



WPI

Arts & Sciences

NEWS AND EVENTS

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Dean's Message: Science for a Democratic Practice

When asked, "Why invest in the social sciences and humanities especially at institutions like WPI?" we should consider the sentiments of our founding citizen scientists Benjamin Franklin, Thomas Jefferson, and John Adams. Each of these patriots connected science to the needs of a nation. These leaders recognized that science was an important factor in the growth of our nation and that science would help solve the vexing problems of a young America, especially if scientific inquiry was connected to the daily lives and struggles of individuals. Over two hundred years later, our obligation at WPI is to give every citizen the opportunity to become a citizen scientist and a science-minded humanist who can fully participate in our democratic process. Citizen scientists give others a peek into what scientists do from the access point of "informal learning." Science as practiced by citizen scientists demands evidence, helps explain and predict, and is not authoritarian but uses information and evidence. Citizen scientists also learn of the power of scientific data, how evidence is mounted to form both theory and policy, and the limitations of science. After all, science does not answer all questions.

We need to ask, "What would happen to our nation's problem-solving abilities and ability to draw validity in statements based on evidence without science-minded citizens? Without these individuals who participate in all walks of life, what



happens to our ability to reason and examine the scientific claims that serve as a platform for policy decisions, particularly during this politically charged time of the year?" It has become increasingly clear during this election cycle that our ability to deploy science credibly and to generate scientific inquiry must be understood by all citizens, and is a basic element to upholding a democracy for and by the people.

“Bootstrap” Computer Science Curriculum Championed by White House



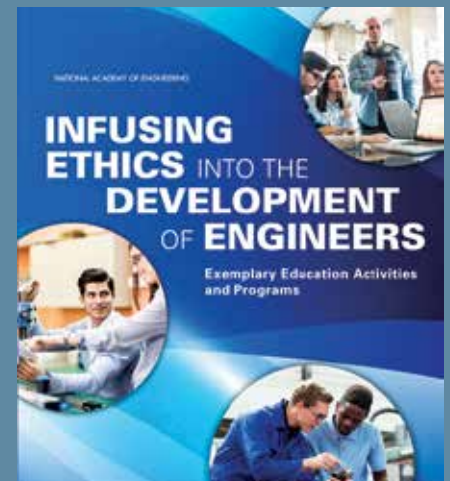
A computer science curriculum, developed in part by faculty at WPI and Brown University, will support a new White House initiative to bring computer science education to students across the country. “Bootstrap,” a middle- and high school curriculum in which students learn key concepts in computer programming and algebra in the process of creating their own video games, was co-founded by Kathi Fisler, professor of computer science. In January, President Barack Obama announced his Computer Science for All initiative, a \$4 billion plan that aims to give U.S. schoolchildren the computer science skills needed for jobs in the new economy. Bootstrap, which already reaches over 10,000 students from 17 states per year, is one of several nationally-established programs participating in the effort. In

July, Bootstrap will partner with two other computer science education programs, “Exploring Computer Science” and “CS: Principles,” to offer CSPdWeek, a professional development workshop for 300 teachers from across the country. The organizers hope the intensive five-day workshop—the first of its kind—could ultimately help bring high-quality computer science education to as many as 10,000 students nationwide in the coming year.

Because the Bootstrap pedagogy is familiar to math teachers—it uses a step-by-step approach to solving word problems, albeit in the context of programming a simple video game—it’s “a gentle introduction to computing for math teachers, who already exist in every school,” says Fisler. The Bootstrap curriculum starts with a training module that is appropriate for math teachers who have no prior computing background, and eases them into computing, at their own pace, while leveraging their deep experience as teachers.

Humanities & Arts Course Gains Recognition

An interdisciplinary, project-based course for WPI students has been recognized by the National Academy of Engineering as an exemplary engineering ethics activity. The course, “Humanitarian Engineering Past and Present: A Role-playing First-year Course,” was one of 25 engineering ethics activities highlighted as exemplary in their approach to infusing ethics into the development of engineering students. The engineering ethics course was first developed by Kristin Boudreau, professor of humanities and arts, Laura Robinson, Gordon Library research librarian, and two HUA Inquiry Seminars. The course was later further developed (with significant historical and engineering content) by the following faculty: Curtis Abel (Undergraduate Studies), Joseph Cullon (HUA), Paul Kirby (HUA), Leslie Dodson (HUA/Social Science & Policy Studies), John Sullivan (Mechanical Engineering), David DiBiasio (Chemical Engineering), John Bergendahl (Civil Engineering), and Glenn Gaudette (Biomedical Engineering).



Vidali Receives Fulbright



Luis Vidali, associate professor of biology and biotechnology, has received a Fulbright Senior Scholar award to conduct research at the Universidad Politécnica de Madrid. His research, Dynamic Analysis of Signaling and Metals in Plant-bacteria Interactions Using the Moss *Physcomitrella patens* as a Simple Model System, will be conducted during the 2016–17 academic year. The program of the U.S. Department of State, Bureau of Educational and Cultural Affairs, provides teaching and/or research grants to U.S. faculty and experienced professionals in a wide variety of academic and professional fields.

BBC Features WPI Rare Earth Metals Recovery Research

BBC World television series *Horizons* recently showcased assistant professor of chemistry Marion Emmert in a segment on how she and her students extract rare earth metals from drive units and motors, a technology applicable to the recycling of electric cars, HD drives, and wind turbines.

The entire procedure—including shredding and demagnetizing the motors and separating the rare earth metals with a two-step chemical process—typically takes about two days. However, by using previously prepared solutions, Emmert was able to take the BBC crew through the entire process, discussing the science behind each step. The resulting episode about the circular economy has aired on May 21, 2016 as part of the seventh season of *Horizons* on BBC World News.



Forgeng Recognized for Scholarship of European Martial Arts



Jeffrey Forgeng, adjunct professor of humanities and arts, received a Lifetime Achievement Award from Historical European Martial Arts (HEMA) for his work “to make European arms and armor accessible to the North American public.” Forgeng is Curator of Arms & Armor and Medieval Art at the Worcester Art Museum. His dual post in Worcester began 16 years ago as a collaboration between WPI and the 83-year-old Higgins Armory Museum, which closed its doors at the end of 2013. He subsequently supervised the transfer of the museum’s world-renowned collection to the Worcester Art Museum.

Scarlata Elected President of the Biophysical Society



Suzanne Scarlata, the inaugural Richard T. Whitcomb Professor of Biochemistry, recently assumed the presidency of the Biophysical Society. Founded in 1958 to encourage the development and dissemination of knowledge in biophysics, the society has more than 9,000 members worldwide. Scarlata, who joined the WPI faculty in the fall of 2015, has been a member of the society for more than 30 years and has served the organization in a number of roles. During her presidency, she will pursue a number of initiatives, with a particular focus on issues related to federal funding for research in biophysics, a field that uses the techniques of mathematics and physics to gain new insights into living organisms and systems.



Esther Boucher-Yip

Associate Teaching Professor in Humanities and Arts

Esther Boucher-Yip has been promoted to associate teaching professor in humanities and arts. She joined the WPI faculty in 2012, having taught English at all levels in many parts of the world. In addition to researching and teaching in the field of English as a Second Language, she conducts research on minority language maintenance, in particular how language policies affect language use in indigenous communities.



Drew Brodeur

Associate Teaching Professor of Chemistry and Biochemistry

Drew Brodeur has been promoted to associate teaching professor of chemistry and biochemistry. He became an assistant teaching professor at WPI in 2011. With research interests in inorganic chemistry, environmental issues, renewable energy sources and solar energy, and pollutant remediation, he has advised undergraduate projects on the adhesion strength of silver nanoparticles to carbon substrates and the remediation of triclosan levels in drinking water supplies, among other topics.



Frank Dick

Associate Teaching Professor of Physics

Frank Dick has been promoted to associate teaching professor of physics. He earned his PhD in physics at WPI in 2007, following 20 years of professional work in the field of computing, and then joined the WPI faculty. With research interests in particle physics, gravity, and astrophysics, he has developed new courses in astrophysics, refined the first-year laboratory program in physics, and is a contributor to WPI's new Nuclear Science and Engineering program and its Master of Science program for physics educators.



Jennifer McWeeny

Associate Professor of Philosophy in Humanities and Arts

Jennifer McWeeny, associate professor of philosophy in humanities and arts, has been granted tenure. She joined WPI in 2012 after eight years of full-time teaching at John Carroll University. With research interests in epistemology, continental philosophy, and feminist philosophy, she is past executive secretary of the Society for Women in Philosophy and co-author of the 2014 book *Asian and Feminist Philosophies in Dialogue: Liberating Traditions* (Columbia University Press).



David Medich

Associate Professor of Physics

David Medich has been granted tenure and promoted to associate professor of physics. Before joining the WPI faculty in 2012, he was director of the Radioactive Materials Program and director of radiation safety at the University of Massachusetts Lowell. A researcher in the area of health physics, he conducts work on diagnostic and therapeutic medical physics, including functional neutron imaging and intensity-modulated brachytherapy dosimetry.

The Arts & Sciences Advisory Board welcomes two new members

Ron Cortese '81 is IT program director for the Office of the Director of National Intelligence (ODNI). He has worked as an IT consultant for more than 30 years, providing consulting services in software strategy, design, development and implementation. In addition to his career in IT, he is founder and president of Legends Sports Leagues Inc. He received his BS in computer science from WPI and his MBA from George Washington University.

Michael Wallent '91 works at Microsoft in Redmond, Wash., and is a director of program management in the Cloud + Enterprise division. His team develops services to help companies manage employee use of mobile devices. He joined Microsoft in 1996 and worked on Internet Explorer, Windows, and Windows Server. In 2001, he testified in front of Congress (commerce subcommittee) for Microsoft regarding Internet privacy issues. He graduated from WPI with a BS in computer science.

The Life Sciences Advisory Board welcomes two new members

Anthony Carruthers is dean of the Graduate School of Biomedical Sciences at the UMass Medical School. Dean Carruthers oversees a student body of 380 doctoral students and works with a graduate school faculty of 380 researchers to coordinate student recruitment, curriculum, research training, career preparation and graduation across 11 PhD programs. Dean Carruthers received his BSc degree from the University of Manchester, U.K. and his PhD in cellular physiology from King's College, London. He received a Wellcome Trust Travel Award and a NATO Overseas Postdoctoral Fellowship to perform postdoctoral work at UMass Medical Center.

Kimberly Warren is a portfolio director at MITRE. She leads MITRE's strategy to identify, shape, accelerate, and implement research, development, and critical program work for the Department of Health and Human Services. She earned her BS in computer science from Syracuse University and her MSc in artificial intelligence from Edinburgh University, Scotland.



Alexander Smith

Associate Professor of Social Science & Policy Studies

Alexander Smith has been granted tenure and promoted to associate professor of social science & policy studies. The director of WPI's Experimental Economics Laboratory, he conducts research on altruism, trust, cooperation, and honesty, with a particular focus on how behavior relates to beliefs about the actions of others and how psychology can be used for promoting pro-social behavior.



Suzanne Weekes

Professor of Mathematical Sciences

Suzanne Weekes has been promoted to professor of mathematical sciences. She joined the WPI faculty in 1998 after serving as a visiting assistant professor at Texas A&M University. She has conducted research in areas such as numerical methods for wave motion through dynamic materials, flow through porous media, and the modeling of tumor growth. She is also co-director of the Mathematical Sciences Research Institute Undergraduate Program (MSRI-UP) in Berkeley, Calif., a program that aims to increase the number of students from underrepresented groups in mathematics graduate programs.

RESEARCH SNAPSHOTS

Undergraduate Research on Soil-Dwelling Viruses



Under the guidance of Michael Buckholt, associate teaching professor of biology and biotechnology, WPI undergraduates are participating in a national program led by the Howard Hughes Medical Institute that seeks to enhance life sciences education while also crowd-sourcing the discovery and characterization of viruses that attack bacteria. The program is called SEA-PHAGES, which stands for Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science. Phages, short for bacteriophages, are viruses that infect bacteria. While they are the most abundant organisms on the planet and likely play important roles in global ecology, the vast majority of phages have never been isolated or analyzed. To close that knowledge gap, SEA-PHAGES enlists thousands of undergraduates at more than 100 colleges and universities to become phage hunters and contribute their findings to a shared database for study. The SEA-PHAGES program includes two undergraduate courses: a discovery phase where students collect soil samples and then use a variety of techniques to search for phages that infect the bacterium *Mycobacterium smegmatis*, and a second phase that focuses on analyzing the phages discovered during the discovery phase, sequencing their genomes, and comparing them to the phages in the growing SEA-PHAGE database. If students isolate a novel phage, they get to name the strain and it will be added to the global database for teams of scientists around the world to use. Since 2008, students in the SEA-PHAGES program have isolated and characterized nearly 800 novel phages that infect *Mycobacterium smegmatis*.

Humanoid Robot Finds Home at WPI

The humanoid Atlas robot known as WARNER now has a permanent home at WPI's Humanoid Robotics Laboratory (WHRL), where it will continue to provide research opportunities for students, faculty, and staff. The \$2 million robot (nicknamed WARNER for WPI's Atlas Robot for Nonconventional Emergency Response), was donated by the US Defense Advanced Research Projects Agency (DARPA). WARNER had been on loan to WPI from DARPA for the past two years while student and faculty teams competed in the DARPA Robotics Challenge. WHRL students and faculty will use the Atlas robot, built by Boston Dynamics, for continued research into advanced manipulation, mobility, perception, and interfaces.



Using Video Games to Promote Systems Thinking Skills

Oleg Pavlov, associate professor, and Yoon Jeon Kim, research scientist, both in the Social Science and Policy Studies Department, have received a Spencer Foundation research grant for "A Game-based Pedagogical Framework for Promoting Systems Thinking Skills." Under this grant, they will develop Game-based Structural Debriefing, a pedagogical innovation to help teachers cultivate systems thinking skills by introducing video games into the classroom. Their initial framework is based on the literature of systems thinking and system dynamics modeling. In collaboration with local science teachers and a nonprofit called Creative Learning Exchange, they will use the design-based research method to refine the framework and investigate its efficacy.

Infectious Disease Research



Reeta Rao, associate professor of biology and biotechnology, is co-principal investigator on a multi-million dollar, multi-institution National Institutes of Health grant recently awarded to the Broad Institute Genomic Center for Infectious Diseases, a collaborative program that targets high-priority viral, bacterial, fungal, and parasitic pathogens that have a major impact on the global burden of disease. The overall aims of the grant are to understand the molecular basis of evolution and the spread of infectious diseases, the genomic basis for pathogen traits, host-pathogen interactions, and metagenomic approaches to identify new infectious agents. Her component of the grant involves eight principal investigators from six institutions (Broad, Brown University, Duke University, Pennsylvania State University, the University of British Columbia, and WPI) and will focus on the genetic basis of virulence for clinical populations of fungal pathogen and host-pathogen networks of immune cell response to *Candida*.



First Large-scale Interlaboratory Study in Synthetic Biology

Published in March, the article "Reproducibility of Florescent Expression from Engineering Biological Constructs in *E. coli*" presents results of the first large-scale interlaboratory study carried out in synthetic biology, conducted as part of the 2014 and 2015 International Genetically Engineered Machine (iGEM) competitions. WPI students who authored the article include Jacob Beal, Traci Haddock-Angelli, Markus Gershater, Kim de Mora, Meagan Lizarazo, Jim Hollenhorst, Randy Rettbuerg along with iGEM Interlab Study Coordinators. The article appeared in PLOS ONE, the first interdisciplinary open access journal.



Students Find Success with Video Game at MassDIGI

The WPI student collective known as Broken Door Studios won the grand prize at the annual Massachusetts Digital Games Institute Game Challenge with their game, Intern Astronaut (IA). IA players take the role of an inexperienced intern thrust into the position of piloting a spaceship with only commands from mission control as guidance. The commands appear on the player's monitor, which is reconfigured every game, making each playing experience a new one and catapulting the user into the mindset of the untrained protagonist. Broken Door Studio is made up of students Sean Halloran, Yingying Chen, Shane Stenson, Kedong Ma, and Jake Hawes.



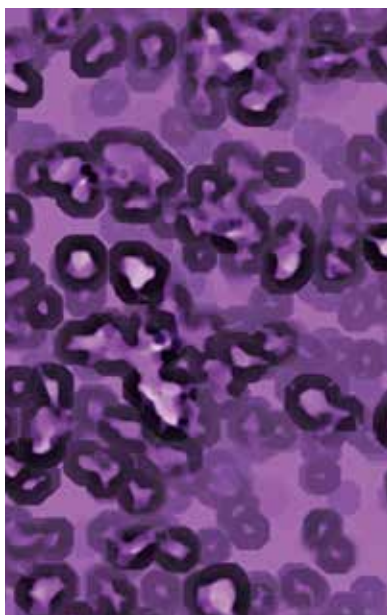
Fishackathon Creates Apps for Fishing Industry



In late April WPI hosted students from across New England for Fishackathon, a two-day problem-solving marathon that sought to create cutting-edge solutions to challenges facing the world's fishing industry. The international annual event uses teams of coding and fishery experts—including developers, designers, and project managers—at 43 sites around the world to innovate new applications for mobile devices to help the fishing industry work smarter and more safely while helping protect the world's oceans. Participants in this year's event were asked to devise a solution for one of nine problems related to fish identification and tracking, monitoring systems for lost fishing gear, fishing vessel data, and compliance with marine laws and regulations. The Fishackathon culminated with teams presenting their solutions to an expert panel of judges. The WPI Fishackathon's winning app tackled the enormous task of tracking fishing vessels through SUSHEE, an Android and web application designed to provide law enforcement officials with centralized access to data about fishing vessels. SUSHEE (Scraping Unsearchable Sources to Halt Environmental Exploitation) was inspired by the chaotic state of fishing vessel data across dozens of databases. WPI's Fishackathon winner will be submitted to the global competition, which will award a top cash prize of \$10,000 when a winner is announced by the State Department on June 8, World Oceans Day.

Cell Signaling, Biophysics and Live Cell Imaging

Suzanne Scarlata, professor of chemistry and biochemistry, has received an award from the Icahn School of Medicine at Mount Sinai to continue studying cell signaling, biophysics, and live cell imaging. Under this grant, center investigators work in a trans-disciplinary style to study pathophysiological processes and drug action. The expertise of investigators will be used to help develop and publish approaches that provide a mechanistic understanding of how molecular interactions within regulatory networks result in tissue and organ behavior and how this information can be used to predict new drug targets, repurpose existing drugs, and predict adverse events in the context of genomic and epigenomic characteristics.



Alumni Spotlight: Jim DeCarlo, Intellectual Property Lawyer



James ("Jim") DeCarlo '80 is an intellectual property shareholder at Greenberg Traurig, one of the world's largest law firms. He is a registered patent attorney with a focus on intellectual property litigation and the procurement and protection of patents for technology companies of all sizes, from start-ups to established public companies. We recently asked Jim to reflect on his time at WPI and to provide some advice to students and graduates interested in the law.

What led you from WPI to a career in intellectual property law?

A career in the law wasn't on my radar at all during my time at WPI. My father-in-law, Herb Kaplain, was an attorney; our frequent conversations about his work as a trial lawyer, and his advice about how my engineering degree could open the door to becoming a patent lawyer (and give me a portable career) sparked my interest, but I never felt the time was right to make such a radical career shift. When he passed away at a young age, our final conversations concerning the opportunities he knew he would be missing were the catalyst that finally pushed me to overcome my reticence. I enrolled in law school at night and while half-way through, after 10 years at AT&T, I left a branch manager position for a job at a small boutique intellectual property firm in New York founded by my patent law professor, Mike Cohen. I took a pretty serious cut in pay and started at the bottom as a law clerk but was fortunate to be trained by excellent partners. Eventually, I outgrew the boutique firm and moved to a mid-size Wall Street firm, where I became a partner. In 2005, I moved to Greenberg Traurig, where I am now a principal shareholder.

What advice can you give students and graduates who are contemplating a law career?

Having an engineering or science degree is a major asset that can set you apart as a law student and open the door to a career in patent law. I tell all students considering a law career to not only focus on their major area of study but to also take electives that will help them become a better writer and public speaker. The written and spoken word is your currency as an attorney. The ability to write in crisp and precise prose and to be a compelling speaker will serve you well both in law school and in your subsequent legal career.

In what ways can alumni with established careers help WPI and its students?

I highly recommend making yourself available to students and sharing your experiences, good and bad. Everyone who has gone through WPI is a valuable resource to those still attending or just starting out. I try to attend WPI Project Center events as often as possible, and I'm working with WPI's entrepreneurship programs to educate entrepreneurs of all stripes on intellectual property issues. I also try to act as a personal ambassador every chance I get when I hear a colleague or acquaintance mention that they have a child interested in engineering. WPI during the time of the original Plan was a unique educational experience for me – I can honestly say I would not be where I am without it. I share that view at every opportunity!



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