

SPRING 2013

THE DISRUPTOR ISSUE



PROFESSIONAL EDUCATION



NEWSLETTER

IN BRIEF

Advanced Study Program

During the past year ASP has grown internationally with over 100 Fellows from more than 19 countries. Students from Brazil, China, Russia, Sweden, and India enjoyed special lunchtime seminars with MIT Faculty and networking dinners. ASP was pleased to have representatives from a wide range of organizations including Samsung Electronics, the United States Air Force, Tektronix, GE, Federal Reserve Bank of Boston, Johnson & Johnson, and more.

International Programs

We share the Institute's mission to advance knowledge and educate adult learners in engineering, science, and technology to best serve the world. As we continue to expand our global presence and commitment to educating professionals around the world, we celebrate recent offerings that allowed us to connect with industry leaders, academics, and alumni in Bogota, Milan, Rome, and Santiago de Chile.

Short Programs

Join MIT faculty in advancing your knowledge and career by taking a short course. Registration for our 64th summer season is still open, but June courses will be closing soon. There are ten new courses, most of which include laboratory exercises and/or group work: you can build a radar, program a robot, develop a game prototype, design novel ideas for viewing and engagement around Social TV, explore strategies for effective negotiation in scientific and technical fields, use modeling to test new materials, or learn to think like a designer to create phenomenal products or services.

DEAR FRIENDS,

In this spring newsletter, we focus on new areas in our lifelong learning programs, highlighting two popular short courses and their faculty as well as an Air Force major's experience in our Advanced Study Program.

Professor of Mechanical Engineering and newly-appointed Director of Digital Learning at MIT Sanjay Sarma speaks about being a "disruptor" in both his academic and business lives, and how he brings that perspective to his professional course titled Radical Innovation. His



Sanjay Sarma.
Photo by
Bryce Vickmark

out-of-the-box thinking promises to also heavily influence his new charge as "experimenter in chief" for digital learning at MIT.

Not all disruption leads to beneficial change, of course. Sustainability: Principles and Practice, a summer course taught by Assistant Professor of Engineering Systems and Atmospheric Chemistry Noelle Selin and Sloan Lecturer Jason Jay, demonstrates how companies can mitigate environmental damage and develop more sustainable business models.

You will read about the learning experience of Major Jasem Fleming, who enrolled in our Advanced Study Program last fall and took Engineering Systems Professor Deborah Nightingale's courses on Lean Enterprise. Jay speaks about how the principles he learned in the program apply to his work in the US Air Force.

You will also learn about the annual concert of the MIT Summer Philharmonic, a summer musical treat for the MIT and Cambridge communities that MIT Professional Education has sponsored proudly for the past 17 years. The all-volunteer orchestra has been under the leadership of George Ogata '92 ever since its inception.

Finally, we pay tribute to Professor Emeritus of Polymer Engineering, Frederick McGarry, who passed away recently. Professor McGarry was the first director of the Professional Institute, the predecessor of MIT Professional Education Short Programs.

Sincerely,

**Bhaskar Pant, Executive Director
MIT Professional Education
bpant@mit.edu**



Bhaskar Pant.
Photo by Stuart Darsch

Sanjay Sarma. Photo by Bryce Vickmark

SANJAY SARMA, DIGITAL LEARNING PIONEER

DIRECTOR OF DIGITAL LEARNING,
OVERSEEING MITX AND MIT OPENCOURSEWARE

FRED FORT FLOWERS AND DANIEL FORT FLOWERS
PROFESSOR OF MECHANICAL ENGINEERING

MIT PROFESSIONAL EDUCATION,
SHORT PROGRAM COURSE DIRECTOR: RADICAL INNOVATION



When Sanjay Sarma was appointed MIT's Director of Digital Learning in November, it was the culmination of a life's work as a self-described disruptor.

"I'm a disruptor in both my academic and entrepreneurial life," Sarma says. "I and my students, we are all disruptors. Our business is to disrupt industry in the interest in doing technology more efficiently." For example, as a founder of the MIT Auto-ID Center, he and colleagues pioneered RFID technologies and standards that have radically changed the way products are tracked worldwide.

Now Sarma is in charge of figuring out how the edX online-learning platform; MITx, the Institute's course offerings on that platform; and other online tools can invigorate MIT's residential education, and allow many more learners than those on campus to benefit from MIT knowledge and expertise. He has long been involved in interactive education. More than a decade ago, he and colleagues introduced computer-based teaching tools to promote active learning and intuition in the classroom.

"Experimenter-in-Chief"

President L. Rafael Reif has described Sarma's role as "experimenter-in-chief" and Sarma is optimistic that providing access to core information online can open up a new "white space" of opportunities in the classroom. He noted that he's been giving a lecture on welding in his mechanical engineering classes for a decade, but the students never have time to actually weld. In a transformed classroom, his students could watch his lecture online, then come to class ready for the hands-on experience.

He is also investigating digital learning opportunities for global learners. "We do a lot on campus with hands-on learning. We give student kits and ask them to design robots. When they learn online, we take that away. What if we could make the kits available to students for a good

RESEARCH

Pioneer in modern RFID helping to develop the technical concepts and standards.

Expert in radio frequency identification, manufacturing, design, and energy, especially applied to energy and transportation.

Authored more than 75 publications in computational geometry, manufacturing, CAD, RFID, signal processing, security, sensors, and automotive systems.

EDUCATION

BTech, 1989, Indian Institute of Technology, Kanpur

MEng, 1992, Carnegie Mellon University

PhD, 1995, University of California, Berkeley

MIT SERVICE

Teaching at MIT since 1996

Past Director, MIT/Singapore University of Technology and Design Collaboration Office

MIT MacVicar Fellowship

National Science Foundation Career Award

Cecil and Ida Green Career Development Chair at MIT

Den Hartog Teaching Excellence Award

Joseph H. Keenan Award for Innovation in Undergraduate Education

PERSONAL INTERESTS

Travel, family, reading



SANJAY SARMA, DIGITAL LEARNING PIONEER

price? So they can get it on Amazon and build their own experiments as our students here build their own robots. There is proof of experience—Lego Mindstorm, a product that came out of MIT.”

Lifelong Learning through Professional Education

He also sees an important role for MIT Professional Education as MIT works to balance new digital opportunities with the fundamentals of residential education—one-to-one experiences, hands-on activities, and flexibility to change curricula fast.

“Lifelong education is the new normal,” says Sarma. “Our education system today is based on outdated state—that you finish your undergraduate degree and maybe do a graduate degree and your learning from then on is on the job by reading articles. In a rapidly changing world, that does not fly any more. So Professional Education is the way for people around the world to remain conversant about the cutting edge and be close to it.”

Sarma is bringing the cutting edge to worldwide learners through the short program he offers through MIT Professional Education, titled Radical Innovation. Besides its regular summer offering, he taught special two-day sessions in Rome and Milan in February and another

is scheduled for Singapore. The goal of these global courses is to enable business leaders to understand the disruptive nature of innovation in startups and academic research and to harness that creative energy for their industries. Companies, both large and small, could encourage skunkworks operations with the freedom to “fast fail” on new ideas, which could ultimately lead to substantial winners and economic success, he says. And he draws from hands-on experience at his own startup, OATSystems, a software company.

In addition to many teaching awards at MIT, Sarma has received industry recognition including the New England Business and Technology Award and the MIT Global Indus Award. In 2003, he was selected for *Business Week*’s eBiz 25 and *Fast Company* magazine’s Fast Fifty. He recently received the RFID Journal’s Special Achievement Award. He serves on the Board of Governors for EPCglobal and the City of Boston’s Complete Streets Advisory Group. ▀

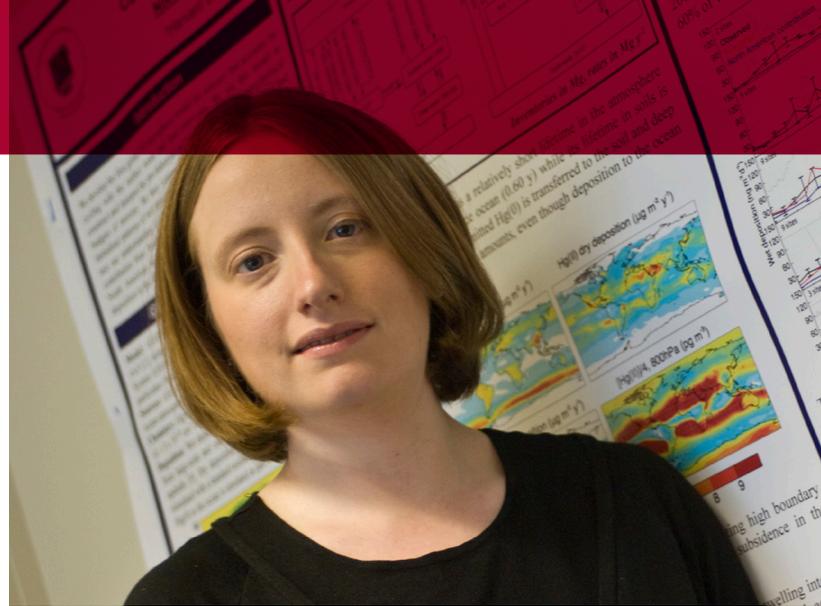
➔ REGISTER NOW:

Radical Innovation, June 10–12, 2013
shortprograms.mit.edu/ri

Noelle Selin. Photo by Patrick Gillooly

PUTTING SUSTAINABILITY TO WORK

A SHORT PROGRAM ON PRINCIPLES AND PRACTICE



On the first day of the Sustainability: Principles and Practice course last summer, participants and faculty began the task of defining sustainability.

Assistant Professor Noelle Selin, who heads the short program offered by MIT Professional Education, says there is a popular United Nations version: in essence, sustainability describes actions that meet the needs of the present as well as the future. Yet developing options that fit that criterion is complex because results need to meet the triple bottom line of economy, environment, and equity.

“One theme of our class is to think not just in terms of what an existing business can do to mitigate damage to the environment from their potential activities,” Selin says, “but to think more broadly about what kinds of business models might be better suited to a sustainable world.”

Selin, who holds joint appointments in engineering systems and in atmospheric chemistry, co-teaches the course with Sloan Lecturer Jason Jay PhD ‘10, who coordinates the Sloan Sustainability Initiative, and with several other experts. In keeping with the topic and Professional Education’s own green philosophy, the professors provided digital handouts, not paper, and students received MIT-branded reusable coffee mugs.

Industry Context Guides Action

Both Selin and Jay say context shapes sustainability plans. Jay presents business cases on Walmart and Patagonia to illustrate sharply different approaches.

“Take Walmart, which is high volume and low cost,” Jay says. “They will look at sustainability as a cost-cutting strategy. They find new ways to reduce energy use, reduce packaging, and reduce costs. They have so much power in their supply chain that they can force their suppliers to invest in their own cost reduction. Proctor and Gamble redesigned their packaging schemes based on Walmart demands.”

Patagonia is the opposite, he says. “It is lower volume and higher price offerings. It is known for the highest performance clothing and equipment, from surfing to mountain climbing,” he notes. “For them, sustainability is all about differentiating and sometimes increasing the cost of products because they are going to last longer and they can be recycled. They will be more appealing to customers who want a higher-end product.”

To demonstrate a third facet of sustainability—protecting the supply chain—participants worked on a web-based Fishbanks game developed at Sloan. Using the cod fishing industry as a model, the students must learn to work cooperatively in teams because companies acting alone cannot prevent overfishing, which would destroy the industry.

Transforming Products into Services

A brainstorming exercise demonstrated another key to sustainable business strategy—converting the focus from products to services. For example, Zipcar, the MIT alumni-founded car services company, gives customers the option of the occasional use of a car rather than the purchase of one. A service company can buy in bulk and thus require manufacturers to minimize waste and boost recycling. Participants came up with their own examples including the idea of creating a television service, offering TV equipment much like cable companies lease DVRs.

How can businesses and organizations get tangible results? The course encourages students to set broad goals for model organizations as well as for their own workplaces. Thinking of sustainability as the “3Es” of environment, economy, and equity, companies may tend to focus on the environment and economy criteria, such as reducing CO2 emissions, using renewable energy options, or minimizing waste. However, the options are much broader, Selin says. Contributing to employment in a local community meets the third criteria, equity.



SHORT PROGRAM

PUTTING SUSTAINABILITY TO WORK

A SHORT PROGRAM ON PRINCIPLES AND PRACTICE

Some 44 percent of the sustainability participants, who ranged from recent graduates to career changers to senior managers, reported that they could apply course skills to their jobs within one month. What is an example of that? Learning how to design a good indicator, says Selin. Once you select a goal, you need to measure progress toward that goal and monitor it over time. To do that, you need a robust indicator of progress that accurately captures productive change. Defining indicators also gives the industry professionals a way communicate about sustainability options in the workplace.

Growing the 3Es in Industry

How widespread is interest in sustainability? The boost in enrollments in last summer's Sustainability short program suggests that companies and organizations are taking the topic seriously.

"A majority of companies are saying something about sustainability, but it is still a small minority that is doing something seriously and creating value as a result," Jay says. "Companies that sell to consumers tend to be quicker to talk about sustainability than the more business-to-business model because consumer-facing companies are vulnerable to boycotts and they put a lot of stock in their brand value."

Motivating more businesses to transform their operations can lead to business success and a healthier planet—and the sustainability course gives participants the tools to do that.

Michelle Brown-Droese, CEO of a Massachusetts-based consulting firm, says the course will help her make a winning case for sustainability to her clients: "The knowledge I've learned at MIT will help me guide my small business and non-profit clients toward a successful and sustainable future." ▼

➔ REGISTER NOW:

Sustainability: Principles and Practice,
August 5–9, 2013
shortprograms.mit.edu/spp

A DAY IN THE LIFE OF AN ADVANCED STUDY PROGRAM STUDENT

What Can MIT's Advanced Study Program Do For You?

"Change your life," according to the Tish Miller, director of academic programs at MIT Professional Education. "Professionals who enroll in the Advanced Study Program come here to advance or switch careers," she says. "What they learn in MIT classrooms and real-world projects, they bring back to their workplaces as new ideas, practical applications of cutting-edge research, and a life-long connection to MIT's renowned learning community."

The MIT Advanced Study Program, a non-degree program open to talented professionals, is growing fast—enrollments have doubled this year. Students, who come from dozens of countries, can take part full or part time. Find out more about the **Advanced Study Program**.

Organizational learning brought Jay Fleming to MIT. Since he was commissioned in 1998, he has excelled in the Air Force's rigorous internal career training and most recently served as chief of acquisitions for a Space and Missile Systems Center group in Los Angeles. Now, as a major, he had the opportunity to spend a year developing competencies outside the military. So he came to MIT.

Fleming, as a 2011-12 National Defense Fellow with the MIT Lean Advancement Initiative (LAI), enrolled in the MIT Advanced Study Program so he could learn how to apply organizational learning principles to the Air Force. When he began a new assignment at the Pentagon in July, he brought new learning tools to the job. "My new work involves an extremely technical, classified program," Fleming says. "My time spent at MIT helped open the door to a fresh, new way of thinking."

The Air Force does a good job on specific technical training, but not necessarily on strategic organizational learning, Fleming says. He focused on that topic in two courses led by Professor Debbie Nightingale, his advisor: Integrating the Lean Enterprise and Enterprise Architecting. "We looked at more effective and efficient ways to organize enterprises, whether that is the breath of scale of the Air Force or small in scope like an office area."

As a class project, Fleming and classmates worked with the Veteran Affairs' Boston Healthcare System. From making rounds with the physicians and nurses to talking with the veterans, Fleming focused on enterprise evaluation as well as understanding the patients' perspectives. "It's been a great project and now we can follow through with recommendations for the future."

So what was a typical day for Fleming?

ON WEDNESDAYS, for example, Fleming arrived on campus at 9 a.m. for his Energy Policy for a Sustainable Future class.

AT NOON, he attended a weekly Security Studies seminar to hear discussions on topics from Defense Department budgets to the CIA disaster in Khost, Afghanistan.

ABOUT 1 P.M., Fleming settled in to the Dewey Library to read, take notes, and conduct research online.

AT THE 4 P.M. LAI Research Seminar, he heard researchers share work in progress.

AROUND 5:30 P.M., Fleming often had dinner with colleagues or attended an MIT Advanced Study Program event.

ABOUT 8 P.M., he was on the last bus to his hotel near Hanscom Air Force base. He worked out most nights at a nearby gym from 9–11 p.m., and then he returned home to read and study until around 3 a.m. After a few hours of sleep, he was off again.

During Fleming's year on campus, he also took courses that built on his background—he had earned a criminal studies bachelor's degree in 1998 and an MBA in 2001. At MIT, he took a comparative politics seminar and Sloan courses including managerial psychology, systems optimization, business sustainability, and developing breakthrough products.

In his breakthrough products course, for example, he learned that the skate board industry was spawned during a California drought when kids were looking for something to do and there were a lot of empty swimming pools.

"There are so many different ways of looking at a problem," Fleming notes. "One of the primary goals of the fellowship is to take Air Force officers out of their comfort zone and introduce them to a different ideas and different ways of thinking. My time spent working on LAI class projects served to introduce me not only to the course material and objectives, but to the different thoughts, opinions, and ideas of the diverse team I was working with. I was consistently amazed at the different ways we all approached a problem...with none of us being "right" or "wrong," and then watching us compromise to the best solution for all. This was particular strength of the program and one that paid great dividends in my learning experience." ▾

➔ **EXPLORE THIS PROGRAM:** Videos, profiles, and more at advancedstudy.mit.edu. Now accepting applications for Fall Term.

ANNUAL SUMMER PHILHARMONIC CONCERT BRINGS SWEET MUSIC TO CAMPUS

Each summer the MIT community enjoys one treat that is not part of any formal curriculum. For 17 years, MIT Professional Education has sponsored an MIT Summer Philharmonic Orchestra (MITSPO) concert.

In fact, MITSPO was launched in 1995 by George Ogata '92 with the support of MIT Professional Education and the MIT Alumni Association. Ogata, then a recent graduate serving as the MIT Symphony Orchestra's concert master, wanted to create an opportunity for area musicians to perform when many local orchestras are on break. Since MIT Professional Education offers short programs throughout the summer, sponsorship was a natural fit.

"We have many MIT alumni and professionals from the Cambridge area who come to our programs each year. And while only a few of them, their colleagues, or MIT faculty join MITSPO, all of the MIT and Cambridge community can enjoy the superb concert that maestro George Ogata arranges and conducts at Kresge auditorium every summer. We at MIT Professional Education are proud to sponsor the concert," says Bhaskar Pant, executive director of MIT Professional Education.

Each year some 70-80 musicians are drawn to the project for the love of music and the camaraderie. Many volunteers return each year, and each spring Ogata also recruits new musicians. They hold six to eight rehearsals starting in late June and get great results.

"We put together a product that is really refined," says Ogata, the symphony's music director and conductor. "Something you would expect from a group who has worked together much longer. We are able to develop chemistry in just a month and a half."

This past summer's concert selection, the *Manfred* Symphony in B minor, Op. 58 by Pyotr Ilyich Tchaikovsky that was presented on August 3 in Kresge Auditorium, was a challenging piece, says Ogata.

"The *Manfred* Symphony is a massive work—it's over an hour long," he says. "We had been working over the month of July to put it together and it all came together well. I was very proud of our orchestra—they did a very nice job."

The role of a conductor is to set expectations and to know the score flawlessly, Ogata says. "If you don't know the score, the musicians will fall apart. If there are any elements of uncertainty in

my mind, that will translate into a hesitation in my baton gestures and that means the orchestra will falter." That did not happen at the free concert in August. Ogata took the orchestra through careful rehearsals working first on the overall composition of the four-movement piece, then fine tuning at each rehearsal to develop difficult sections and then transitions.

Why did Ogata choose this particular piece of music? "Tchaikovsky himself said that it was his greatest symphonic achievement. Despite that, it is not performed often. When I was thinking what to program this summer, I took into account the fact that this is a fun piece that the orchestra would enjoy playing but it also would be a good piece to work on because it is neglected and the audience would appreciate hearing it."

Although the mix of performers varies year to year, many musicians return. Perhaps 20 percent of the group are MIT faculty, staff, and students, and they are joined by performers from area orchestras including the Boston Philharmonic and the New England Philharmonic. Amanda Mok '11, who won the 2011 MIT Symphony Orchestra Concerto Competition, says she has benefitted from working with this ensemble of musicians. "I have found my personal musical voice through performing on violin in MITSO and MITSPO," Mok says.

For Ogata, this is a labor of love. During the academic year, he is conductor of the Longy Youth Chamber Orchestra. He maintains an active career as a project manager at an ecommerce software company and leads workshops on an iterative model of software development called Scrum. But each summer, he is drawn back to MIT and the summer concert.

Not only has MIT Professional Education been a stalwart supporter every year, the program is also very thoughtful in how they support it, he says. The program provided nicely printed programs and advertised in the Institute community, and each performer received a commemorative paperweight. Ogata says the musicians really appreciated that.

"I am very indebted to MIT Professional Education and to Bhaskar Pant and Clara Piloto [Director of Marketing] for being such passionate supporters of the summer concert," Ogata says. ■

➔ SAVE THE DATE:

The next concert is July 19, 2013 www.mitspo.org





IN MEMORIAM:
**MATERIALS SCIENCE
 PROFESSOR LED
 PROFESSIONAL
 INSTITUTE**

Professor Emeritus of Polymer Engineering Frederick J. McGarry, former executive director of the Professional Institute, now called MIT Professional Education Short Programs, died on March 27, 2013, after a long illness.

He taught his first Professional Institute summer course, Composite Materials, in 1962 and became the program's director in 1983. At the program's 50th anniversary in 1999, he lauded its ongoing benefits to industry and to faculty. "It's a bona fide intellectual exercise, because two-thirds of the students have advanced degrees; one-third have PhDs," he said in an MIT Tech Talk article. "Faculty of the summer courses make a lot of contacts for consulting, research, and other activities within industry and government." Through his vision he laid much of the foundation of what MIT Professional Education is today.

McGarry taught first in the Department of Civil Engineering, and then in 1975 he moved to Department of Materials Science and Engineering (DMSE) to focus on polymer education and research. His pioneering contributions include the development of rubber toughening in thermosetting resins, a vital part of modern composites technology.

Outside the classroom, McGarry served as chair of the ROTC program, secretary of the faculty, and participated in many international programs including the MIT Inter-American Program in Civil Engineering in the 1960s.

McGarry, 86, earned an AB in physics and math from Middlebury and an SB in mechanical engineering from MIT in 1950. He then received an SM in mechanical engineering/materials from MIT in 1953. ■

For more information on our programs, visit
<http://professionaleducation.mit.edu>

MIT Professional Education
 Massachusetts Institute of Technology
 77 Massachusetts Avenue, 35-433
 Cambridge, MA 02139