UNIVERSITY OF PENNSYLVANIA
SCHOOL OF ARTS AND SCIENCES
STATE of the SCHOOL REPORT

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SCHOOL OF ARTS AND SCIENCES ADMINISTRATION
Often in my years as dean of the School of Arts and Sciences, I have met with alumni and parents from across the country and around the world and discussed what it is we do. I explain that SAS is the largest of Penn’s 12 schools and that our faculty is made up of nearly 500 world-renowned scholars who push the frontiers of knowledge. I tell them our 27 academic departments provide the foundation for interdisciplinary collaboration across the University. I remind them that our College of Arts and Sciences is the largest of Penn’s undergraduate divisions, with 6,600 students, and that we are deeply involved in the education of undergraduates in Wharton, Engineering and Nursing. I also tell them we are the home of over 30 doctoral degree programs, and that more than 25 SAS-based research centers act as catalysts for the discovery, application, and dissemination of knowledge.

This is an accurate description of what the School is and the activities that we pursue. But I’ve come to believe that it does not fully capture what we are really about. SAS is, more than anything, about transformation. Our faculty are believers in the power of big ideas to solve problems and change lives. We love the pursuit of knowledge—both for its own sake and because we are, collectively, passionate about the essential role of that knowledge in improving the human condition.

In just the past year, our faculty have explored such issues as the impact of climate on sea-level changes and how proteins fold, and misfold—with implications for a range of diseases. They have provoked discussion on the restrictions current copyright laws impose on the arts and developed techniques for the efficient production of carbon nanotubes that have revolutionary technological applications. They have studied the factors that drive voters’ decision making, used DNA analysis to trace human migration patterns, and led excavations that are piecing together what life in the Roman world was like to its rural peasants. And in these pursuits, they have mentored and inspired countless undergraduates, graduate students, and postdoctoral fellows.

Our educational mission is also about transformation for every one of our students. By teaching them to communicate effectively in speaking and writing, to think creatively and solve problems, and to be engaged citizens of the world, we strive to provide them with a foundation for successful and rewarding lives. Further, we are dedicated to securing the resources required to extend this opportunity of transformation to students of all financial means.

We recognize that at times we must turn our analytical attentions inward, to consider how the academy should transform itself. In the past year, for example, we engaged in extensive discussion of faculty diversity. We explored what diversity means in the context of different academic disciplines and the overall value inherent in having a more diverse faculty: enriching our research, teaching and engagement with our world with a range of differing viewpoints. These discussions have contributed to a School-wide plan to enhance faculty diversity. And in recognition of the fact that a true solution to this problem will require a long-term investment, we have committed ourselves to creating educational opportunities for students of all backgrounds and at every stage—from high school students to undergraduates, graduate students, and postdocs—to ensure that the pool of talented young scholars who are considering academic careers in the future is more inclusive than the pool today.

In advancing our goal of transformation, we rely heavily on experimentation and innovation. In the pages that follow you will find stories about some of our key areas of innovation from the past year, including developments in undergraduate education, experiments with new teaching technologies, and of course, our groundbreaking faculty research. Our many supporters are the other critical ingredient for our success. In providing funds for our faculty, for scholarships, and for 21st century facilities like the Neural and Behavioral Sciences Building, our generous donors continue to fuel our ability to pursue big ideas and change lives. I am happy to be able to share with you this summary of our recent accomplishments and hope that you will be as excited as I am by the impact of the liberal arts on our students, the University and society.
The nearly 500 faculty of the School of Arts and Sciences are the foundation for excellence in all that we do. Through their committed teaching, their innovative scholarship, their standing as leaders within their fields, and their ability to work across disciplinary boundaries, they define Penn’s stature in research and education.
Boundary-crossing scholarship and teaching have long been essential to how we define ourselves. Thus it's no surprise that out of 14 Penn Integrates Knowledge professors—renowned scholars who hold endowed professorships and joint appointments between Penn's schools—11 sit within SAS. The concept of faculty working across departmental lines is not unique to our PIK professors, however. Sarah Barringer Gordon, Professor of History and the Arlin M. Adams Professor of Constitutional Law, is an expert in the areas of church and state and teaches topics such as American religious and constitutional history to both College undergraduates and Penn law students. And this fall, the School of Arts and Sciences and the Annenberg School for Communication jointly welcomed Guobin Yang as an Associate Professor of Sociology and Communication. Yang, who came to Penn from Columbia University, has published on a wide range of social and communication issues with a focus on China, including the internet and civil society, the 1989 student movement, and collective memories of the Chinese Cultural Revolution. His appointment is contributing to Penn's strength in studies of contemporary China as well as digital media, and he is now one of three SAS faculty who hold an appointment in Annenberg.

Recruiting faculty who are able to make intellectual contributions across disciplines is a key tool enabling us to maintain the excellence of our academic departments without necessarily enlarging the overall size of our faculty. In the past year we have made progress in institutionalizing approaches to recruiting that encourage even greater collaborative thinking among our departments. Through a new initiative that we are calling "cluster hiring," the School will soon be approving a small number of searches centered around broad academic themes designed to enhance research and teaching across multiple departments. We expect that this initiative will add depth and breadth to the overall academic profile of the School as well as individual departments, and may present opportunities for outside funding. In the coming year, the School is launching its initial experiment with this approach, focusing on a cluster of hires around the concept of evolution, in all its contexts.

Last year our interdisciplinary strengths led to the establishment of a new Africana Studies department. This department is distinctive for drawing on disciplines across Penn and for its global, cross-regional approach to historical and contemporary Africana studies. The initial roster of 11 standing faculty are all current SAS professors who now hold joint primary appointments with their original home departments. Additional faculty from across SAS and from several other Penn schools are expected to assume secondary appointments.

The School is also home to two new centers that support interdisciplinary work. The Center
for the Study of Contemporary China is designed to advance Penn’s leadership in programs, research and scholarship about China. The Center will focus on the political, legal, economic and social factors shaping China and its role in the world today. It will serve as an important hub to facilitate cross-School initiatives and collaboration, provide support for faculty and graduate student research, and sponsor conferences and visits from major international scholars and world leaders. Avery Goldstein, the David M. Knott Professor of Global Politics and International Relations and Professor of Political Science, is the Center’s inaugural faculty director.

The new Social Science and Policy Forum will serve as a cross-University hub for scholarly research on key social, economic, legal and policy challenges confronting the United States and the world. Under the leadership of Thomas J. Sugrue, the David Boies Professor of History and Sociology, the Forum will foster cutting-edge scholarship across the social sciences, connect Penn research to policymakers and opinion leaders and disseminate knowledge to diverse audiences through workshops, public lectures, annual conferences, working papers, scholarly articles, innovative courses and a series of books published by Penn Press. The Forum will coordinate its scholarship and public events around annual themes focusing on key matters of public policy. For the coming year—its first year of active programming—the theme is global financial crisis.

More than 2.3 million people are behind bars in American prisons and jails, representing one of the highest incarceration levels in the world. Professor of Political Science Marie Gottschalk has been exploring this phenomenon for many years. A specialist in American politics who has focused on criminal justice and the welfare state, Gottschalk is the author of the 2006 book *The Prison and the Gallows: The Politics of Mass Incarceration in America*, which won the Organization of American Historian’s 2007 Ellis W. Hawley Prize.

Gottschalk is now applying her expertise as one of 18 leading scholars and corrections experts who have been named to a National Academy of Sciences panel that is reviewing the causes and consequences of the high incarceration rates in the United States. Focusing on existing scientific evidence, the commission will consider why U.S. incarceration rates have skyrocketed since the 1970s, examine costs and benefits of the nation’s current sentencing and incarceration policies, and look into whether alternative punishments might net similar public safety benefits at lower financial and social costs.

Gottschalk, who teaches courses on race and criminal justice and the politics of crime and punishment, among other topics, is also continuing her own work on incarceration. Her current project examines the political possibilities for significantly reducing the incarceration rate.
FACULTY IN THE SPOTLIGHT

SAS faculty are honored every year with some of the highest distinctions in their disciplines, and the past year has been no exception. Associate Professor of Anthropology Claudia Valeggia was among the many SAS honorees of 2011-2012. Last fall, Valeggia traveled to the White House to receive a Presidential Early Career Award for Scientists and Engineers, the highest honor bestowed by the United States government on science and engineering professionals in the early stages of their independent research careers. A biological anthropologist, Valeggia studies the interaction between human reproductive biology and its ecological and cultural contexts. Her current work, funded by a five-year National Science Foundation CAREER Award, is focused on a group of Toba women and girls from the province of Formosa in northeastern Argentina.

The History Department’s Barbara Savage, Geraldine R. Segal Professor of American Social Thought, won the prestigious Grawemeyer Award for her book Your Spirits Walk Beside Us: The Politics of Black Religion. Published in 2008, the book traces the persistent debate among African-Americans about the public responsibility of black churches and religion in black political struggle by profiling the work of African-American religious leaders and politicians.

Paul Hendrickson, Senior Lecturer in the Department of English, received a number of honors for his most recent book, Hemingway’s Boat: Everything He Loved in Life, and Lost, 1934-1961. In this critically acclaimed biography, Hendrickson uses Hemingway’s 38-foot cabin cruiser, Pilar, as a narrative device to guide readers through the final decades of his life. The book was selected as a 2011 National Book Critics Circle finalist for best biography. In addition, it was a New York Times best-seller and appeared on many year-end “best” lists, including The Wall Street Journal, The Washington Post, Chicago Tribune, The Economist and Newsweek.

DiMaura Professor of Conservation Biology Daniel Janzen was honored in February 2012 with the BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology. Janzen was singled out for his contributions to the conservation and scientific understanding of tropical ecosystems. The award announcement describes him as “a supreme example of the complete ecological scientist” who has “shaped tropical ecology as we know it today.” For 40 years, Janzen has worked in Costa Rica, where he and his collaborators have documented and sequenced a portion of the DNA of roughly 12,000 species of caterpillars. He also helped acquire and restore degraded forest in Costa Rica to become the 163,000-hectare Área de Conservación Guanacaste, a tropical-forest reserve. The ACG is now a UNESCO World Heritage Site, noted for incorporating community outreach and restoration ecology practices.

An SAS economist and an animal behavior expert were among this year’s newly elected members of the American Academy of Arts and Sciences. One of the nation’s most prestigious honorary societies,
In a land of more than 175 million people, nearly all goods in Pakistan are delivered by truck, and just about every truck boasts an array of ornate adornments and brightly painted images ranging from religious scenes to families, movie stars and political sayings.

Jamal Elias, Class of 1965 Term Professor and Chair of Religious Studies, is a scholar of Islamic religion, art, and culture—and the world’s foremost expert on Pakistani truck art. In his most recent book, On Wings of Diesel: Identity, Imagination and Truck Decoration in Pakistan, he takes readers on a beautifully illustrated trip through Pakistan’s truck-decoration culture. The book includes interviews with short- and long-haul truckers who discuss their motivations for painting their vehicles and the symbolism of the images and materials used. An accomplished amateur photographer, Elias illustrates the book with his own photographic work, beautiful images of the “mechanical dinosaurs adorned in full courtship colors.”

Elias describes the book as a look at “Pakistani society. Its class structure, the aspirations of various people, education, economics, religion certainly, all viewed through this window of truck decoration.” The book was recently selected by the American Institute of Pakistan Studies to receive its Best Senior Book Prize. Elias was also a 2012 recipient of a John Simon Guggenheim Memorial Foundation Fellowship, which will help support his work on the history of the Mevlevi Sufi order, sometimes called the “Whirling Dervishes,” from its inception in the 13th century until the modern era.
Some of today’s most exciting scientific discoveries are happening in materials science, and according to Arjun Yodh, James M. Skinner Professor of Science in the Department of Physics and Astronomy, the big problems in this field are too big for any single lab to tackle on its own. As Yodh notes, “These problems are multifaceted … they require collaborations between chemists; physicists; chemical, electrical and mechanical engineers; bioengineers; biologists and even medical researchers.” As director of the University’s Laboratory for Research on the Structure of Matter, Yodh leads Penn’s efforts at just these sorts of collaborations, and with the help of a six-year, $21.7 million center grant from the National Science Foundation, he and other investigators from SAS, Engineering (SEAS), and the Perelman School of Medicine are pursuing lofty research aims in four new areas of cutting-edge materials science.

- Vicki and William Abrams Professor of Natural Sciences Randall Kamien, in the Department of Physics and Astronomy, is working with Kathleen Stebe, Richer & Elizabeth Goodwin Professor of Chemical and Biomolecular Engineering (SEAS), to lead an effort to harness the effects of curvature and elasticity in soft materials and their interfaces to create novel responsive materials and structures.

- P. Roy Vagelos Professor of Chemistry Virgil Percec and Daniel Hammer, Alfred G. and Meta A. Ennis Professor of Bioengineering and Chemical and Biomolecular Engineering (SEAS), will be studying, synthesizing and developing applications for molecules known as Janus-dendrimers and designer proteins. The resulting smart nano-materials, with virus-like structures and functions, have potential uses as environmental sensors and actuators.

- Hepburn Professor of Physics Andrea Liu and Rob Carpick, chair of the SEAS Department of Mechanical Engineering and Applied Mechanics, are leading the team studying disordered materials, ranging from metallic glasses to granular media, such as sand. Their work will develop new understanding about how such disordered solids fail under stress, relevant for building tougher materials.

- A group led by Professor of Physics and Astronomy Jay Kikkawa and Professor Cherie Kagan of the SEAS departments of Electrical and Systems Engineering and Materials Science and Engineering will build “inter-dimensional” materials from nanocrystalline particles, assemblies that have novel electronic, optical, acoustic and magnetic properties.
As a school we value and are deeply committed to diversity in all of its dimensions. Diversity embraces race, gender, sexual orientation, socioeconomic status, nationality, and age, those categories that define who we are as individuals, but it also extends to our commitments and beliefs, including religion and politics, and our work as scholars, practicing a multiplicity of different approaches to the creation and dissemination of knowledge.

As part of its Action Plan for Faculty Diversity and Excellence, the University of Pennsylvania sets forth principles that must also shape the future of the faculty of the School of Arts and Sciences.

If, as stated in that plan, a great university must “encompass a universe of backgrounds and experiences, ideas and ideologies, theories and perspectives,” a vibrant School of Arts and Sciences, too, by definition gains its strength from such breadth, which informs everything we do in both research and education.

Because SAS is at the heart of this University, we believe we should lead the way in Penn’s overall mission to further diversify the faculty. We have the opportunity not only to make an impact on Penn’s intellectual community right now, but to help transform the academy for years to come.

The School recognizes that the task of diversifying the faculty is one that requires a sustained and multi-faceted approach that will achieve this short- and long-term impact. This plan therefore has two overarching goals:

**Enhance and support the diversity of the SAS faculty today, by**

- Restructuring the process for faculty hiring, to ensure that we are reaching out to as wide a pool of candidates as possible in building the faculty.

- Strengthening efforts to create a nurturing and inclusive environment in which all faculty will thrive, particularly in the early to middle stages of their careers.

**Build pipelines to attract a more diverse group of scholars to the Penn faculty and the broader professoriate of tomorrow, especially in fields where they are underrepresented, by proactively and strategically reaching out to students at all levels, from high school through post-doctoral.**

In addition to the School-wide planning to support diversity, SAS has engaged all departments in a discussion of the value inherent in having a more diverse faculty, both for the School overall and within their discipline. Each department undertook a discussion to consider the meaning of diversity in its discipline and worked to formulate a strategy for diversity that was appropriate to its own context. The department reports both stand on their own and have informed the SAS-wide plan, with the latter also taking into account the broader context of the School’s and University’s diversity initiatives.
EDUCATION:
INNOVATION IN SUPPORT OF EXCELLENCE

The School of Arts and Sciences is home to roughly half of Penn’s student body and provides the liberal arts foundation for all of Penn’s undergraduates and many of its graduate and professional students. SAS’s three divisions – for undergraduate, graduate, and lifelong learning – are united by an overarching commitment to providing an unrivaled education.
UNDERGRADUATE EDUCATION

Excellence in the arts and sciences at Penn owes a philosophical debt to our founder. As Benjamin Franklin personifies the inventive spirit, we are driven by a belief that sustained excellence in education is built on a willingness to experiment and adapt. At the College—the academic home to 6,600 undergraduates and the liberal arts foundation for all Penn undergraduates—we continually strive to deliver an education that recognizes and responds to the demands of technological change, the accelerating pace of discovery, and the global society that we live in.

While innovation is a constant element of our approach to education, the past year has been especially rich in programs and initiatives that demonstrate our commitment to adapt and deliver.
A NEW INTRODUCTION TO THE LIBERAL ARTS: THE INTEGRATED STUDIES PROGRAM

The 2011-2012 academic year saw the launch of the innovative Integrated Studies Program (ISP). ISP represents a reimagining of the Benjamin Franklin Scholars program, offering a unique structure for exploring the liberal arts. Open to all College freshmen who make a special application, the program is interdisciplinary, immersive and demanding.

Students take half of their freshman year coursework within the program. Faculty from three disciplines—one each in the humanities, sciences and social sciences—collaboratively develop and deliver courses focused on broad themes designed to encourage exploration of the great ideas that drive our understanding of the world and the human place in it. For the coming year, these themes include “Knowing” and “Thinking.” Faculty members each meet with the class weekly, and students gather with the full teaching staff for a fourth weekly meeting to address the common theme for the week using discussion, breakout groups and presentations. And because ISP is residentially based, the intellectual interactions continue beyond the classroom in small group discussions, working lunches and impromptu conversations.

In its first year, the program has proven to be a powerful inspiration to students and has created a devoted cohort; students were so enthusiastic about the experience that they worked with Penn’s College House program to extend it beyond freshman year. Beginning in the fall of 2012, a new Integrated Living Program is providing 34 slots for ISP students to continue their living/learning community—and for its first year, the program received four times as many applications as available slots.

“We, as faculty, might never be here teaching if we hadn’t experienced that sense of wonder during one of our freshman college classes. That is what we’re trying to give back.”

Peter Struck
Associate Professor of Classical Studies
Director, Benjamin Franklin Scholars Program

“ISP has given me the opportunity to explore fields of knowledge which I might have otherwise not pursued. It provides an interdisciplinary approach to help me intellectually develop to be able to face the challenges presented in an ever-evolving world, and a new way of looking at the world through multiple lenses, which when stacked together, enable me to have a much more visceral level of understanding.”

Igor Baran, C’15, W’15

“ISP stays true to what a liberal arts education should mean in a modern context. Higher education should aim to be more like a web connecting various disciplines to examine how larger ideas really work and that’s what the program does. There is an immense amount of creativity built into the program which challenges not only how we view the world but how we seek to change it for the better.”

Katherine Boas, C’15

“My roommate is a 22-year-old Singaporean, who recently completed his mandatory service in the army. I am an 18-year-old Caucasian from suburban Connecticut. We have shared passions for politics, international affairs and philosophy, and an idealistic hope for how we can contribute to making a better world. You can imagine the conversations that keep us up until the early hours of the morning.”

Matthew Kalmans, C’15
ENERGIZING SOLUTIONS: VIPER

Innovation and the integration of knowledge across disciplines form the foundation for another new program in the College. This one, called VIPER—the Vagelos Integrated Program in Energy Research—is crossing school boundaries to engage students with top faculty in SAS and Engineering and inspire them to pursue careers in this critical area. VIPER students complete a major and earn degrees within both schools. They receive instruction and state-of-the-art research experiences, enabling them to pursue advanced degrees in these fields and to establish high-caliber research careers as innovators in the discovery and development of sustainable ways to harness, convert and use energy.

The program, which was established through a generous gift from Penn trustee emeritus P. Roy Vagelos, M.D., C’50, Hon’99 and his wife, Diana, parents, immediately proved to be of great interest to prospective students, attracting over 130 applicants within a few months of being announced.

VIPER students will benefit from interaction with and mentorship from energy researchers working at the cutting edge, including Andrew Rappe, Professor of Chemistry, co-director of Pennergy—the Penn Center for Energy Innovation—and now VIPER’s co-director. Rappe is a recent recipient of an Energy Commercialization Institute Award for his work to develop a thin-film process and solar cell technology based on a new class of materials—ferroelectric semiconductors—which are more cost-effective to produce. This method will help pave the way for less expensive solar cell fabrication techniques. In addition, the University recognized Rappe’s accomplishments in the classroom by naming him among this year’s winners of the Lindback Award for Distinguished Teaching, Penn’s highest teaching honor. Rappe was cited in particular for his ability to “inspire his students to be passionate about science”—a trait which promises to truly distinguish VIPER.

HOW BIRDS SING

The complex neurological functions that allow birds to create their songs gave Biological Basis of Behavior major Arielle Spellun, C’12, her senior honors thesis. Spellun, who was supported by a Pincus-Magaziner Family Undergraduate Research and Travel Fund grant, worked with Associate Professor of Biology Marc Schmidt to study how the song system works in the brain of the zebra finch. In particular, she examined the role of a part of the brain’s neural motor pathway called the robust nucleus of the arcopallium (RA, for short).

Each hemisphere of a songbird’s brain contains a complete song system pathway that controls one half of the bird’s double-sided vocal organ, with each side in perfect sync with the other. But what happens if one side of the bird’s song system isn’t functional? Spellun’s work built on previous experiments in which ibotenic acid was injected to knock out the left or right RA in adult birds and also in juveniles, who were still developing neurologically and learning their songs from adults. As expected, disabling an RA in either hemisphere of an adult zebra finch’s brain permanently affected its singing ability. But the young zebra finches affected by an RA lesion before their songs were fully learned fared quite differently, maturing into adult birds with a fully functional song system.

“Like humans, there’s a critical period of neurological plasticity,” Spellun explains. “If you lesion the RA prior to song crystallization and then compare the adult song to a normal adult zebra finch, there aren’t any changes. So we hypothesize that maybe there’s some sort of crosshemispheric plasticity that makes up for the RA being lesioned in the juveniles, and that something is going on there to correct for losing that single RA.” As Spellun points out, “Although our research doesn’t directly connect to it, there’s a lot going on in trying to see how we can take what we know about the song system and using it to understand why some children aren’t able to learn language, or why some language pathologies and problems develop.”
GOALS AND OUTCOMES IN THE LIBERAL ARTS

DENNIS DETURCK
DEAN, COLLEGE OF ARTS AND SCIENCES
ROBERT A. FOX LEADERSHIP PROFESSOR
PROFESSOR OF MATHEMATICS

The College curriculum represents, in a sense, a collective understanding on the part of our faculty of the goals, nature, and value of the education we offer students. As the cost of higher education rises, the calls for increased accountability become more strident and students and parents look more closely at “return on investment.” Against this backdrop, our faculty are entering the third year of a multi-year project to articulate educational goals and the means of measuring our success in achieving them for each of our majors, as well as components of our general education requirement. In particular, we want to provide students with the understanding they need to make more informed choices across institutions and within our own curriculum, and this explicit understanding will help us deploy our most precious resources—the time and effort of our faculty, staff and students—in the most effective way.

In our 56 major programs, goals focus on mastery of specific content areas, as well as methodology and modes of thinking and discourse: for example, formal argumentation and proof in mathematics, or extracting information from primary sources in history. Each of our programs have developed statements of their goals and have examined their offerings to discern how well the curricula and goals align. They have also developed plans to measure the extent to which students achieve the major’s stated goals.

In the coming year, most undergraduate programs will implement the plans they formulated. In some departments, this will involve careful analysis of student performance on exams in required courses and advanced lab work. Faculty in all majors will examine students’ senior theses and capstone projects using rubrics to assess valid use of methodology, cogency of analysis, and application of critical thinking to arrive at conclusions that are effectively communicated and forcefully defended. We believe that regardless of the major, these are the skills that define success, and students who are able to master these skills will have the ability to thrive, whatever the 21st century may bring.
“She’s the most passionate professor I have ever met,” says one student of Mirjam Cvetic, the Fay R. and Eugene L. Langberg Professor of Physics. This year Professor Cvetic received both the School’s highest teaching honor, the Ira H. Abrams Memorial Award, and the top University-wide award for teaching, the Lindback Award for Distinguished Teaching.

A string theorist whose research bridges the gap between basic theory and the experimental consequences of those theories, Professor Cvetic’s work was recently ranked eighth by total citations of all papers published on supersymmetry in the last 10 years. A native of Slovenia (then part of Yugoslavia), she says her own graduate education was typical of Europe, relatively impersonal with less interaction with the instructor. She has fashioned her own teaching style from the bottom up, all in service of communicating—and spreading—her lifelong passion for her field.

Q: What drew you to physics?
MC: It was actually excitement with the learning and competition that drew me into math and physics in gymnasium, high school. Physics prevailed over math because of its ideas of connection to nature. It isn’t abstract.

Q: Was it unusual for a woman to study physics?
MC: In my case, my father was an electrical engineer, so there was certainly encouragement. But in theoretical physics, I think the percentage of women is still unusually low. I’m trying to improve that by being a mentor and encouraging female students to pursue research in physics.

Q: What do you try to achieve teaching your undergraduate students?
MC: I focus on trying to bring to my teaching my own enthusiasm and perspective that drew me into studying physics, and pursuing research in my field of theoretical high energy physics. And this seems to be a very powerful core connection with students because that’s something I can give that they would not find in regular college books. It’s a two-way road. They respond, and I’m excited about teaching them the subject.

Q: When you won the Lindback Award, one of your colleagues said that you were determined to create the perfect course in introductory physics, down to details like how you drew diagrams. How do you keep refining your approach?
MC: I believe that Penn students are smart, driven, ambitious—and capable, which is the main thing I use. Even though it may not be the subject they will pursue in life, my goal is to challenge them and excite them about this particular subject—and they respond. So I’m continually trying to challenge them to higher and higher levels, because the knowledge and scientific methods in my field can be useful when they apply them to other aspects of their professional life. It’s rewarding, and I’m glad I managed to achieve a balance by going strong in both directions of my calling—research and teaching.
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<td><strong>6,609</strong> Total number of College students as of Fall 2012</td>
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<td><strong>THE COLLEGE CLASS OF 2016</strong></td>
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<td><strong>1,548</strong> Number of Students</td>
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<td><strong>2150</strong> Average SATs</td>
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<td><strong>12.6%</strong> Percentage Admitted</td>
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<td><strong>13.8%</strong> First Generation to Attend College</td>
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<td><strong>56</strong> Number of Majors Offered</td>
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<td><strong>80</strong> Number of Minors</td>
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<td><strong>6</strong> Number of Special Joint and Accelerated Degree Options</td>
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<td><strong>43</strong> Percentage of Undergraduates Receiving Financial Aid</td>
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<td><strong>$35,888</strong> Average Individual Financial Aid Award</td>
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<td><strong>$66 million</strong> Total Size of SAS Undergraduate Financial Aid Bill</td>
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GRADUATE EDUCATION

The School’s doctoral programs attract the most talented scholars from across the country and around the world and prepare them to become the intellectual leaders of the next generation. Our 31 graduate groups combine disciplinary strength with interdisciplinary collaboration, and the graduates of these programs expand the body of scholarly knowledge, apply their knowledge to the world, and maintain Penn’s stature as a world-class university.
OUTSTANDING GRADUATE STUDENTS ARE ESSENTIAL TO THE INTELLECTUAL LIFE OF A GREAT UNIVERSITY, AND ONE OF OUR MOST SIGNIFICANT CHALLENGES IN GRADUATE EDUCATION IS SECURING THE RESOURCES REQUIRED TO ATTRACT THE VERY BEST AND PROVIDE FOR THEM A LEVEL OF SUPPORT THAT WILL ALLOW THEM TO FOCUS ON THEIR STUDIES AND COMPLETE THEIR DEGREES IN AN APPROPRIATE AMOUNT OF TIME. A GRANT FROM THE ANDREW W. MELLON FOUNDATION IS HELPING SAS SUSTAIN ITS COMMITMENT TO THE NEXT GENERATION OF SCHOLARS. THIS ENDOWMENT GIFT IS BEING USED TO EXPAND THE SCHOOL’S CAPACITY TO SUPPORT GRADUATE STUDENTS IN THE HUMANITIES AND THE HUMANISTIC SOCIAL SCIENCES BY ESTABLISHING SPECIAL FELLOWSHIPS FOR OUR MOST EXCEPTIONAL HUMANISTIC SCHOLARS. THE FRANCIS HOPKINSON FELLOWSHIP PROGRAM IS NOW IN ITS SECOND YEAR. TWO STUDENTS WERE NAMED HOPKINSON FELLOWS IN 2011-2012; FOR THE 2012-2013 ACADEMIC YEAR, FIVE DOCTORAL STUDENTS WERE SELECTED TO RECEIVE THIS HONOR, WHICH INCLUDES EXTRA SUMMER SUPPORT AND A RESEARCH FUND OF $5,000.

History doctoral student Anne Fleming is among the five SAS graduate students to be honored this year with a Hopkinson Fellowship in recognition of her superlative academic performance. The Hopkinson fellowship will help Fleming conduct research on her dissertation, provisionally entitled “City of Debtors: Law, Loan Sharks, and the Shadow Economy of Urban Poverty, 1900-1970.”

AN ELEGANT SOLUTION CAN BE HARD TO FIND—but as chemistry doctoral student Sarah Trice knows, you recognize one when you find it. Working with Hirschmann-Makineni Professor of Chemistry Gary Molander, Trice recently developed a new type of reagent that allows for easier synthesis of boronic acids, one of the main ingredients needed to perform a Suzuki-Miyaura cross-coupling reaction—the most efficient way to create carbon-carbon bonds in critical biaryl systems.

Bis(pinacolato)diboron (BisPin) is critical to chemists as the tried and tested synthesizing reagent for many pharmaceutical building blocks. However, because of BisPin’s molecular weight, almost 90 percent of the reagent is wasted each time it is used for a coupling. This amounts to a staggering 10 tons of pinacol discarded per year. To reduce this waste, Trice and Molander sought a solution that would allow them to replace BisPin. The bis-boronic acid that resulted from their work is not only lightweight, but incorporates nearly 50 percent of the needed mass into the final molecule. In addition, the method utilizes one of the rare drinkable solvents—ethanol—and wastes far less palladium catalyst than traditional methods.

The method that they have developed is already gaining popularity among researchers and has the potential to improve cost and production efficiency markedly for pharmaceutical companies—and Molander and Trice have decided not to patent it. As Trice notes, “Dr. Molander wanted to allow access to everyone because he feels that it is more efficient, environmentally friendly, and solves many of the problems associated with using standard BisPin.”
IGNITING A PASSION FOR SCHOLARSHIP

This summer marked the second year that the Graduate Division has collaborated with Biomedical Graduate Studies to take part in the Leadership Alliance-Early Identification Program. This national program is designed to encourage undergraduates from groups traditionally underrepresented in the sciences, social sciences and humanities to consider research careers. Students receive full support including a stipend and travel and housing expenses and are paired with faculty mentors to take part in their research for 10 weeks. At the end of their internship, participants are expected to present a written report or abstract and to make oral or poster presentations of their research, both at Penn and at the national Leadership Alliance symposium.

This year, the Graduate Division hosted five undergraduates, who came to Penn from across the country. In addition to working closely with their faculty mentors, the group of students lived in the same dorm, attended seminars, received career counseling from faculty, and went to local events including a Phillies game. In addition, participants received preparation and support for the graduate school admission process, including sessions on study and presentation skills.

While it is too early to tell what the outcome will be for this year’s cohort, one of last year’s participants came back to SAS this fall as a demography Ph.D. student. Thomas Anderson worked with Frederick J. Warren Professor of Demography and Professor of Sociology Hans-Peter Kohler to explore the decline in fertility rates in East Asia. The experience helped solidify Anderson’s interest in demography and led him to conclude that going directly into graduate school was the best choice for him. He found the Leadership Alliance program to be not only academically stimulating but also “a blast… The group of participants came from so many different ethnic, linguistic and cultural backgrounds that there was never a dull conversation.”

According to Patricia Rea, Associate Director of Admissions for the Graduate Division, the Leadership Alliance-Early Identification Program has been a transformative experience for many of the participants—and for her as well. She notes that such transformation is “what the program is all about—giving these interns access to life as a graduate student, providing research experience and the freedom to find their way, to think about whether they have the passion to make the commitment to complete a Ph.D. degree and how they can change the world with it. I think I am getting so much more out of the program—it has been the most rewarding experience of my career.”

HOW SOCIAL MOVEMENTS FIND A VOICE

Ksenia Gorbenko, a Ph.D. candidate in sociology, has dedicated her graduate research to exploring the role of media in successful social movements.

“Normally in a democratic society, you expect the people to enact change through voting, but for those who are disenfranchised, it’s a different story. For them, mass media is extremely important because if their plight isn’t brought to attention, no one will care. Unfortunately, the empowered citizens have the most access to the media, so movements have to adapt and strategize to get the word out.”

Gorbenko’s dissertation, “From Print to Pixel: Visual Media Technology and the Fate of Nonviolent Social Movement Activism,” explores these themes through the lens of five historical social movements of the disenfranchised, including Gandhi’s national liberation and the U.S. Civil Rights movements. Her insights lend important perspective to the uprisings of today. “There’s a lot of debate about how social media has revolutionized social movements, and the fact is, a lot of the reason it’s so effective right now is because it’s so new,” says Gorbenko. “Social media is particularly vulnerable in countries where internet use is controlled entirely by the government…. As time goes on, it’s going to be a dynamic race where technology is constantly trying to keep up. Since the disenfranchised rarely have any impact on advertising or power to network with powerful executives, the burden unfortunately lies with them to get their voices heard.”
In Tarshiha, the tiny Arab Israeli village where music graduate student Hanna Khoury grew up, Arab music was a way of life. He would perform with relatives at home gatherings, as well as with a local ensemble that specialized in classical Arab music, while taking lessons in Western classical violin. The winner of a prestigious Pew Fellowship in the Arts, Khoury credits this combination of Western technical training and the Arab music of his background with opening the doors to his high-profile performance career—a career that so far has included collaborations with Grammy winners like Shakira, Beyoncé and Youssou N’Dour, as well as with Arab pop music royalty like Kazem Al-Saher and Cheb Khaled. But despite this success, Khoury was troubled by the fact that classical Arab music did not seem to have many official outlets.

For the past few years, Khoury has been spearheading efforts to make Philadelphia a locus for Arab music outreach and education. He is a violinist and Arab music adviser for Intercultural Journeys, a local music non-profit that aims to bridge cultural divides through music and art. In addition he has launched an Arab music concert series that features a resident music ensemble performing a classical Arab music repertoire with various guest soloists. (Videos of past performances can be viewed at online at http://albustanseeds.org/music/videos/.)

“Providing access to high-level Arab music performances right in downtown Philadelphia will showcase a fuller view of Arab culture,” Khoury says. “This is especially needed in light of recent political events, which have led to many people having a one-sided perception of the Arab world. My goal is to take this concert series model nationally.” Khoury further hopes to develop a large body of pedagogical materials and make them accessible to musicians and educators across the globe. “We really need to document Arab music and develop the tools to teach it,” Khoury says. “Otherwise we may lose some of it and it may never get the exposure that it really deserves.”

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### GRADUATE EDUCATION IN THE ARTS AND SCIENCES

- **31** Number of Graduate Groups
- **192** Doctoral Degrees Conferred, 2011-2012
- **6,100** Number of applicants for Fall 2012 admission to doctoral programs
- **251** Number of doctoral students matriculating, Fall 2012
- **$23,700 + summer fellowship** Typical graduate stipend
- **9** Number of professional master’s programs
- **917** Total enrollment in professional master’s programs
AN INCUBATOR FOR INNOVATION: LIBERAL AND PROFESSIONAL STUDIES

The College of Liberal and Professional Studies (LPS) has long been an incubator for innovation within the School of Arts and Sciences. An important point of access for “non-traditional” students, LPS’s options range from its part-time undergraduate program, to post-baccalaureate programs that prepare students for graduate study, to language programs that help international students achieve proficiency in English, to master’s degree programs that advance skills and knowledge for a range of professionals.
EXPLORING THE POTENTIAL OF ONLINE LEARNING

As the hub for SAS’s involvement in Coursera, LPS is leading in the development of liberal arts courses for classes whose enrollments number in the thousands. Coursera, an independent company with 33 partner institutions, including Penn, offers an online platform that delivers non-credit courses featuring top faculty, free of charge, to students all over the world.

The Coursera initiative is part of our ongoing process of exploring technology’s possibilities in delivering a Penn education—a process that is not defined or limited by any single platform. Like all of the online technologies we have employed, Coursera forces faculty to think differently about their pedagogy—and in this case, one of the key differences our faculty are encountering is scale: SAS’s four initial Coursera offerings drew more than 120,000 subscribers as of August 2012, and with three of those courses yet to begin at that time, these numbers will undoubtedly increase.

This scale presents both challenges and opportunities. Chief among the opportunities is the unprecedented power to connect SAS faculty with students from all over the world, showcasing their scholarship and expertise while supporting our commitment to access for students of all ages and circumstances. With Coursera courses, we will also have access to a wealth of metrics that will give us great insight into how students learn in the online environment—data which will allow us to improve course design and delivery, resulting in improved outcomes. In addition, we will be exploring how tools offered by the Coursera platform may be used to support learning within our classrooms on campus.

While Coursera is our latest online initiative, it is not our first: The Arts and Sciences Learning Commons platform has been offering credit courses developed by Penn faculty for Penn undergraduates, master’s, and other students since 2008. One opportunity that we will explore is whether, and how, students who initially engage with Penn through Coursera might further their engagement through the Learning Commons, campus-based programs, or some combination of the two.

At the same time that we recognize the tremendous opportunities associated with experiments in online learning, we also acknowledge that there is a considerable cost associated with such innovation, and we are committed to managing the School’s resources well. In exploring developments in online learning platforms, we continue to seek synergies between the opportunities to reach new communities and our strengths, resources and capabilities.

“WORLD MUSIC” FOR THE WORLD

Professor of Music Carol Muller says that before she taught her first online course in 2003, she had never even used PowerPoint. This summer she guided 32,000 students—ranging in age from the late teens to 90-plus and in locations from New Jersey to Kazakhstan—through an introduction to world music via Coursera. After nine years of online teaching experience, Muller found that Coursera posed new challenges, including time zone, cultural and technological differences, as well as having to find publicly accessible music samples. While she and her students addressed and reconciled issues as they arose, her enormously diverse class learned and interacted, not only from Muller but through each other.

“The cultural stuff, the insider perspectives—that’s what makes Coursera great for the humanities,” she says. “You really are learning different ways of doing things and hearing through this platform.” On their own, students organized groups using Facebook and other social media and shared their local music. “I didn’t even know some of this music existed,” says Muller. “It was pretty exciting.”

A native of South Africa, Muller understands the need for quality instruction that exists in many parts of the world, and says that she feels privileged to have the opportunity to make a piece of a Penn education available to more people, for their own enrichment and that of their communities.

Muller’s course was the first SAS offering to be presented on Coursera. Three other SAS faculty are also among Penn’s initial slate of courses, including Robert Ghrist, the Andrea Mitchell Professor of mathematics and engineering, on single variable calculus; Associate Professor of Classical Studies Peter Struck on Greek and Roman Mythology; and Kelly Family Professor of English Al Filreis on Modern and Contemporary American Poetry.
EXPANDING THE EDUCATIONAL PIPELINE

LPS has a critical role to play in supporting the School’s commitment to broadening the education pipeline for students from groups that are underrepresented in higher education, to involve many students who might otherwise be left out.

The Young Scholars program is SAS’s high school dual enrollment program, providing free access to SAS/LPS courses to academically able students currently enrolled in the 11th or 12th grades. The program provides Philadelphia high school students with a scholarship for one course per semester. Non-Philadelphia students or those in private schools pay LPS tuition and fees.

Program enrollment by School District of Philadelphia students has doubled in the past calendar year. SAS has provided $138,944 in tuition and fees scholarship support to these students. Of the students enrolled in the past year, eight matriculated as freshmen in the College this fall.

Another initiative, the Penn Summer Scholars Program, provides opportunities for exceptional Philadelphia public and charter school students to perform academic study beyond the level offered in high school and to gain a college experience through participation in a four-week Summer Academy at Penn.

Academy offerings for the summer of 2012 included the Biomedical Research Academy, in partnership with the Department of Biology; the Experimental Physics Academy, in partnership with the Department of Physics and Astronomy; the Art in the City Academy, in partnership with the Department of the History of Art; and the Social Justice Research Academy in partnership with the Urban Studies program. Academies run a full-time schedule for four weeks. Although each academy sets its own curriculum the guiding principles of the academies are the same:

- The highest level of academic rigor and quality
- A combination of traditional content delivery and experiential learning opportunities
- A capstone project at the end of the program

While this year’s summer academies attracted 165 tuition-paying students from across the country, SAS provided funding for full scholarships to support qualified Philadelphia high school students via the Penn Summer Scholars Program. In addition, partial scholarships were awarded to students from other parts of the country with demonstrated need who were already receiving funding from other sources, including the Schuler Foundation (which funded students from urban Chicago schools) and the Ivy League Connection program (in Northern California). For the summer of 2012, SAS provided a total of $128,933 of need-based support, allowing 22 students to take part in the summer academies—13 percent of the programs’ total enrollment.
PROFESSIONAL AND LIBERAL EDUCATION IN BRIEF

- **2,794** Overall enrollment (for-credit programs)
- **34** Average age of LPS undergraduate students
- **2,527** Overall enrollment (non-credit programs)
- **59** Number of majors offered to LPS undergraduates
- **8** Number of merit scholarships available to part-time students
FISCAL YEAR 2012

The School’s financial performance in fiscal year 2012 was strong by all measures. Revenue grew in every major category, the value of the endowment returned to pre-recession levels through a combination of market performance and new gifts, the size of the standing faculty stabilized, and the School was able to add to its strategic reserves for the third straight year.

Operating and capital gifts grew by 31%, growth that was largely driven by new gifts and payments for the Neural and Behavioral Sciences (NBS) Building, which has now exceeded its funding target. The Division of Professional and Liberal Education (PLE) delivered a 19% increase in special programs tuition, primarily through robust growth in English Language Programs (ELP). The School also achieved a 3.9% increase in sponsored research support in a very challenging funding climate.

The School continues to focus on tight management of expenses and prudent investment in priority areas. General and equipment expenses were reduced compared to prior years. Undergraduate student aid rose by 3.8%, consistent with the University’s commitment to access. Graduate student aid and stipends rose by 3.0%, helping to ensure the market competitiveness of our graduate programs. The School has invested in its infrastructure through contributions to facilities renewal projects. In addition, strategic investments in staff will ensure that there is adequate support for faculty research and teaching, as well as for revenue-generating areas. FY 2012 also saw the start-up of Training and Consulting Services (TCS), a segment of PLE that will be leading new revenue-generating initiatives.

The School initiated or completed several facilities projects to advance priorities of the School and the University in FY2012, including renovations to house the Center for the Study of Contemporary China, the new Department of Africana Studies, the Vagelos Integrated Program in Energy Research, and the Center for Particle Cosmology. Major construction projects included the Singh Center for Nanotechnology and the NBS Building, which was nearing the end of the design phase.

We anticipate that the economy will continue to create a challenging fiscal environment. However, through a combination of the successful completion of the Making History campaign; the continued support of the University, our Board of Overseers and other friends; and our own continued focus on strong management of our resources, SAS will retain its position of strength in funding its core priorities and ensuring eminence in the arts and sciences at Penn.
FY 2012 OPERATING BUDGET: $437 MILLION
SUPPORTING THE SCHOOL OF ARTS AND SCIENCES

With the close of the 2012 fiscal year, the School of Arts and Sciences entered the final months of the Making History in the Arts and Sciences Campaign, but the campaign’s impact on the School is already being felt all across campus. In the diversity of the student body, in our newly built and renovated facilities, in newly created professorships, and in a range of new programs and initiatives, SAS today is stronger because of the support of our alumni and friends.
In the past year, gifts to the School provided the funding needed to launch two innovative undergraduate programs. The Integrated Studies Program, which delivers a unique, interdisciplinary introduction to the liberal arts for some of our most talented undergraduates (see p. 15), was launched with the support of Roxanne Conisha Bok, C’81, and Scott L. Bok, C’81, W’81, L’84. The Vagelos Integrated Program in Energy Research welcomed its inaugural class this fall. Thanks to the generosity of Penn trustee emeritus P. Roy Vagelos, M.D., C’50, Hon’99 and his wife, Diana, parents, this program will inspire generations of Penn freshmen to pursue research and careers in this critical area (see p.16). And one of the School's most pressing facilities needs, construction of a new Neural and Behavioral Sciences Building, will soon move forward thanks to a collective response including major gifts from 18 donors.

Making History in the Arts and Sciences: Progress to Date

VIPER Welcomes Inaugural Class

The inaugural group of students in the newly established Vagelos Integrated Program in Energy Research. (from left) Albert Xiao (Berkeley, Calif.), Anjali Khetan (Stamford, Conn.), Julia Fordham (Los Alamos, N.M.), David (Jin Soo) Lim (Sellersville, Pa), Meehir Pathare (Ariz.), Gerardo Cedillo Servin (Mexico City), Eric Lu (Laurel, Md.), Connor Lippincott (Charlotte, N.C.).

Shared Vision Yields Concrete Result

Campaign gifts of more than $33 million enabled the School of Arts and Sciences to move into the formal design phase for the Neural and Behavioral Sciences Building—one of the School’s, and the University’s, top facilities priorities of the Making History Campaign.

The project represents a new model for approaching facilities projects—an approach that is based on interdisciplinary thinking and that supports priorities across departments. The NBS Building will advance exciting lines of brain and behavior research, help to attract the best faculty in the life sciences, and provide first-rate facilities for some of the School’s most popular undergraduate programs.
The generosity of our supporters allowed SAS to exceed its 2011-2012 fundraising goal of $61.5 million by 23 percent, for a total of nearly $75.5 million—the second highest single-year giving record in the School’s history. As of June 30, 2012, the School’s total for the Making History Campaign was $456.7 million toward our goal of $500 million. With the continued support of generous alumni, parents, and friends we anticipate that we will achieve our goal and will continue to transform the arts and sciences at Penn.

FACULTY SUPPORT

STUDENT FINANCIAL AID

UNDERGRADUATE EDUCATION

FACILITIES PROJECTS

All Figures Current As Of June 30, 2012.
The School gratefully acknowledges the following gifts of $1 million or more made in 2011-2012. These contributions, and all gifts in support of the Making History in the Arts and Sciences Campaign, catalyze student and faculty achievement across the School, at Penn and beyond.

The Bill and Melinda Gates Foundation made a two-year grant for a study led by Angela Duckworth, Assistant Professor, Psychology, titled “Understanding and Increasing College Persistence.”

Gifts in support of the construction of the Neural and Behavioral Sciences Building were made by Michael J. Price, W’79, and Vikki Price; Julie Breier Seaman, C’86, and Jeffrey R. Seaman, W’83, parents; David M. Silfen, C’66, and Lyn G. Silfen, parents, and two anonymous donors.

Sarah Wilder Fuller, CW’71, parent, made a gift to help establish a new endowed professorship. Andrea Mitchell, CW’67, and Alan Greenspan endowed the Andrea Mitchell University Professorship through the Penn Integrates Knowledge Initiative. The RRL Professorship was established with an anonymous gift.

Several gifts were made in support of one of the School's most important priorities—financial aid for students in the College:

- The Bok Family Foundation, Roxanne Conisha Bok, C’81, and Scott L. Bok, C’81, W’81, L’84, established the Bok Family Scholarship Fund.
- A gift from the Howard Kurz Family Foundation, Nancy Lewson Kurz, C’80, and Howard A. Kurz, C’79, parents, established the Kurz Family Endowed Scholarship.
- William J. Levy, W’57, L’64, made a new gift in support of the William J. Levy Endowed Scholarship.
- Marc E. Platt, C’79, and Julie Beren Platt, C’79, parents, made a new gift in support of the Julie Beren Platt and Marc E. Platt Endowed Scholarship.
- Curtis J. Schenker, C’80, established the Schenker Family Foundation Scholarship.

P. Roy Vagelos, M.D., C’50, Hon’99, and Diana Vagelos, parents, made a gift to create a new undergraduate sciences program—the Vagelos Integrated Program in Energy Research (VIPER).

A gift from Paul C. Williams, W’67, parent, will support programs in the School of Arts and Sciences, as well as the Paul Williams Family Endowed Scholarship.

An anonymous gift established the Emerson Fellows Program at the Barbara and Edward Netter Center for Community Partnerships. The program will strengthen Penn’s university-assisted community schools in West Philadelphia and nationally.

An anonymous gift established an endowed fund to provide support to the Cinema Studies Program.

An anonymous gift was made to support scholarships, internships and the Parents Program.

An anonymous gift established the Moon Family Fellowship Fund.
SUPPORTERS OF THE SCHOOL OF ARTS AND SCIENCES

We are pleased to recognize the following donors who have enhanced the excellence of the School of Arts and Sciences. They embody the spirit of the School with their dedication to achieving and maintaining distinction in the liberal arts. They demonstrate a unique awareness of the importance of balancing tradition and innovation in higher education and champion both in equal measure. Their vision informs our pursuit of excellence, and their generous support moves us forward.
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