Shukla

Jagadish Shukla, Distinguished University Professor in the Department of Atmospheric, Oceanic and Earth Sciences and the 2009 Celebration of Scholarship honoree in the College of Science, recently discussed “Global Warming: Science, Adaptation and Mitigation” in the first Vision Series lecture of the academic year. He presented conclusive evidence that global warming is real; unveiled projected climate changes and their implications in the 21st century; and discussed potential responses from individuals, institutions, and governments to the consequences.

An internationally recognized meteorological expert, Shukla is a recipient of the highest honors in his profession conferred by the World Meteorological organization, the American Meteorological Society, and the Indian Meteorological Society. He was a lead author of the Intergovernmental Panel on Climate Change report — the co-recipient of the 2007 Nobel Peace Prize, and he was appointed to the Virginia Commission on Climate Change by Gov. Timothy Kaine.

– Patty Snellings

Climate change studies indicate:

• The last two decades of the 20th century were the hottest in 400 years.
• An increase in extreme weather events — such as wildfires, heat waves, and strong tropical storms — may be attributed to climate change.
• In the Northern Hemisphere, thaws come a week earlier in spring and freezes begin a week later than they did in 1910.
• Since 1979, more than 20% of the Polar Ice Cap has melted because of warmer surface air and ocean temperatures.