Columbia Engineering Plus

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Your personal path and society’s have converged at a powerful moment.

Among your generation will be a new era of pioneering creators and groundbreaking problem solvers. They will be doctors, journalists, researchers, CEOs, architects, lawyers, artists, and policy makers.

they will have one thing in common — an engineer’s education.

Because we live during an unprecedented time when engineering is the key to so much from medicine to moviemaking; from smart cities to smart policies; from new journalism to new economics to new technologies.
The uniqueness of engineering here is that within our orbit are equally powerful schools of medicine, journalism, business, public health, arts, law, social work, and teaching. Building on more than 150 years as one of the world’s incubators of history-making discovery, Columbia Engineering has become emblematic of the new pan-disciplinary era in engineering.
Engineering Revolution
Engineering Revolution

What do curing disease, cybersecurity, 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 1788SEAS procured patents in early steamboat technology and received the first railroad charter in the United States.

1864 Columbia founded the School of Mines, the first in the US and the foundation for today’s Columbia Engineering. The school’s first dean, Charles Frederick Chandler, was a pioneer of modern sanitation in his role as the head of the New York City Metropolitan Board of Health.

1899 Michael Idvorsky Pupin 1883SEAS invented the “Pupin coil,” extending the range of long-distance telephones.

1810 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.

1904 William Barclay Parsons 1882SEAS was the chief engineer of New York City’s first subway system.

1910 Edwin Howard Armstrong 1913SEAS invented the superheterodyne circuit and developed the method of frequency modulation (FM) for radio broadcasting.

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

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.
1954
Admiral Hyman George Rickover ’29SEAS 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 ’46SEAS was the father of modern robotics, founding the world’s first robotics company.

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

1960

1978
Edmund DiGiulio ’50SEAS 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.

1980

1982
Emerita Electrical Engineering Professor Gertrude Neumark Rothschild was inducted as a fellow of the American Physical Society in 1982 for her research improving light-emitting and laser diodes now used in many cell phones, flat-screen televisions, and Blu-ray disc players.
1990

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

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

1997
Robert C. Merton ’66SEAS won the Nobel Prize in Economics for his role in developing a formula for the valuation of stock options.

1997
Columbia Engineering is officially named The Fu Foundation School of Engineering and Applied Science (SEAS) 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.

1998
Professor Emeritus of Applied Physics and I.I. Rabi Professor Emeritus of Physics Horst Störmer won the Nobel Prize for Physics for his discovery of a new form of quantum fluid with fractionally charged excitations.
\[
d \ln(r) = \left[ \theta_t + \frac{\sigma_t^2}{\sigma_t} \ln(r) \right] dt + \sigma_t dW_t
\]

**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 and AT&T Labs Research.

**2002**

Computer Science Professor [Tony Jebara](#) is a coinventor and holds multiple patents in vision, learning, and spatiotemporal modeling that have social media and face recognition applications. He joined SEAS in 2002.

**2001**

[Michael Massimino](#) was one of two NASA astronauts aboard the [Columbia Space Shuttle](#) mission that successfully upgraded the Hubble Space Telescope. He was also the first person to tweet from space and is now a Columbia Engineering professor in mechanical engineering.

**2003**

[Elisa Konofagou](#), Associate Professor of Biomedical Engineering and Radiology, is pioneering new uses for an imaging technology that is radiation free. She joined SEAS in 2003.

**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 *Businessweek*’s top ten books of 2005.

**2002**

Applied Mathematics Professor [Chris Wiggins](#) ’93CC, who joined SEAS in 2001, is using data-driven modeling to determine how to turn off cancer genes.

**2005**

Percy K. and Vida L. W. Hudson Professor of Computer Science [Mihalis Yannakakis](#) won the Knuth Prize for the significance, impact, and breadth of his contributions to theoretical computer science, including contributions to database and algorithmic graph theory.
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.

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

2008
Mechanical Engineering Professor Huiming Yin is developing roofing materials that double as solar panels.

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2009
Funded 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 copublished 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 reestablish distinct tissue-to-tissue boundaries post-injury.

2009
Lenfest Junior Professor in Applied Climate Science Ah-Hyung (Alissa) Park is developing an efficient, cost-effective energy conversion system that turns nonrecyclable plastics into jet fuel.

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2010
Mechanical Engineering Professor Kristin Myers studies the engineering behind pregnancy. Her ultimate goal is to prevent miscarriages and preterm labor.

2011
Popular Science magazine named Computer Science Professor Eitan Grinspun among its “Brilliant Ten,” the magazine’s annual list of the top ten researchers in the United States. Grinspun studies the basic rules of motion and turns them into computer programs that help animate Hollywood movies and provide new tools for graphic designers.

2011
Kartik Chandran, Associate Professor of Earth and Environmental Engineering, was 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.
“Students at Columbia Engineering become part of a vibrant, intellectually challenging school with a distinguished history of transformational breakthroughs that have impacted the world. As part of that legacy, we anticipate that they, too, will transform the future.”

MARY CUNNINGHAM BOYCE
Dean, Columbia Engineering
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 comprehensive first-year introductory engineering 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

The Art of Engineering will guide your transition from high school student to successful collegiate engineer. A sampling of experiences in The Art of Engineering includes:

- The Common Project, through which students experience hands-on engineering research
- Friday group lectures designed to encourage creative, collaborative thinking
- Guest lectures led by engineers working in the real world
- Half-semester research in the department of your choosing

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

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

Student 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 Center and the Columbia Startup Lab, a coworking facility located in lower Manhattan dedicated to housing and nurturing budding Columbia entrepreneurs.

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, non-governmental organizations, 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 subfield of every discipline, affiliated institutions like NASA Goddard Institute for Space Studies and Nevis Laboratories make the research possibilities virtually limitless.

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
- Anthropology
- 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

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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 ’05SEAS
Program Manager
at Schafer Corporation
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 ’06SEAS
Project Manager for a top Silicon Valley company
How will The Art of Engineering introduce you to the unique character of Columbia Engineering?

Because our combination of lectures, projects, and research opportunities allow students to engage in a collaborative, creative environment.

“...to be a rapid introduction to the inquisitive nature of Columbia Engineering. During one lecture, Professor David Vallancourt took apart a coffeemaker and explained how each part of it worked. This was my first time seeing someone approach an engineering project simply for the sake of knowledge and discovery; it showed me how much engineers at Columbia value intellectual curiosity and exploration. Additionally, many aspects of life as an engineer at Columbia are collaborative, from research projects to problem sets, and The Art of Engineering was my first exposure to that mentality.”

Drew F.
Port Washington, NY
Applied Physics
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.

Why do we immerse you in a course that requires a semester-long group project where you work to solve a real engineering problem as soon as you arrive? Why does every major include preprofessional courses with knowledge and experience fresh from the field?  

**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 ’09SEAS**  
**Ph.D. candidate in the Computer Vision Laboratory at Columbia**
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 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 part of the next generation of leaders.

Senior Design Projects

- Epilepsy Brain Sensor for In Vivo Reflectance Observation
- Windmill-Driven Water Pump
- Rapid Prototyping 3-D Printer
- Novel Ventriculoperitoneal Shunt

Some recent senior design projects range from a rapid prototyping 3-D 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.
Earth and Environmental Engineering major Henry J. 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.
“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.
“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.

From Lab to Mayor’s Office
Judy K.
Hometown: Clarksville, TN
Major: Earth and Environmental Engineering

Professor of Earth and Environmental Engineering 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 pathbreaking 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.
“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 Samuel 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 under way to test it in Uganda.

Associate Professor of Biomedical Engineering Samuel 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:

- Brookhaven National Laboratory
- Carleton Strength of Materials Laboratory
- Center for Electron Transport in Molecular Nanostructures
- Columbia High-beta Tokamak
- Energy Frontier Research Center
- 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. Columbia’s research centers focus on defining and pushing the boundaries of disciplinary frontiers in order to solve today’s great global challenges. A small sampling of these innovation centers includes:

- Center for Computational Learning Systems
- Center for Integrated Science and Engineering
- Columbia Nano Initiative
- Columbia Water Center
- Data Science Institute
- Earth Institute at Columbia
- Lenfest Center for Sustainable Energy
- Mortimer B. Zuckerman Mind Brain Behavior Institute
- NASA Goddard Institute for Space Studies

And you’re part of Columbia Engineering’s Student 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
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.

World Science Festival

Cofounded by 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.

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.

The Intrepid Sea, Air & Space Museum

The Museum is housed on the aircraft carrier Intrepid, a National Historic Landmark and one of the most successful military ships in US history.

Rose Center for Earth and Space Featuring the Hayden Planetarium

Columbia has close research ties with the American Museum of Natural History and its research center, which is just blocks from campus.

Silicon Alley

Many of Manhattan’s tech and new media innovators like Columbia Startup Lab, Google, and Squarespace make their home along a corridor from the Flatiron District down to SoHo and TriBeCa along Broadway.

More than 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.

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

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

**Grand Central Station**
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.

**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.

**New York Botanical Garden**
Explore 50 diverse gardens and plant collections across 250 acres.

**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 New York City’s own “Silicon Beach,” which had 65 digital companies in a five-block radius as of a few years ago — 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.
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, 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 have interned and worked with:

- Alcatel-Lucent
- American Express
- Arup
- BASF
- Bloomberg L.P.
- Boeing
- Broadcom
- Brookhaven National Laboratory
- Brooklyn Motorized Corporation
- Bug Labs
- BuroHappold Engineering
- CIA
- Citigroup
- CodeGreen Solutions
- Columbia Water Center
- Con Edison
- Credit Suisse
- E*TRADE
- ECI Technology
- Ernst & Young
- ExxonMobil
- FactSet Research Corporation
- Facebook
- Fidelity Investments
- GZA GeoEnvironmental, Inc.
- General Dynamics Electric Boat
- Goldman Sachs
- Google
- Greensulate
- Jaros, Baum & Bolles Consulting Engineers
- Jefferson Laboratory
- Langan Engineering & Environmental Services, Inc.
- Lucasfilm
- ECI Technology
- Ernst & Young
- ExxonMobil
- FactSet Research Corporation
- Facebook
- Fidelity Investments
- GZA GeoEnvironmental, Inc.
- General Dynamics Electric Boat
- Goldman Sachs
- Google
- Greensulate
- Rockstar Games
- PricewaterhouseCoopers
- Procter & Gamble
- R3 Energy
- Sony Music Entertainment
- Sunoco
- Time Warner
- Tissue Engineering Group — University of Melbourne
- US Patent and Trademark Office
- US Department of State
- US Department of Transportation
- US Foreign Service
- Van Dam Engineering
- VMWare
- NASA
- New York City Mayor’s Office of Operations
- New York State Department of Transportation
- Northrop Grumman
- Parsons Brinckerhoff
- Pfizer
Big-name companies like Pfizer, Facebook, Google, and Goldman Sachs are a subway ride away from campus. The 1 train, which runs the length of Manhattan, has a stop steps from Columbia’s main entrance.

“One of Columbia’s greatest assets is its New York City location. I’ve networked with professionals from PepsiCo, the *New York Times*, and Cisco. And my friends have worked in both large established companies and small start-ups.”

Victoria V.  
Baltimore, MD; Mechanical Engineering
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, non-governmental organizations, 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; Paris; Beijing; Amman; Nairobi; Santiago; Istanbul; and Rio de Janeiro. Columbia Engineering also partners with Tsinghua University in Beijing to collaborate on cutting-edge genomics and with Jordan University of Science and Technology in biomedical engineering and nanotechnology.

Global Internships

Columbia students have interned all over the world including 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.
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 UN 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.

Study Abroad

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

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 a positive and significant impact in the international arena.

“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
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.
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.

1,500
undergraduates.

9
academic departments.

16
areas of study from biomedical engineering to applied physics.

400+
research positions reserved for undergraduates.

40,000+
Columbia Engineering alumni network.

54
members of the National Academy of Sciences.

100+
start-ups founded by Columbia students, alumni, and faculty in recent years — in all kinds of fields, from clean tech to high-tech.

18
members of the National Academy of Engineering among current faculty.

Columbia University

4,500
Columbia College undergraduates to call your friends, classmates, teammates, and fellow Columbians.

80+
areas of study from creative writing to sustainable development.

16
areas of study from creative writing to sustainable development.

150
study abroad programs.

146
faculty in the American Academy of Arts and Sciences.

82
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.

More than
300,000
University alumni.
Engineering Plus Professional Dance
Vikas A.
Hometown: Seattle, WA

“During my first two years here, I’ve appeared on The Tonight Show and in a music video. I’ve choreographed my own piece for a Columbia dance group, been cast in the famous off-Broadway production of STOMP, and featured on So You Think You Can Dance. The day I auditioned for STOMP, I came back to campus, finished my classes for the day, and was doing graph theory research when I got a call from the casting directors. Where else do you get to do graph theory research and perform for STOMP in the same day? For So You Think You Can Dance, I was doing slow-motion tap dance shots in Central Park, and then I ran up to campus in time to learn how to write my own Web server in Advanced Programming. The doubled magic that I have experienced, of engineering plus more, is something that seeps into every part of the undergraduate engineering experience here.”

Major
Industrial Engineering and Operations Research (IEOR)

Activities
“In high school I had two very distinct passions: science and dance. As I began to look at colleges I thought one passion would have to give way to the other. That is definitely not the case here. Because of Columbia’s New York City location, I have been able to pursue incredible dance opportunities while simultaneously pushing myself academically. When I’m not in class or dancing, I’m heavily involved in the Columbia Organization of Rising Entrepreneurs and in mobile app development.”

Internships and Research
“I spent the spring of my first year working for a start-up that was seeded by the Columbia Business Lab, whose clients have included Nike and TED. Having start-up experience as a first-year really opened my eyes to the flexibility and collaborative environment that is unique to start-ups, in a way that no classroom could have taught me.”

Post-Columbia Plans
“It’s extremely rewarding to realize that both engineering and dance — or some combination of the two — are potential career paths for me once I graduate. That’s something I definitely didn’t expect when coming to college.”

60+
a cappella, 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 production now in its 122nd year.

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

ArtsLink
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.
“In my second year studying computer science, I was fortunate enough to take a course with Professor Steven Feiner, a pioneer in the field of augmented reality and head-mounted displays. He was kind enough to take me into his lab, and over the course of two semesters, helped me conduct research on the Oculus Rift and Google Glass. The following summer, I was able to leverage that experience to get an internship with the actual Google[x] team working on Google Glass. It was like a dream come true.”

**Activities**
Student body president of the Engineering Student Council, Application Development Initiative, Columbia chapter of Lambda Phi Epsilon.

**Internships**
Columbia’s Computer Graphics and User Interfaces Lab, Google[x], YouTube, Vaunte.

**Post-Columbia Plans**
“After graduating, I will be a software engineer with a start-up in San Francisco doing cyber risk modeling. Next, I plan to earn a Ph.D. in computer science and ultimately develop cutting-edge augmented reality devices. The idea that we can process the visual world around us and seamlessly integrate data into our perception fascinates me. It’s the stuff of childhood sci-fi dreams.”

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

**Fast Pitch**
Our annual competition allows you to pitch your entrepreneurial ideas and compete for funding to launch your business.

**CORE**
One of the largest student organizations on campus, CORE (Columbia Organization of Rising Entrepreneurs) hosts the Startup Internship Program in partnership with the Columbia Center for Career Education, pairing students with start-ups during the spring semester.
Megan A.  
*Hometown: Ann Arbor, MI*

**Major**  
Biomedical Engineering

**Civic Engagement**

“One of the projects I’m involved in is the Columbia 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 Peer Health Exchange; InterVarsity Christian Fellowship, Social Justice team leader; Columbia Outdoor Orientation Program (COOP) leader; Columbia Undergraduate Scholars Program; high school tutor; Veritas Forum interfaith 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.”

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30+ 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 about 900 students participate in 27 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.
Athletics brings together undergraduates from all over Columbia. 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. William Levine; Landmark Advisors research and marketing Intern

Post-Columbia Plans
Environmental consulting, preferably for large-scale city infrastructure.

Jesse V.
Hometown: New York, NY

Major
Earth and Environmental Engineering

Varsity Soccer

31
NCAA Division I sports.

40+
club sports.

40+
intramural sports.

109
individual Ivy League titles in the past five 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**
**Urban Architecture**

**Maria Elena B.**
*Hometown: Alcobendas, Spain*

“As a civil engineering major and architecture minor, I cannot think of a better place to study than New York City. The city’s Second Avenue subway project and the World Trade Center transportation hub have been case studies in my courses. I also got to participate in the Global Infrastructure Leadership Forum. As an architecture minor, I’ve been able to take hands-on architecture studios and courses such as Global Urbanism and Urban Praxis — a class on the theory of cities. The combination of this university in this city has allowed me to get a much broader understanding of the global construction industry, its constraints and how those constraints force creativity and innovation.”

**Major**

**Civil Engineering, Architecture minor**

**Activities**

Treasurer of Barnard/Columbia Design for America, part of a national network of student social innovators and entrepreneurs; *Columbia Spectator* photographer; member of Columbia’s Global Recruitment Committee.

**Research and Internships**

“Working with practicing engineers has been one of the highlights of my four years. One of my professors, Julius Chang, describes himself as a ‘pracademic’ — a practicing academic. These pracademics make amazing mentors and classes extend way beyond theory. I had the opportunity to be directly involved in the Columbia campus expansion in Manhattanville. We studied the project and found different ways to enhance benefits for the Harlem community.”

**Post-Columbia Plans**

“Being in New York has not only allowed me to learn about capital construction in a city with some of the greatest challenges, but also taught me how challenges the construction industry faces worldwide are fostering innovation within the industry. Innovation born of constraint has inspired me to pursue my masters in Sustainable Design for Construction.”

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**8 million**

people in New York City, an amazing percentage of whom are experts, visionaries, and global leaders.

**15**

engineering minors; 22 liberal arts minors.

**13**

innovation clubs, funds, and events:

- ADI — Application Development Initiative
- HTA — HealthTech Assembly
- Entrepreneurship minor
- Startup Internship Program
- Barnard/Columbia Design for America
- Hackathons
- IE@Columbia (Business School)
- cFund Ignition Grants
- Tamer Fund for Social Ventures
- NYC Startup Job Fair
- Pitch workshops
- Tech Talent Draft
- #StartupColumbia
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.

82% 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 Columbia Engineering graduates:

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

The top three graduate schools attended by Columbia College and Columbia Engineering graduates are Columbia University, Harvard University, and Stanford University.
**Clues to the Universe**

Just a few months after former NASA astronaut Michael 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 mind-set — 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 Massimino ‘84SEAS**
Professor of Professional Practice, Department of Mechanical Engineering, and former NASA astronaut

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**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 US 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 ‘82SEAS**
CEO, Xerox Corporation

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*A view of the 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.*
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.”

Jean Chen ’90SEAS
Vice President Product Development, Bridgepoint Education
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 that everyone has something constructive to add to any discussion or debate. Diversity of thought brings strength to any organization.”

Jim Albaugh ’74SEAS
Senior Advisor, The Blackstone Group, and former CEO and President, Boeing Commercial Airlines

On Their Way

Amandine Godier-Furnémont ’09SEAS
After graduating she continued at Columbia as a Ph.D. student. She held 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 ’10SEAS
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 ’10SEAS
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 cofounder and CEO of a start-up company called Welkin Health.

Janelle Heslop ’10SEAS
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 a senior associate at Veolia, an environmental services company providing consulting on water supply and management.

Chelsey Roebuck ’10SEAS
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 ’07SEAS
An entrepreneur, he is the co-founder of Exit Strategy NYC, a subway navigation iPhone app; and founder of Timehop, the social media flashback service.
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<thead>
<tr>
<th>Departments</th>
<th>Majors</th>
<th>Student-Faculty Research Portfolio</th>
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<tbody>
<tr>
<td>Applied Physics and Applied Mathematics</td>
<td>Applied Physics; Applied Mathematics; Materials Science and Engineering</td>
<td>Nanoscale science; advanced scientific computing; earth science; plasma physics; materials for information technologies</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Biomedical Engineering</td>
<td>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</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Chemical Engineering</td>
<td>Science and engineering of polymers and soft materials; genomics engineering; biophysics and soft matter physics; bioinductive and biomimetic materials; interfacial engineering and electrochemistry</td>
</tr>
<tr>
<td>Civil Engineering and Engineering Mechanics</td>
<td>Civil Engineering; Engineering Mechanics</td>
<td>Environmental, earthquake, and geotechnical engineering; structural control and health monitoring; flight structures and construction materials; infrastructure delivery and management; solid, fluid, and probabilistic mechanics</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Computer Science; Computer Engineering</td>
<td>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</td>
</tr>
<tr>
<td>Earth and Environmental Engineering</td>
<td>Earth and Environmental Engineering</td>
<td>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</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Electrical Engineering; Computer Engineering</td>
<td>Multimedia networking; light wave communications; image and advanced television; laser processing; microelectronics fabrication</td>
</tr>
<tr>
<td>Industrial Engineering and Operations Research</td>
<td>Financial Engineering; Engineering Management Systems; Industrial Engineering; Operations Research</td>
<td>Financial engineering; engineering management systems; logistics; production and supply chain management; revenue management; quality control; mathematical programming; queuing theory; reliability; portfolio management; option pricing; data mining; risk management</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Mechanical Engineering</td>
<td>Controls and robotics; energy and micropower generation; fluid mechanics; mechanics of materials; manufacturing; material processing; nanotechnology; orthopaedic biomechanics</td>
</tr>
</tbody>
</table>

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 also to create a better one.