Columbia Engineering *Plus*

Columbia Engineering *Plus*

Aerial view of Columbia campus with Columbia Engineering-affiliated buildings highlighted in blue

Go to one of the oldest and most distinguished engineering programs in the country, where leadership, entrepreneurship, groundbreaking innovation, and social responsibility are part of the air you breathe.

Don't just be an "engineer." **Be a Columbia engineer.** It will make all the difference.

1
College entrepreneurs attend PitchFest, where students take 90 seconds to "pitch" their ideas for new ventures and products to industry leaders.

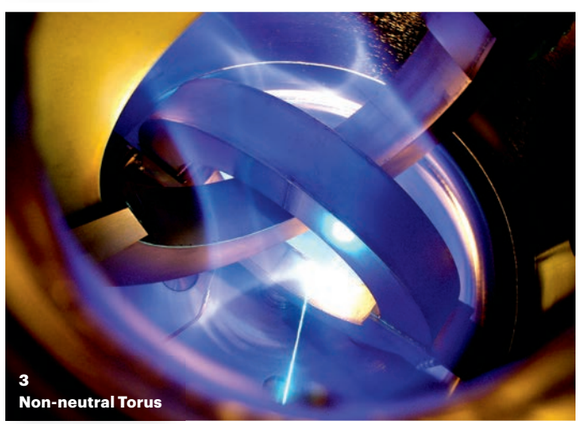
2
With a nearly $1 million federal grant, Columbia Engineers are studying cracking and collapsing polar ice sheets to better understand their link to global warming.

3
A photo of the Columbia Non-neutral Torus, a small stellarator at the Columbia Plasma Physics Laboratory designed to conduct the first investigation of non-neutral plasmas confined on magnetic surfaces.

4
The Combustion & Catalysis Laboratory focuses on converting carbon-based material into something useful (such as greenhouse gases into fuel).


1
PitchFest


2
Climate Change


3
Non-neutral Torus


4
Combustion and Catalysis Laboratory

Columbia Engineering's Better World BluePrint

Columbia Engineering is believing that engineering is essential to a safer, healthier — even happier — world and future.

Our way of engineering means joining some of today's smartest, most versatile young people to collaborate on high-impact research with professors whose patented ideas and inventions generate more income than almost any other university.

It means gaining the tangible skills companies look for so that you are technically astute — able to design, build, and test your ideas — while also able to think about problems in a broader context so you can bring creative ideas to the table.

It means working on socially responsible, culturally appropriate and environmentally sustainable solutions from day one.

It means immersing yourself in a university known around the world for its field-shaping thinkers in every discipline — not only in science and engineering but also in business, economics, law, design, media, and philosophy.

Columbia Engineering means not limiting yourself to one-dimensional engineering but rather gaining a deep understanding of the world itself before you try solving its greatest challenges.

Going to Columbia Engineering means becoming one of the most sought after young leaders of your generation no matter what field(s) you choose, from biomedical, chemical, mechanical, and financial engineering to environmental law, nanotechnology, computer science, or medicine.

It's a blueprint that calls for living in a global capital of innovation, entrepreneurship, opportunity, and inspiration, otherwise known as New York City.

Our blueprint for a better world is a formula for leaders who are ready to solve society's most pressing needs. We invite you to make it your formula too.

1
Engineering Revolution

Engineering Revolution

What do curing disease, cyber security, investment banking, renewable energy, and digital media all have in common? Engineering. No silo-confined discipline but a transferable, transformational knowledge base, engineering has become a key to solving many of the world's most pressing problems. Columbia Engineers are leading this revolution. Here's where we've been and where we're going.

1754
Founded as **King's College**, Columbia University has always been an institution of and for engineers. Among other disciplines, the University's original charter laid out a plan to teach "the arts of Number and Measuring, of Surveying and Navigation ... the knowledge of ... various kinds of Meteors, Stones, Mines and Minerals, Plants and Animals, and everything useful for the Comfort, the Convenience and Elegance of Life."

1815
John Stevens, Class of 1768, procured patents in early steamboat technology; received the first railroad charter in United States.

1864
Columbia founds **the School of Mines**, the first in the U.S. and the foundation for today's Columbia Engineering.

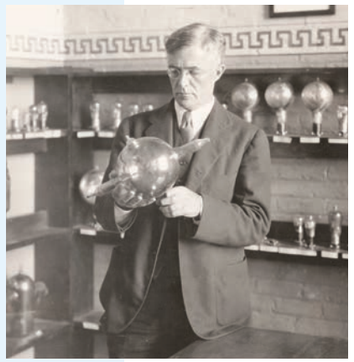
1899
Michael Idvorsky Pupin, Class of 1883, invented the "Pupin coil," extending the range of long-distance telephones.

1904
William Barclay Parsons, Class of 1882, was the chief engineer of New York City's first subway system.

1910
In 1910, Professor and future Nobelist **Thomas Hunt Morgan**'s research on fruit flies led him to develop the chromosome theory of heredity—the cornerstone of modern genetics.

1913
Edwin Howard Armstrong, Class of 1913, invented the superheterodyne circuit and developed the method of frequency modulation (FM) for radio broadcasting.

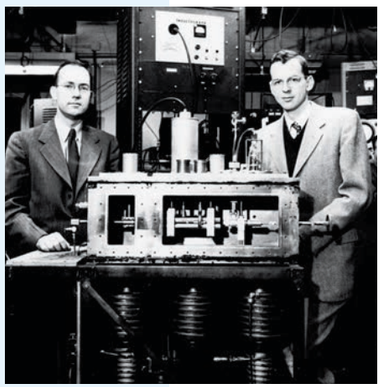
1932
Irving Langmuir, Class of 1903, invented the gas-filled tungsten lamp; research in monolayering and surface chemistry led to a Nobel Prize in chemistry in 1932.



1954
Admiral **Hyman George Rickover**, Class of 1929, served during the Second World War as head of the electrical section of the Navy's Bureau of Ships. He directed the planning and construction of the world's first nuclear submarine, launched in 1954.

1956
Joseph Engelberger, Class of 1946, was the father of modern robotics, founding the world's first robotics company.

1964
Dr. **Charles Hard Townes** shares the Nobel Prize in Physics for his work at Columbia in quantum electronics that helped develop laser technology.

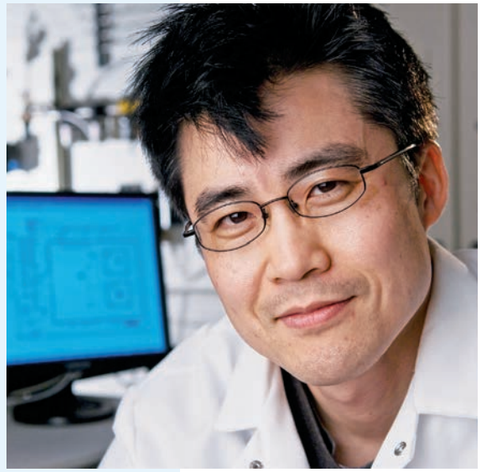


1978
Edmund DiGiulio, Class of 1950, received both an Oscar and an Emmy for his development of the Steadicam and other specialty cameras designed especially for Stanley Kubrick and now used extensively by movie directors.

1982
Emerita Electrical Engineering Professor **Gertrude Neumark Rothchild** was inducted as a fellow of the American Physical Society in 1982 for her research improving light emtting and laser diodes now used in many cellphones, flat-screen televisions, and Blu-ray disc players.

1754 1850 1900 1940 1960 1980

Columbia Engineering's uniquely broad and rigorous education is a student's best preparation for a leadership role in engineering or in any of the diverse career paths our graduates follow. Proof of the effectiveness of our approach is the fact that the world has long embraced the work of Columbia Engineers, who continue to distinguish themselves in almost every field of human endeavor.



1990

1996
A named inventor in multiple patents, Applied Physics and Applied Mathematics Professor **James Im**'s process for developing high-quality silicon film is playing a crucial role in the latest generation of flat-screens. Top display makers, including LG Display, Sharp, and Samsung, have already licensed this technology.

1997
Columbia Engineering is officially named **The Fu Foundation School of Engineering and Applied Science** in honor of the late Chinese philanthropist Z.Y. Fu, who gave the school $26 million to bring the best and brightest faculty and students to Columbia Engineering.

1997
Robert C. Merton, Class of 1966, won the Nobel Prize in Economics for his role in developing a formula for the valuation of stock options.

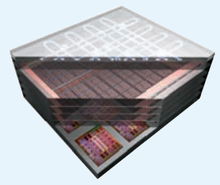
1996
Computer Science Professor **Shree Nayar** invented the first 360-degree camera in 1996; he also created the BigShot, low-cost cameras used to teach engineering concepts to children in high-need populations.

1998
Professor of Applied Physics **Horst Stormer** won the Nobel Prize for Physics for his discovery of a new form of quantum fluid with fractionally charged excitations.

2000

2001
Applied Mathematics Professor **Chris Wiggins**, who joined SEAS in 2001, is using data-driven modeling to determine how to turn off cancer genes.

2001
Electrical Engineering Professor **Keren Bergman**, who joined SEAS in 2001, is working to speed up the Internet. Her central research project involves the fiber optic network—the portion of the Web that consists of optical fibers over which data can be sent in the form of light waves. Her work has captured the attention of industry partners like Alcatel-Lucent Bell Labs and AT&T Labs Research.



$$d\ln(r) = [\theta_t + \frac{\sigma_t'}{\sigma_t}\ln(r)]dt + \sigma_t\, dW_t$$

2005
Industrial Engineering and Operations Research Professor **Emanuel Derman** developed one of the first interest rate models and his memoir, *My Life as a Quant: Reflections on Physics and Finance,* was selected as one of *Business Week*'s top ten books of 2005.

2003
Elisa Konofagou, an associate professor of biomedical engineering and radiology, is pioneering new uses for an imaging technology that is radiation free. She joined SEAS in 2003.

2002
Michael J. Massimino, Class of 1984, was one of two NASA astronauts aboard the Columbia shuttle mission which successfully upgraded the Hubble Space Telescope (he was also the first person to Tweet from space).

2002
Computer Science Professor **Tony Jebara** is a coinventor and holds multiple patents in vision, learning, and spatio-temporal modeling that have social media and face recognition applications. He joined SEAS in 2002.

2004
Earth and Environmental Engineering Professor **Klaus Lackner**, who joined SEAS in 2004, is developing "artificial trees" that will scrub carbon dioxide out of the atmosphere in much the same way that real trees do.

2007
Professor **Ah-Hyung (Alissa) Park** is developing an efficient, cost-effective energy conversion system that turns non-recyclable plastics into jet fuel.

2008
A cofounder of the Columbia Water Center, Earth and Environmental Engineering Professor **Upmanu Lall** is working to solve the global consumption crisis. His work focuses on tripling water efficiency by changing the way farmers water crops.

2008
Mechanical Engineering Professors **Jeffrey Kysar** and **James Hone** were the first to determine the actual strength of graphene, the strongest material ever measured.

2008
Biomedical Engineering Professor **Gordana Vunjak-Novakovic** created the first viable, anatomically shaped human bone and was inducted into the Women in Technology International Hall of Fame.

2010
Mechanical Engineering Professor **Kristin Myers** is helping to pioneer a new pan-disciplinary field CyberBioPhysical™ Systems at Columbia by studying the engineering behind pregnancy. Her ultimate goal is to prevent miscarriages and preterm labor.

2010
Civil Engineering and Engineering Mechanics Professor **Huiming Yin** is developing roofing materials that double as solar panels.

2011
Popular Science magazine named Computer Science Professor **Eitan Grinspun** among its "Brilliant 10," the magazine's annual list of the top 10 researchers in the United States. Grinspun studies the basic rules of motion and turns them into computer programs that are animating Hollywood movies and creating new tools for graphic designers.

2011
Kartik Chandran, associate professor of Earth & Environmental Engineering, is awarded $1.5 million from the Bill & Melinda Gates Foundation to develop technology that will convert waste treatment facilities into biorefineries, a practical boon for poor and resource-starved regions.

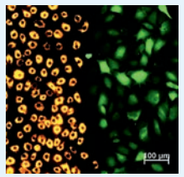
2011
Columbia Engineering became home to the City of New York's **Urban Technology Innovation Center**. The Center connects the latest scientific developments, green building technology companies, and building owners in New York to build a greater, greener New York.

2010

2009
Funding by a multi-million dollar grant from the National Institutes of Health, Mechanical Engineering and Biomedical Engineering Professor **Gerard Ateshian** is working to grow artificial cartilage in his lab that's as strong and resilient as the native tissue.

2009
Computer Science Professor **Peter Allen** co-published his leading-edge work on building disposable surgical robots.

2009
Helen Lu, associate professor of biomedical engineering, received the Presidential Early Career Award for Scientists and Engineers (PECASE)—the nation's highest honor for young scientists. Lu focuses on biological interfaces between different types of connective tissues and how to re-establish distinct tissue-to-tissue boundaries post-injury.



2010
Civil Engineering and Engineering Mechanics Professor **Patricia Culligan** is working to overhaul the massive, centralized infrastructure projects that are hallmarks of modern civil engineering, replacing them with smaller, more decentralized systems. She was the principal investigator for the Columbia Green Roof Consortium, which runs New York City's first-ever network of green roof research stations. In 2010, she helped launch Columbia's new major in sustainable development.

"In our classrooms and laboratories, the scientific breakthroughs of the past imbue the ideas and innovation of the present to incubate novel solutions to meet the challenges of today and of the future."

FENIOSKY PEÑA-MORA
Dean, Columbia Engineering
Columbia Engineering Convocation, August 30, 2010

2
An Education for Engineers Who Lead

A Combination You Can't Find Anywhere Else

Columbia Engineering's unique program includes an unparalleled breadth and depth of majors and minors, a first-year design course, professional-level courses, hands-on design projects, research in New York City and around the world, and Columbia's legendary Core Curriculum. It's a combination you can't find anywhere else.

The Columbia Engineering Core

The Art of Engineering:
First-Year Design Course
Calculus
Physics
Chemistry
Computer Science
Economics
Physical Education

Professional-Level Course

Firsthand experience with the most current skills, practices and ideas in the field. A sampling of courses includes:

- Atomic-Scale Engineering of New Materials
- Design of Buildings, Bridges, and Spacecraft
- Engineering in Medicine
- Molecular Engineering and Product Design
- A Better Planet by Design
- Physics of the Human Body
- Introduction to Electrical Engineering, with Laboratory in Circuit Design
- Engineering Graphics
- Mechanical Engineering: Micro-Machines to Jumbo Jets

16 Areas of Study

Majors

Applied Mathematics
Applied Physics
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Engineering
Computer Science
Earth and Environmental Engineering
Electrical Engineering
Financial Engineering
Engineering Mechanics
Engineering Management Systems
Industrial Engineering
Materials Science and Engineering
Mechanical Engineering
Operations Research

Liberal Arts and Engineering Minors

Engineering Minors

Applied Mathematics
Applied Physics
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Science
Earth and Environmental Engineering
Electrical Engineering
Engineering Mechanics
Entrepreneurship and Innovation
Industrial Engineering
Materials Science and Engineering
Mechanical Engineering
Operations Research
Sustainable Engineering

Liberal Arts Minors

Architecture
Art History
Dance
East Asian Studies
Economics
English and Comparative Literature
French
French and Francophone Studies
German
Greek
Hispanic Studies
History
Latin
Middle Eastern, South Asian, and African Studies
Music
Philosophy
Political Science
Psychology
Religion
Sociology
Statistics

Research, Internship, and Entrepreneurship Opportunities in New York City and the World

Undergraduate Research Involvement Program

400+ research positions working with prizewinning faculty reserved for engineering undergraduates.

Engaged Entrepreneurship Program

Promotes innovation and entrepreneurship through interdisciplinary minors; student challenges such as the Columbia Venture Competition that offer project opportunities and prize money; support from national and international experts through the Entrepreneurship Advisory Board; outreach in New York via the Columbia-Harlem Small Business Development.

Science Technology Engineering Program (STEP)

Offers Columbia students high-quality internship experiences in a comprehensive array of engineering fields through alumni and employer partnerships. Recent opportunities include design engineering, cancer research, software development, and nanotechnology.

Global Internships

Every summer Columbia Engineering students intern in companies, NGOs, and labs around the world through several established global internship programs in Germany, Scandinavia, Brazil, France, and multiple cities in Asia and Africa.

Columbia Affiliate Research

Not only does Columbia have faculty and labs doing pioneering research in nearly every sub-field of every discipline, affiliated institutions like NASA Goddard Institute for Space Studies and Nevis Physics Laboratories make the research possibilities virtually limitless.

(More on research, New York City, and the world in the next chapters.)

The Columbia College Core

Columbia Engineering students take about half of the Columbia College Core.

Literature Humanities,
Contemporary Civilization, or
Global Core
Art Humanities or Music Humanities
University Writing

Columbia's School of Mines was founded in 1864 and was the first mining school in the United States. The School awarded the first Columbia Ph.D. in 1875 and was the keystone for today's Fu Foundation School of Engineering and Applied Science. Le Marteleur (The Metallurgist), created by the Belgian sculptor Constantin Meunier, was a class gift from one of the early School of Mines classes (1889) and stands in the Columbia Engineering courtyard.

How does Columbia's renowned Core Curriculum make you a better engineer?

Because in order to find solutions to the world's most pressing problems, you have to fully understand the world around you.

"I knew that I had to find a university that touched not only on the technical dimension but also on the human dimension - Columbia's Core Curriculum did just that. As I refined my understanding of humanitarian relief efforts in my Supply Chain Management course, in my Contemporary Civilization class I learned about philosophy and world religions, which strengthened my understanding of others and honed my sense of ethical duty. It is more important than ever that engineers find solutions with consideration not only to the latest engineering knowledge but also to the impacts on those on the receiving end of those solutions."

Carmen Zapata
SEAS '07
Associate, Advanced Analytics
Booz Allen Hamilton
Supports Department of Homeland Security and Immigrations and Customs Enforcement

Civil Engineering and Engineering Mechanics Professor Patricia Culligan's laboratory. Her research focuses on geoenvironmental engineering, porous media flow and transport, urban sustainability, and geotechnical centrifuge modeling. She teaches Engineering for Developing Communities, Urban Ecology Studio, and works with students on independent studies and research. (Read more about her on page 10.)

Why do we give you over 20 minors in the liberal arts, plus innovative interdisciplinary minors in emerging fields from which to choose?

Because great engineers see problems from multiple perspectives.

"In managing hardware and software engineering teams I've found that the most difficult challenges in engineering are often not engineering problems. These challenges involve understanding cultural boundaries, organizational behavior, and making a decision on what to do (versus how to do it). Columbia prepared me to navigate not only the technical challenges, but also those that require you to reach beyond your knowledge base and comfort zone and be a leader."

Stephen Wang
SEAS '06
Project manager for
top Silicon Valley company
(household name that likes to remain nameless in publications such as this)

Rather than general education requirements, Columbia College's Core Curriculum is a single set of small, discussion-based seminars taught by leading professors in every department. Columbia Engineering and Columbia College students come together to discuss the groundbreaking ideas in timeless works such Plato's *Republic*.

Mechanical Engineering Professor Elon J. Terrell's research involving lubricated gearbox systems, such as those used in wind turbines, could be the first to integrally connect fluid mechanics, solid mechanics, and particle dynamics applicable to several industries. He teaches Tribology: Friction, Lubrication and Wear as well as individual honors tutorials and project courses.

Butler Library is a favorite study spot. It is the main library within the Columbia University system, which is one of the ten largest academic library systems in the nation.

Q

Why do we immerse you in a hands-on design course as soon as you arrive? Why does every major include preprofessional courses with knowledge and experience fresh from the field?

A

Because engineering has to be tested in the real world and applied to real problems.

"Senior year I got to help Professor Shree Nayar develop an online curriculum for BigShot, a build-it-yourself digital camera designed to expose kids to science, engineering, and photography. My favorite moment was field testing the camera with real kids in Japan. It was the first time a project of mine made such a big impact."

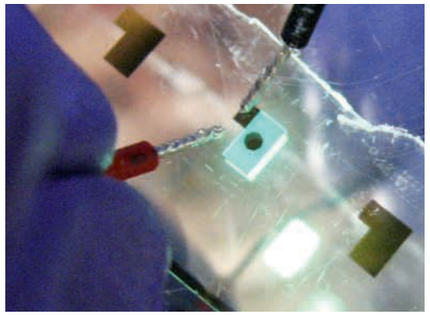
Brian Smith
SEAS '09
Ph.D. student in the Computer Vision Laboratory at Columbia

Why do we do what other engineering schools don't? Because we don't just educate great engineers. **We educate great engineers, global citizens, and entrepreneurial thinkers. We educate leaders.** We are a different kind of engineering school.

3
Real Research, Real Impact

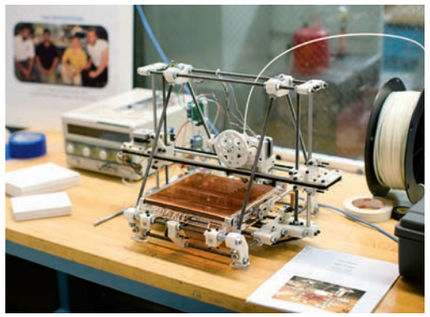
As a Columbia engineer you will be part of fascinating research endeavors on the cusp of breakthroughs that have a major impact on the way we live our lives today and tomorrow. You will be mentored by superstars in their fields. You will be the first author on research papers and go on to present your work at national conferences. You will be part of a great tradition of socially responsible engineering and a close community of scientists, engineers, and innovators. **The work you do here will make you one of the next generation of leaders.**

Senior Design Projects

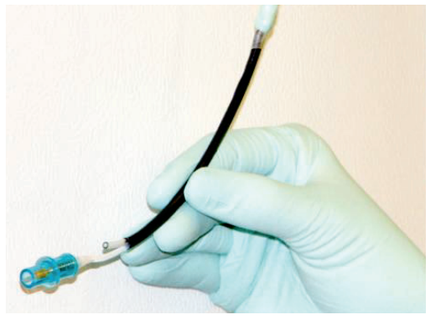


Epilepsy Brain Sensor for In Vivo Reflectance Observation

Windmill-Driven Water Pump



Rapid Prototyper 3D Printer

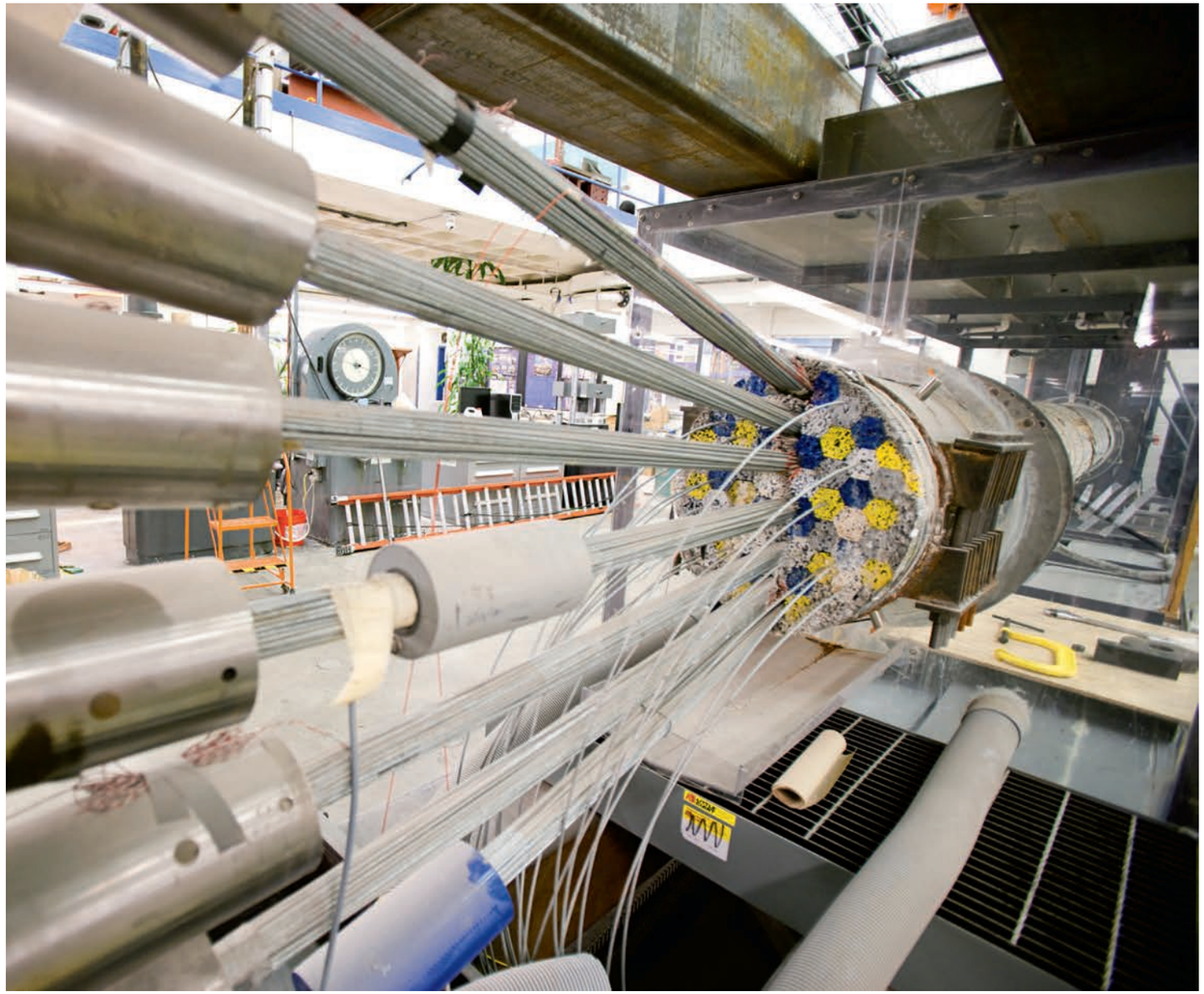


Novel Ventriculoperitoneal Shunt

Some recent senior design projects range from a rapid prototyper 3D printer to a nationally award-winning neonatal vital signs monitor to a windmill-driven water pump; senior engineering capstone projects allow students to integrate all that they've learned to design, test, and build the novel, the viable, and the useful. The projects often lead to new companies and patents and even future careers.

A team of Columbia Engineering students working with Electrical Engineering Professor Ken Shepard at the Bioelectronics Systems Lab. Chemistry, biology, and integrated circuit design come together in the lab to build micrometer-scale arrays of sensors that can detect biological molecules or select strands of DNA.

Carleton Strength of Materials Laboratory, home to one of the country's largest centrifuges, has a rich history of supporting the New York engineering community with specialty testing in a wide variety of problems, ranging from high-strength manhole covers to full-scale shoring system tests, as well as fatigue testing of suspension bridge wires and monotonic and cyclical concrete masonry block testing.



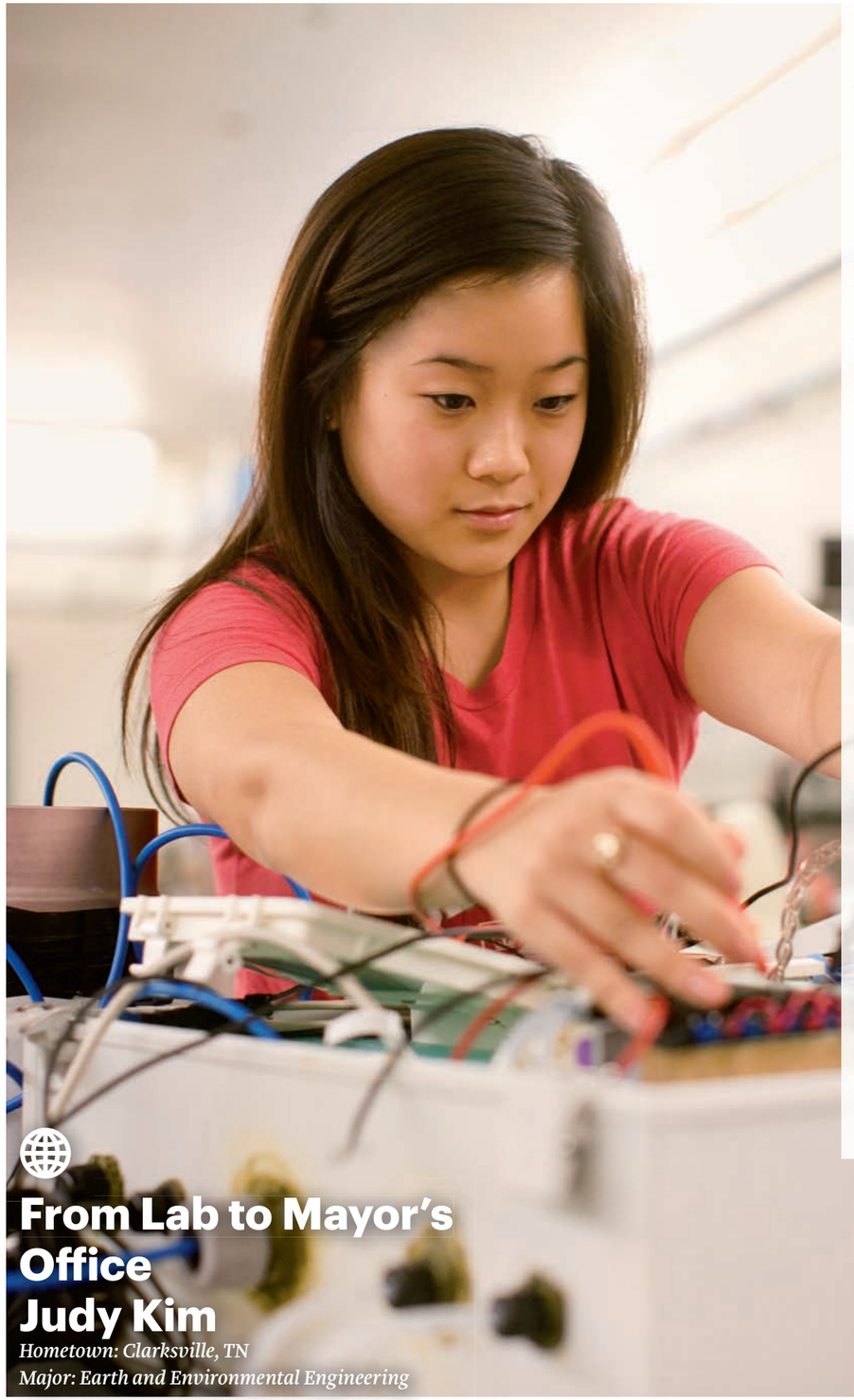
Earth and Environmental Engineering major Henry Jones has gained hands-on experience working in Columbia's Department of Mechanical Engineering. He not only plans to use that experience working in industry, but he also uses his knowledge of the engineering problem-solving process now as a mentor for a high school robotics team that competes around the country.

Climate Chemistry
Joe Barakat

Hometown: Chadds Ford, PA
Major: Chemical Engineering

"From my very first year at Columbia, I worked on a project that had a direct impact on a church in East Harlem. The next year when I found out one of my courses was being taught by a leader in climate change studies, Professor Faye McNeill, I jumped at the opportunity to work in her lab." Ultimately, Joe was able to develop his own study on ultrafine particle emissions and learn how to model chemical reactions in the atmosphere via computational chemistry methods.

Professor of Chemical Engineering **Faye McNeill** received a prestigious CAREER Award from the National Science Foundation to fund her research into one of the biggest problems facing climate scientists: how aerosol particles and ice in the environment profoundly influence Earth's climate and atmosphere.



From Lab to Mayor's Office
Judy Kim

Hometown: Clarksville, TN
Major: Earth and Environmental Engineering

"As a rising sophomore I worked in Professor Ah-Hyung (Alissa) Park's lab. Working in the lab gave me the chance to delve into areas of environmental engineering I was not aware of that ended up being my real passion — environmental bioremediation techniques; more specifically, within brownfields and water contamination." Now Judy is working with the Mayor's Office of Environmental Remediation, focusing on risk assessment of contaminants in brownfield sites in the New York City area.

Professor in Applied Climate Science **Ah-Hyung (Alissa) Park** has been called the "Carbon Lady." She is one of the leading experts on the many forms carbon takes as humans transform and move it through the environment. Her path-breaking work may help pave the way to a future in which society obtains energy from a wide range of sustainable sources and deals with its excess carbon in surprising ways.

Vital Designs
Morris Kaunda Michael

Hometown: Syracuse, NY, via Sudan
Major: Biomedical Engineering

"All I've known is living the refugee life. But I've always had arms stretching out to help me." Morris is a former Sudanese refugee. He is also a key member of Professor Sam Sia's research team and plans to become a doctor. "I feel like I owe it to the world to help people around me." His senior design project is a vital signs monitor for developing countries. Such devices usually start at $1,000 but his would cost between $50 and $200. Plans are already underway to test it in Uganda.

Professor of Biomedical Engineering **Sam Sia** has received the National Science Foundation's CAREER Award and been called one of the World's Top Young Innovators for his groundbreaking work in biotechnology and medicine. Sia uses microfluidics to build low-cost handheld devices for performing sophisticated medical tests on a small microchip. His lab-on-a-chip device allows for diagnosis of multiple diseases on the spot.

If you're a Columbia Engineer,

you're doing research using state-of-the-art labs and equipment and an almost overwhelming array of basic and advanced research installations. Centers include:

- Botwinick Multimedia Learning Lab
- Brookhaven National Laboratory
- Carleton Strength of Materials Laboratory
- Center for Electron Transport in Molecular Nanostructures
- Columbia High-beta Tokamak
- Geotechnical Centrifuge
- Laser Diagnostics and Solid-State Physics Lab
- Materials Research Science and Engineering Center
- Microelectronics Sciences Laboratories

You're working with professors at the cutting edge of their fields

in one of Columbia's 200 research centers and institutes. Research centers like the Lamont-Doherty Earth Observatory, where the concept of plate tectonics was formulated, currently home to hundreds of researchers studying the origin, evolution, and future of the natural world, but also:

- Center for Computational Learning Systems
- Center for Integrated Science and Engineering
- Columbia Water Center
- Earth Institute at Columbia
- Goddard Institute for Space Studies
- Lenfest Center for Sustainable Energy

And you're part of Columbia Engineering's Undergraduate Research Involvement Program,

which gets you involved in projects like:

- Brain imaging of psychological disorders
- DNA cloning
- Electrophysiological measurements and signal processing
- Laser probe of thin films and thin film processing
- Modeling and simulation of genetic networks
- Nanotechnology for solar energy and fuel cells
- Recovery of heavy metals by recycling of industrial wastes
- Reliability of fatigue-sensitive structures, including aircraft and ships
- Response of materials to ultrasonic excitation
- Seismic behavior of reinforced soil structures
- Space physics, microwave heating, and plasma sources
- Tissue engineering of cartilage-bone interface
- Virtual worlds and augmented reality

4

New York and the Next Big Thing

Routes to Inspiration

Pioneering work in the built environment from skyscrapers to long-span bridges, from subways to water supply systems. Continuous innovation in efficiency and sustainability, resulting in one of the smallest carbon footprints of any major city on Earth. Global leaders in research. Silicon Alley – it's all here. New York City puts our students and faculty at the nexus of every next big thing on campus and off. While you may find the spark of a new idea along any New York avenue, here are a few spots guaranteed to inspire whether you're researching, interning, or just visiting.

Museum Mile

Nine museums along Fifth Avenue and across from Central Park: Museum for African Art, El Museo del Barrio, Museum of the City of New York, The Jewish Museum, National Academy Museum and School of Fine Arts, Solomon R. Guggenheim Museum, and Smithsonian Cooper-Hewitt National Design Museum, Metropolitan Museum of Art, Goethe House German Cultural Center.

New Jersey's Pharmaceutical Corridor

What makes **Columbia** a great place for research? In part, it's location, location, location. New York is surrounded by great collaborative opportunities, especially for engineers. **New Jersey's big pharma corridor** is a perfect example. No other area has a greater concentration of pharmaceutical research and development.

World Science Festival

Cofounded by renowned Columbia Professor of Mathematics and Physics **Brian Greene**, the **World Science Festival** takes over New York City each June. The world's leading scientific minds are joined by renowned artists and influential thinkers for a five-day celebration of science.

Rose Center for Earth and Space Featuring the New Hayden Planetarium

Columbia has **close research ties** with this major museum and research center, which is just blocks from campus.

The Intrepid Sea, Air & Space Museum

The Museum is centered on the aircraft carrier Intrepid (CVS-11), one of the most **successful ships** in U.S. history.

Silicon Alley

Many of Manhattan's tech and new media innovators like Google and DoubleClick make their home along a corridor from the **Flatiron District** down to SoHo and TriBeCa along Broadway.

Over 2,000 bridges and tunnels make New York a city of civil engineering feats. The Brooklyn Bridge (shown here) is one of the oldest suspension bridges in the United States, opening in 1883. The Holland Tunnel (1927) was the world's first vehicular tunnel. And two bridges set records as the world's longest suspension bridges when they opened, the George Washington Bridge in 1931 and the Verrazano-Narrows Bridge in 1964.

Columbia University Medical Center

On 20 acres in the Washington Heights community of northern Manhattan, our **Medical Center** provides world-class leadership in scientific research, health and medical education, and patient care with faculty from four schools (College of Physicians and Surgeons, College of Dental Medicine, School of Nursing, and Mailman School of Public Health) teaching and conducting research there.

Bronx Zoo

The **largest metropolitan zoo** in the United States. Bisected by the Bronx River with indoor and outdoor exhibits on 265 acres of park lands and naturalistic habitats.

Botanical Garden

Explore **50 diverse gardens** and plant collections across 250 acres.

Grand Central

New York is the largest transportation hub in the world and **Grand Central** is an enduring symbol of that fact. One of the city's most famous landmarks and listed on the National Register of Historic Places, the station was an innovation in transit-hub design that continues to inspire today.

New York Hall of Science

Built initially as a pavilion for the 1964 World's Fair, the **New York Hall of Science** is now New York City's hands-on science and technology center.

Columbia University

The Museum of Arts and Design

The Museum of Arts and Design explores the intersection of art, design, and craft today.

World Health Organization

WHO is part of the United Nations — responsible for leadership on global health matters, shaping the health research agenda, providing technical support to countries, and assessing health trends.

DUMBO

The **Down Under the Manhattan Bridge Overpass (DUMBO)** section of Brooklyn is one of the newest hubs for start-up companies. DUMBO includes "Silicon Beach," which had 65 digital companies in a five-block radius at last count — the largest being Etsy, the online site for vintage and handmade clothing and other items. DUMBO is also the first New York City neighborhood to offer free wireless on its streets and in parks and plazas.

Wall Street

You'll find just as many of today's investment bankers with engineering degrees as MBAs. Home to the world's largest stock exchange, **Wall Street** makes New York City one of the world's prime financial centers.

Real-World Symbiosis: Your Professional Network

Our city is the front door to innovation, and opportunity is always knocking. In this world capital of culture, media, science, education, health, politics, finance, and technology, Columbia Engineering's network can connect you to thousands of internships, job opportunities, and mentors in coveted firms and organizations. Access is key for an engineer and that's what you have when you live in a city that is home to an amazing percentage of the world's visionaries, experts, iconic and next-generation institutions, and global leaders. Active, global, fresh, and exciting, every opportunity that's now and next is here.

Columbia's STEP (Science, Technology, Engineering Program) Internships

Our STEP summer program places engineering students with firms across the city and around the country. Here are some of the companies, start-ups, and organizations Columbia Engineers are interning and working with:

AOL
Alcatel-Lucent
American Express
Arup

BASF
Bloomberg L.P.
Broadcom
Brookhaven National Laboratory
Brooklyn Motorized Corporation
Bug Labs
Buro Happold

CIA
Citigroup
CodeGreen Solutions
Columbia Water Center
Con Edison
Credit Suisse

E*TRADE
ECI Technology
Ernst & Young
FactSet Research Corporation
GZA GeoEnvironmental, Inc.
General Dynamics Electric Boat
Goldman Sachs
Google
Greensulate

HSBC Bank USA
Hazen and Sawyer
HEICO Aerospace
Institute of Bioengineering and Nanotechnology
Institute for Myeloma & Bone Cancer Research
Integral Derivatives LLC

Jaros, Baum & Bolles Consulting Engineers
Jefferson Laboratory
Langan Engineering & Environmental Services, Inc.
LimeWire LLC
Lucasfilm

Major League Baseball
MediaMerx
Merck
Merrill Lynch
Micro Empowering
Microsoft
Morgan Stanley

NASA
New York City Mayor's Office of Operations
New York State Department of Transportation
Northrop Grumman
Parsons Brinckerhoff
Pfizer

Rockstar Games
R3 Energy
Sony Music Entertainment
Sunoco
Time Warner
Tissue Engineering Group — University of Melbourne

U.S. Patent and Trademark Office
U.S. Department of State
U.S. Department of Transportation
U.S. Foreign Service
Van Dam Engineering
VMWare

Big name companies like AOL, Citigroup, Google, and Goldman Sachs are a subway ride away from campus. The #1 Train, which runs the length of the city, has a stop steps from Columbia's main entrance.

"The internships and job opportunities available to you while in New York make it all the more worthwhile to gain a rigorous and holistic engineering education."

JOHN CHAVEZ
Fulshear, TX; Biomedical Engineering and Applied Math

Global Engineering Experience

Engineering is synonymous with a global perspective. At least it should be. Urbanization, public health, poverty, sustainability — these are global challenges that engineers are uniquely positioned to tackle. Global engineering for the good of the world is at the heart of Columbia Engineering. The international flow of ideas through the work of students and faculty here leads to cooperation and partnerships with other universities, communities, companies, NGOs and governmental bodies around the world. Owning an obligation to help advance society is the history of Columbia Engineering. It also happens to be the future of engineering. We've just been doing it all along.

Global Centers

We have Global Centers in Mumbai, India; Paris, France; Beijing, China; and Amman, Jordan, with new centers opening or recently opened in Nairobi, Kenya; Santiago, Chile; and Istanbul, Turkey. Columbia Engineering also partners with Tsinghua University in Beijing to collaborate in cutting-edge genomics and with Jordan University for Science and Technology in biomedical engineering and nano-technology.

The Columbia University Middle East Research Center is headquartered in Amman, Jordan, providing a base for research and projects throughout the region.

Global Internships

Columbia Engineering has several established internship programs in Brazil, France, Germany, and Scandinavia. Intern with the Pasteur Institute in Paris, gaining hands-on laboratory experience in biomedical engineering. Work in forestry and life sciences in Finland or sustainable engineering in Brazil. The Columbia Experience Overseas (CEO) program also offers students dozens of internship experiences.

Columbia Engineering undergraduates can participate in a 12-week international research experience in sustainable engineering co-led by the University of Campinas.

Global Social Responsibility Projects

Students here have abundant opportunities to work with groundbreaking faculty like Professor of Earth and Environmental Engineering Kartik Chandran, who has developed a revolutionary new model in water, sanitation, and energy. Or Professor of Mechanical Engineering Vijay Modi, who leads the U.N. Millennium Project's efforts on energy services and rural infrastructure. Given our mission of global social impact, it's no coincidence that Columbia's chapter of Engineers Without Borders (EWB) was one of the first in the country. Our EWB chapter works to improve the lives of others locally and around the world through creative, sustainable engineering solutions.

Columbia's EWB has current projects in Dubai, Morocco, and Uganda.

Study Abroad

In addition to the almost 200 global study options available to both Columbia Engineering and Columbia College students, engineering students can study abroad through programs designed specifically for them with Columbia partner universities, including École Polytechnique or École Centrale de Paris in France and University College London or Imperial College in the United Kingdom.

Study in Paris while continuing your major in computer science, mechanical or civil engineering, or applied mathematics and physics.

Global Alumni

From pioneering advances in international shipping and open management styles to leading universities and aerospace companies, Columbia Engineering graduates are using their expertise in finance and banking, music and media, biotech and education to make positive and significant impact in the international arena.

The Columbia University network is 250,000 strong with long-standing alumni chapters in cities around the world, including three in China.

"Our role as engineers isn't to go into a community and say, 'This is wrong. We'll fix it.' Our role is to listen to the people in a community and understand their goals and work with them to achieve them."

PATRICIA CULLIGAN
Professor of Civil Engineering and Engineering Mechanics

5
Our Students Define Engineering *Plus*

Columbia Engineering does not live by data sets, systems, chemicals, and circuits alone. An engineering education at Columbia University is engineering *plus* a generous helping of a student's other talents and passions. You get a phenomenal engineering curriculum, faculty, and research program. Beyond that you have all of Columbia as well as New York City and the world to expand on your education in almost limitless ways. On the next few pages, read five students' personal versions of engineering *plus*.

Going to college in New York City means living in one of the largest and most diverse cities in the world, where you are at the center of every industry - research, business, technology, arts, media, publishing, and more. Going to Columbia means free and discounted tickets to theatre, concerts, and museums, ensuring you'll have access to all that New York City offers.

Not only do you get all of the advantages of New York City but also a traditional college campus with guaranteed campus housing for all four years.

Columbia Engineering

Columbia Engineering students are not only part of a world-class engineering school, they are also part of a top-ranked college of arts and sciences, and one of the premier research universities in the world.

1,400
undergraduates

9
academic departments

16
majors

400+
research positions reserved for undergraduates

40,000+
Columbia Engineering Alumni Network

40
members of the National Academy of Sciences

4, 4, 10
In the last two years alone, faculty have won the MacArthur Foundation Award (the "Genius" Award) 3 PECASE (Presidential Early Career Award for Scientists and Engineers) Awards, 4 Sloan Fellowships, and 10 NSF CAREER Awards.

20
members of the National Academy of Engineering among current faculty. That number represents 13% of the total Engineering faculty, one of the highest percentages of any school in the country.

Columbia University

4,400
Columbia College undergraduates to call your friends, classmates, teammates, and fellow Columbians

80+
areas of study from creative writing to sustainable development

80%
of undergraduate classes have fewer than 20 students

Almost
200
study abroad programs

143
Faculty in the American Academy of Arts and Sciences

79
Nobel Prize winners are Columbia alumni, faculty, or former faculty. More Nobel Laureates have graduated from or taught at Columbia than any other university in the Ivy League.

13
graduate and professional schools

4
affiliate institutions
- Barnard College
- Jewish Theological Seminary
- Teachers College
- Union Theological Seminary

22
Libraries

20+
Residence Halls

500+
student clubs and organizations

250,000
university alumni

Engineering *Plus* Theater

Lisa Mack

Hometown: Philadelphia, PA

"In high school I was always branded as a "science kid," but I've always had a passion for theatre. Being a Chemical Engineering major, I was worried I would have to leave theatre behind, but since coming to Columbia I've been able to act in, play music for, direct, and produce countless plays. How many engineers can say that they performed in a play on Broadway*? Only Columbia could create an opportunity like that. While what I learn in the classroom will help me throughout the rest of my life as an engineer, some of my favorite moments at college have been performing a Shakespearean play outside on Low Steps at midnight or seeing the cast of a play that I directed nail a performance."

* Our blackbox theatre is on Broadway, so every show I've done is technically on Broadway.

Major

Chemical Engineering, Psychology minor

Activities

Theatre, Engineering Student Council, Residential Programs (I was a Resident Adviser last year and I'm a Community Adviser this year). Volunteer at St. Luke's Hospital.

Internships and Research

I've interned with Advanced Lubrication Specialties calibrating pressure sensors of oil holding tanks. Last year I conducted atmospheric chemistry research with Chemical Engineering Professor Faye McNeil and now I am working in Chemical Engineering Professor Sanat K Kumar's lab. His lab focuses on several areas including biochemical engineering, composite materials, interfacial phenomena, nanotechnology, and polymers. I'm working on nano-composite polymer research with him.

Post-Columbia Plans

Work in the engineering industry and then go to graduate school.

60+
a capella, comedy, dance, film, music, and theatre clubs and organizations

More than a
dozen
conservatory-caliber arts majors and programs

The Varsity Show, an entirely student-run performance now in its
118th
year

The CU Arts Initiative offering
free
and discounted tickets to New York City cultural events, including Broadway shows, Lincoln Center concerts, and blockbuster films.

Arts Link

A Columbia program allowing professors to seamlessly include arts and cultural events around the city in their syllabi. Professors can also take their classes on self-guided museum tours with all costs covered by ArtsLink.

Engineering *Plus*
A Fellowship and Social Entrepreneurship
Daniel Bell

Hometown: El Paso, TX

"I chose Columbia because of the 'pluses' and I have intended to have as many as possible. One of my big pluses is being a Kenneth Cole Community Engagement and Civic Action Fellow. As a Fellow I have the opportunity to work and learn about community engagement and civic action through courses and through hands-on experience in the community during a summer internship. I've also been able to travel to Norway, England, and Italy as a student here. Another big plus for me is minoring in Entrepreneurship and Innovation so that I can start my own business one day."

Major

Electrical Engineering with minor in Entrepreneurship and Innovation

Activities

I'm very involved with the Multicultural Recruitment Committee — we host events, speak to students, and help throughout the year to bring talented students of underrepresented backgrounds to Columbia.

Internships

As a Kenneth Cole Fellow, I met Mr. Cole while spending the summer working with the Community League of the Heights. My internship focused on helping to develop a new community center in the neighborhood. I've also been invited to go to Haiti to continue community work there with the Kenneth Cole Fellows.

Post-Columbia Plans

I hope to own my own business focused on green technology and innovative ways to develop a more self-sustaining society.

Res. Inc.

The mission of the Engineering-Entrepreneurship Residential Initiative or "Res Inc." is to foster innovation and entrepreneurship through a residential community of engineering students interested in starting new ventures. It's a "dorm-cubator" — a creative, entrepreneurial environment for engineering.

Kenneth Cole Fellowships

Fashion designer Kenneth Cole established his namesake fellows program at Columbia to encourage students to become agents of social change. The program includes courses, community-based summer internships, annual colloquia, and a unique living-learning arrangement in Columbia's residence halls.

Annual Pitch-Fest

Our annual PitchFest lets you pitch your entrepreneurial ideas for companies, inventions, and applications and compete for funding to launch your business.

Megan Armstrong

Hometown: Ann Arbor, MI

Major

Biomedical Engineering

Civic Engagement

"One of the projects I'm involved in is the Columbia University Peer Health Exchange, which gives teenagers the knowledge and skills they need to make healthy decisions. Through the program, I've been trained as a public speaker, gained expertise in health topics, learned how to manage a classroom, and discovered I love teaching. When I became a leader in the program, I also learned to manage groups, which has been really useful in other organizations and on engineering projects. None of these things would have happened if I had not come to Columbia."

Activities

Columbia University Peer Health Exchange; InterVarsity Christian Fellowship of the Social Justice team leader; Columbia Outdoor Orientation Program (COOP) leader; Columbia Undergraduate Scholars Program; High School Tutor; Veritas Forum inter-faith discussion group leader

Post-Columbia Plans

I see three possible paths I may take: One is working in the biomedical engineering field, taking new technologies to parts of the world that need them. Another path would be social justice work, leading the training of social activists and their efforts at activism. The third option is med school to become a doctor of osteopathy, taking everything I've learned to parts of the world that lack adequate health care.

40+
religious/spiritual campus organizations

60+
social justice, service, and student-led initiatives, clubs, and organizations

Community Impact is one of the largest community service organizations in the Ivy League, in which 950 students participate in 25 community service programs, serving more than

8,000
people each year.

CU EMS
is a student-operated, New York State-certified, Basic Life Support (BLS) volunteer ambulance corps that provides prehospital emergency medical care, free of charge, to Columbia University's Morningside Heights neighborhood — just one way to gain hands-on healthcare experience.

Jesse Vella

Hometown: New York, NY

Major

Earth and Environmental Engineering

Varsity Soccer

"Athletics brings together students from Columbia Engineering, Columbia College, and Barnard. The athletic and academic vision here are in sync — focused on scholar-athletes at the highest level — and that creates great, well-rounded people. Being a member of Columbia's Men's Division I Varsity Soccer Team introduces a component of college life that I love. I feel honored knowing I have developed a wonderful family away from home."

Internships and Research

Biomedical internship at Columbia Presbyterian under Dr. Levine; Landmark Advisors Fund of Funds Research and Marketing Intern

Post-Columbia Plans

Environmental consulting, preferably for large-scale city infrastructure.

31
NCAA Division I Sports.

45+
Club Sports

40+
Intramural Sports

14
Ivy League championships in the last four years.

17,000
seat stadium at Baker Field, home to Columbia's football, baseball, crew, field hockey, football, lacrosse, softball, soccer, tennis, and track and field teams.

Engineering *Plus* Languages, Culture, and the Great Outdoors

Mike Linshi

Hometown: Naperville, IL

"There are so many non-engineering interests that I've been able to pursue here at Columbia. I'm very interested in learning new languages and experiencing new cultures, and I've been able to take multiple semesters of Chinese, Spanish, and Japanese classes. While I love being in a city like New York, I also have a strong interest in nature and the outdoors. As a COÖP leader (Columbia Outdoor Orientation Program), I've had the opportunity to test hiking trails in the Catskills over the summer, and share my passion for nature with a group of incoming first-years on a canoeing trip down the Delaware River in the fall semester. This year, I lived on and volunteered at an organic farm in upstate New York during spring break. I've also been volunteering at a nonprofit farm and education center in the Hudson Valley aiming to increase awareness of healthy and sustainable food systems."

Major

Industrial Engineering and Operations Research

Activities

Undergraduate Recruitment Committee. COÖP leader. Class Council.

Internships

During the summers I've had internships at an investment firm in Chicago and a management consulting firm in New York. One semester during the school year, I interned in the sales department of the major American fashion label Marc Jacobs.

Post-Columbia Plans

I'll be staying in New York and working at a management consulting firm with a focus on the financial services industry. I'm excited to stay in the city, and to be directly applying my academic background in optimization and analysis. One day, I'd really like to start my own business — something that my parents have done and that I respect and admire greatly.

Instruction in nearly

50

foreign languages

5

pre-orientation programs:

- CUE (Columbia Urban Experience) — Community service around New York City
- International Student Pre-Orientation Program (ISOP)
- 3 COÖPs (Columbia University Outdoor Orientation Programs — HOP for hiking, BOP for biking, ROP for river canoeing)

13

Environmental and outdoor clubs

- Columbia Barnard Earth Coalition
- Consilience: The Journal of Sustainable Development
- CoreFoods Food Cooperative
- Cycling
- Equestrian
- Hiking
- Kayak
- Road Runners
- Rock Climbing
- Sailing
- Ski Racing
- Students for Economic and Environmental Justice
- Triathlon

6
Future Smart

More than ever before leadership in every field requires a deep understanding of science and technology. That's "future smart." Columbia Engineering is the perfect education for such leadership because we integrate top engineering majors and research, technological innovation, and a stellar humanities education like no other engineering school can or does. Graduates define "future smart" — becoming trailblazers in every field from biomedicine and banking to education, environmentalism, and entrepreneurism to security, shipping, and social media to corporate leadership and city planning.

Designed in the Beaux-Arts style by acclaimed architects McKim, Mead, and White, the Columbia University campus has been described as one of the great urban spaces in America.

88%
admit rate to medical school, almost twice the national average, and equally high acceptance rates into the most selective graduate and professional schools

Sampling of employers hiring new SEAS graduates:

- Accenture
- AllianceBernstein
- AT&T
- BlackRock
- CitiGroup
- Deutsche Bank
- Goldman Sachs
- Google
- IBM
- JPMorgan Chase
- Teach For America

No. 1
Columbia Engineering and Columbia College are the #1 feeder schools to Columbia University Law, Medical, and Business Schools.

Trailblazing Alumni

Clues to the Universe

Just a few months after NASA astronaut Mike Massimino and his team successfully updated the Hubble Space telescope, 21 new galaxies were identified. Massimino finds himself regularly falling back on what he learned as a Columbia Engineering student. In particular, he says, it's the engineering mindset—a way of looking at a problem—that helps him the most. "Engineering teaches you how to solve problems. It teaches you to look at a problem, decide what's important, and break it down into something you can engage."

Michael J . Massimino '84
NASA Astronaut

Innovating to Educate

"From my science and engineering background, I learned discipline, problem solving, turning complexity into simplicity, managing by fact—all of these are fundamental attributes of successful engineers and, I believe, of successful leaders," says Xerox CEO Ursula Burns. In addition to leading Xerox, she was appointed by President Obama to help lead Educate to Innovate, an initiative intended to improve performance of U.S. high school students in STEM (science, technology, engineering, and math) subjects. "We need more people to pursue engineering careers, especially women and minorities, because our companies are better when we build engineering communities that are diverse.... I want to help them get there."

Ursula Burns '82
CEO, Xerox Corporation

A view of the new Northwest Corner Building, an interdisciplinary science and engineering building that includes — among other state-of-the-art resources — one of the world's largest science and engineering libraries.

Improving the Developing World

With an estimated 2.5 billion people in the world "unbanked," Citigroup CEO Vikram S. Pandit believes the banking industry can provide leadership to improve communities in the developing world partly through mobile-computing technologies that allow banking over mobile phones, which are uniquitous in those regions. "Once you get people into the financial system, studies show that economies grow faster, they do better, and they do better for their families," says Pandit. Pandit's tenure as Citi CEO caps a career in finance that began to take shape at Columbia. A native of India, Pandit earned his B.S. and M.S. degrees in electrical engineering, then his M.Phil. and Ph.D. in Business at Columbia.

Vikram S. Pandit '76
Citi CEO

Conceptualizer, Implementer, Manager

With 95 shipping vessels under her companies' control, Navios CEO Angeliki Frangou keeps an eye on global affairs that may affect international trade. There are hurricanes in the Caribbean, political unrest in the Mideast, floods in Australia, and piracy in the Indian Ocean. After spending two years as an analyst on the trading floor for Republic Bank of New York, Frangou launched her own company, with one vessel, valued at $2 million. "In the business world, the combination of conceptualizer, implementer, and manager in a single individual is very rare," wrote the British shipping magazine *Fairplay*. "Frangou is one such individual."

Angeliki Frangou '88
Navios CEO

Launching the Newest Airliners

"At Columbia, we learned the power of teamwork in engineering and in problem solving," says Jim Albaugh. "I also learned the discipline of engineering, the rewards of hard work, and, most important for my role today, that everyone has something constructive to add to any discussion or debate. Diversity of thought brings strength to Boeing, as it does to any organization."

Jim Albaugh '74
President, Boeing Commercial Airplanes

"Whether you continue in engineering, or later tackle finance, business, politics, or research, the discipline you develop as an engineering student will ground you, providing you the instincts to continually ask questions, to seek explanations beyond first impressions."

JEANE CHEN '90
VP of Software Development, Blackbaud

On Their Way

Amandine Godier-Furnémont '09
After graduating she continued at Columbia as a Ph.D. student. She holds a graduate research fellowship from the National Science Foundation and works with adult and embryonic stem cell-derived heart cells to mediate repair in the heart.

Adrian Haimovich '10
After coming to Columbia in part to work with one of the leaders in the field of computational biology, he began to conduct research focused on advances in patient care, including using support vector machine techniques to make clinical studies more efficient. He is now pursuing his M.D./Ph.D.

Chase Hensel '10
At Columbia his research focused on machine learning—teaching a computer to recognize patterns. He's developed algorithms for mining sensitive data like medical records. He interned with Google, creating a successful new product and is now a member of Google's Associate Product Management Program living in Beijing, China.

Janelle Heslop '10
A leader in Engineers Without Borders, she interned at the Center for Climate Change Law at Columbia Law School and at the Earth Institute's Millennium Villages in Rwanda Access Project. She's now an analyst at GreenOrder, a strategy consulting firm specializing in environmentally sustainable and socially responsible business.

Chelsey Roebuck '10
He founded a nonprofit organization called Emerging Leaders in Technology and Engineering, Inc. (ELiTE) that sends teams of volunteers to developing countries and offers free summer camps and education programs to students in socioeconomically disadvantaged communities.

Benny Wong '07
An entrepreneur, he is the co-creator of the highly successful subway navigation iPhone App called Exit Strategy NYC.

Departments and Majors

Departments	Majors	Student-faculty Research Portfolio
Applied Physics and Applied Mathematics	Applied Physics; Applied Mathematics; Materials Science and Engineering	Nanoscale science; advanced scientific computing; earth science; plasma physics; materials for information technologies
Biomedical Engineering	Biomedical Engineering	The intersection of engineering, physical science and biological science, biology and medicine, living systems and their behavior, biomedical systems and devices. Concentrations: biomechanics; cell and tissue engineering; biomedical imaging
Chemical Engineering	Chemical Engineering	Science and engineering of polymers and soft materials; genomics engineering; biophysics and soft matter physics; bioinductive and biomimetic materials; interfacial engineering and electrochemistry
Civil Engineering and Engineering Mechanics	Civil Engineering; Engineering Mechanics	Environmental, earthquake, and geotechnical engineering; structural control and health monitoring; flight structures and construction materials; infrastructure delivery and management; solid, fluid, and probabilistic mechanics
Computer Science	Computer Science; Computer Engineering	Computer graphics; computer-aided digital design; computer vision; databases and digital libraries; data mining and knowledge discovery; distributed systems; mobile computing; natural-language processing; networking; operating systems; programming systems; robotics; user interfaces; real-time multimedia
Earth and Environmental Engineering	Earth and Environmental Engineering	Environmentally sound extraction and processing of primary materials (minerals, fuels, water); management and development of land and water resources; recycling or disposal of used materials
Electrical Engineering	Electrical Engineering; Computer Engineering	Multimedia networking; lightwave communications; image and advanced television; laser processing; microelectronics fabrication
Industrial Engineering and Operations Research	Financial Engineering; Engineering Management Systems; Industrial Engineering; Operations Research	Financial engineering; engineering management systems; logistics; production and supply chain management; revenue management; quality control; mathematical programming; queueing theory; reliability; portfolio management; option pricing; data mining; risk management
Mechanical Engineering	Mechanical Engineering	Controls and robotics; energy and micropower generation; fluid mechanics; mechanics of materials; manufacturing; material processing; nanotechnology; orthopaedic biomechanics

Low Library, seen here in the foreground facing Butler Library and the city beyond, features the largest freestanding granite dome in the United States. The Rotunda created by the dome is the site of major prize ceremonies such as the University's presentation of the Pulitzer and Bancroft Prizes.

What makes Columbia Engineers so special?

They have knowledge and experience that are crucial for our times. They see the component parts of problems as well as the interconnections that lead to solutions. In other words, Columbia Engineers see the forest through the trees.

When you're a Columbia Engineer you have the vision and the leadership not only to see the future but to create a better one.

New Columbia Engineers celebrate their achievements and futures at graduation (Columbia Engineering hammer optional).

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212-854-2522
www.studentaffairs.columbia.edu/admissions