engineering and applied science

COLUMBIA UNIVERSITY

table of contents

The Fu Foundation School of Engineering and Applied Science at Columbia University

Engineering is about leadership, ideas, vision. You can't be a great engineer until you're an active citizen, a creative thinker, a student of the world.

No other engineering school offers what we offer: an education from one of the country's most distinguished engineering programs, in one of the world's most renowned universities, in the world's most vibrant, cosmopolitan city. An academic program steeped in history and committed to innovation. An education designed to nurture the next generation of visionaries and pioneers.

This is where the engineers of tomorrow are educated: to be bold, broad-minded and deeply engaged with the world.

Columbia's undergraduate population is as diverse as New York City. (For example, this year's entering Engineering class was 37% female, 13% Hispanic/Latino and 8% African American.)

tradition and innovation

One of the nation's most storied and prestigious engineering and applied science programs. A proud history of innovative research, socially conscious teaching and a profound engagement with the world's concerns.

SNAPSHOTS

On a tour of his lab in the Lamont-Doherty Earth Observatory, a professor tells his earth and environmental engineering students, "The idea of plate tectonics was developed here. That's not just history—that will affect what we will study in the next thousand years."

Inspired by the invention of FM radio in Columbia's Philosophy Hall, an electrical engineer works on groundbreaking research on digital compression technologies.

Hunched over microscopes on the ninth floor of the Schapiro Center, a team of engineers dreams of finding the next deuterium, an isotope that was first isolated in a Columbia lab.

COLUMBIANS WHOSE TECHNICAL INNOVATIONS CHANGED HISTORY

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

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

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

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.

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

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

Joseph Engelberger, Class of 1946, was the father of modern robotics.

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

Electrical Engineering Professor Gertrude Neumark is one of the world's foremost experts on doping wide-band semiconductors, a critical step in the development of commercial blue semiconductor diode lasers and LEDs.

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

Michael J. Massimino, Class of 1984, was one of two NASA astronauts aboard the Columbia shuttle mission which successfully upgraded the Hubble Space Telescope.

Students relax in front of Philosophy Hall, where FM radio was invented.

Columbia Engineering is committed to educating the whole person—you'll learn skills like teamwork, entrepreneurship and public speaking.

engineers as leaders

Rigorous training for leadership. Regular collaboration between students and industry leaders. A school-wide belief in the value of civic engagement and enlightened stewardship.

SNAPSHOTS

In Ceará, Brazil, civil engineering students develop an integrated approach to a sustainable water system, to address problems like drought relief, energy production and disease prevention.

A 6 a.m. phone call from a client wakes an electrical engineering student who runs his own technology consulting firm.

A sophomore calls the president of a Columbia-founded oscilloscope manufacturer to accept an internship.

Seniors in the undergraduate industrial engineering and operations research program work on a team project to develop an improved manufacturing process for sophisticated jewelry––including demand forecasts, production schedules and stone procurement—sponsored by industry giant Tiffany and Co.

THE GATEWAY CLASS: CREATING SOLUTIONS

Our Gateway class is the country's only hands-on, community-based design course for first-year engineers. Teams of students work with nonprofit organizations and community service agencies to solve real-world problems. You'll not only learn how to be an engineer, you'll change people's lives.

A SAMPLING OF RECENT GATEWAY CLASS CLIENTS AND PROJECTS

Downtown Little League—students designed safer baseball fields.

Future Leaders Institute—students helped a local elementary school create a weather station that is connected to the network of existing meteorological stations in and around New York City.

Henry Viscardi School—students designed an air hockey table that is accessible to students with muscular dystrophy.

New York City Department of Parks and Recreation—students designed new park furniture that will be used city-wide, including a wheelchair-accommodating swing, game table, bench, and drinking fountain, using the guidelines of the Americans with Disabilities Act.

New York City Public Schools—students developed a sensory vest for children who suffer from cerebral palsy.

Columbia University Office of Environmental Stewardship—students created a distribution system for biodiesel fuel by converting waste product from campus cafeterias to combustible oil to blend with diesel fuel.

REAL-WORLD EXPERIENCE: ENGINEERING INTERNSHIPS

Columbia offers thousands of internships each year, listed by the Center for Career Education and individual academic departments. Columbia students have a unique ability to take advantage of all of the professional opportunities in New York City. You can go to chemistry class in the morning, hop the downtown subway to Wall Street for your internship, then head back to campus for an evening meeting of the Engineering Student Council, all in a single day.

A SAMPLING OF INTERNSHIP OPPORTUNITIES

Amgen, an international biotechnology company
Brooklyn District Attorney's Office
Deloitte, a consulting firm
Digitas, a digital and direct marketing company
Financial Times
Goldman Sachs' Fixed Income, Currencies and Commodities division
Google
IBM
Lockheed Martin Space Systems
Lucent Technologies' Bell Laboratories
Mt. Sinai Medical Center
Triborough Bridge & Tunnel Authority

ENTREPRENEURSHIP: STUDENT-RUN ENTERPRISES

Columbia Tutoring and Translating Agency (CUTTA)
Columbia Bartending Agency and School of Mixology
Inside New York Guide
CU Snacks

Professor Lawrence Yao's Mechanical Engineering students explore robotics in the Manufacturing Research Lab.

faculty snapshots

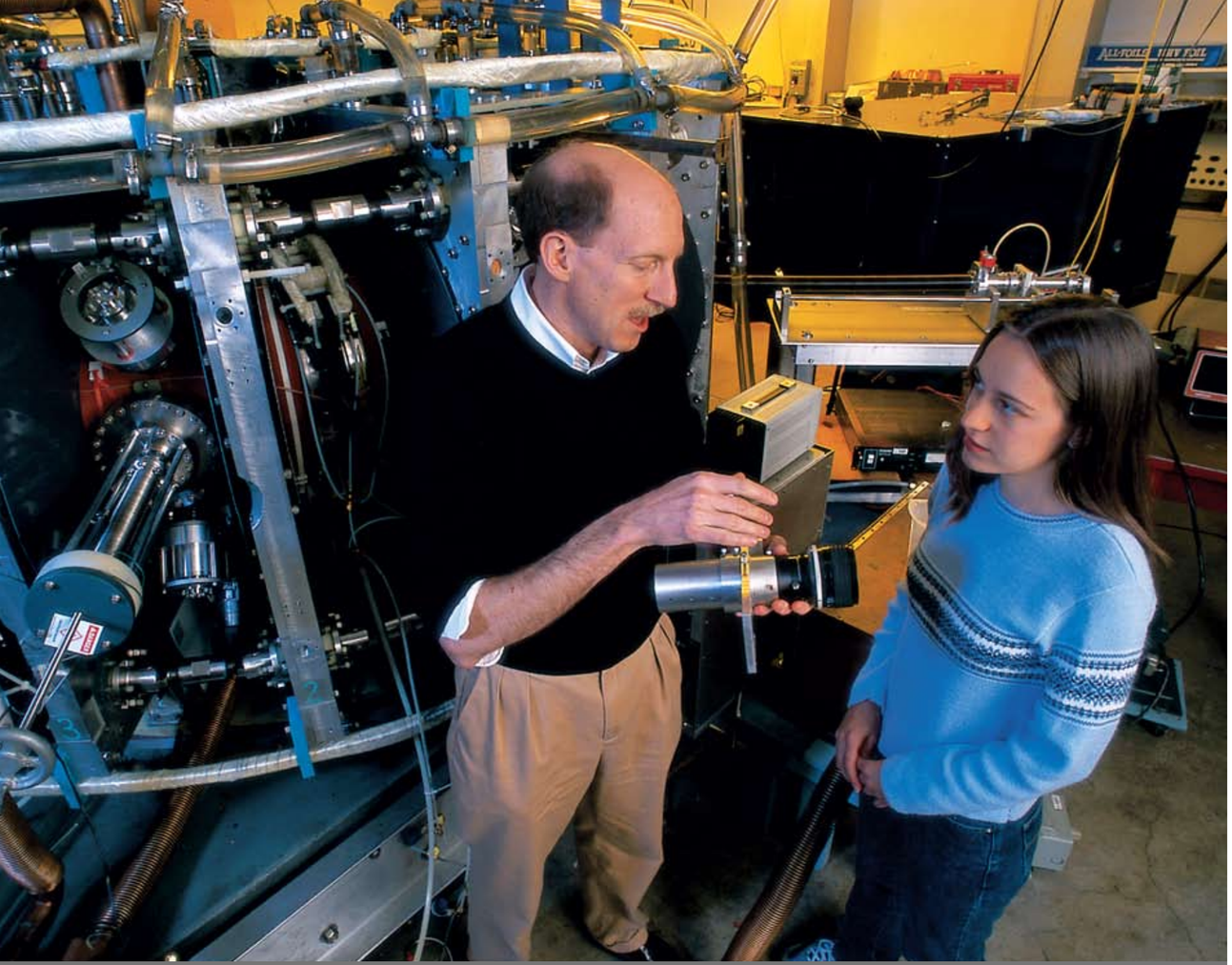
World-renowned scholars, researchers and teachers. Professors who lead pioneering labs, supervise groundbreaking institutes and research centers, and serve as mentors to undergraduates from their first day on campus. Here are just a few of the Columbia Engineering faculty leading their fields and energizing their disciplines.

Lawrence Yao – Mechanical Engineering
Professor Yao is Chair of the Mechanical Engineering department and Director of the Manufacturing Research Laboratory. He conducts groundbreaking research in laser assisted manufacturing, including micro-scale laser shock peening, laser shaping and meso/micro/nanoscale laser machining. He has worked with countless major companies, including General Electric and Boeing, and has authored over 100 papers.

Gordana Vunjak-Novakovic – Biomedical Engineering
Professor Gordana Vunjak-Novakovic, one of the world's leading tissue engineers, is building craniofacial tissues and vascularized cardiac muscle that will give the body the help it needs to repair or regenerate damaged tissue. She is successfully using biomimetics, the science of imitating nature, to produce in just eight days engineered cardiac tissue that may be able to patch damaged areas of the human heart. She also supervises undergraduate students in independent study projects in biomedical engineering.

Ponisseril Somasundaran – Earth and Environmental Engineering
Professor Somasundaran is developing "smart" materials that imitate nature by sensing, responding to and controlling changes in environmental conditions and the human body and has several research opportunities for undergraduates in his lab. One possible result of his research: nanogels that can absorb lethal overdoses of drugs. Somasundaran is one of the many Columbia Engineering faculty members to have been elected to the National Academy of Engineering. He serves as editor-in-chief for the international journal "Colloids and Surfaces." He has published more than 300 works and has won more than a dozen awards, most recently the Frank F. Aplan Award from the Engineering Foundation.

Kathleen McKeown – Computer Science
Rothschild Professor Kathleen McKeown, former Computer Science Chair, specializes in natural language processing. She developed Columbia Newsblaster, a news summarization system that automatically collects, organizes and summarizes news in many languages and allows the user to browse news topics with English summaries. Another of her projects uses computers to filter medical information to bring the most current research on specific medical conditions to both doctors and patients.



Columbia's Plasma Physics Laboratory offers opportunities for students to study confined matter at temperatures that reach millions of degrees.

cutting-edge research

Professors at the vanguard of their fields. The resources of a major university and the world's most forward-looking city. Research that shapes the future.

SNAPSHOTS

For a joint venture with some of the world's major car companies, faculty and students hash out the details of a long-term project to build environmentally sensitive public transportation.

In a matter of moments, the software created by Computer Science professors and undergraduate researchers reads and summarizes thousands of multilingual pages of informal websites and published news.

In the Carleton Lab, a team of civil engineering students uses a full-scale replica to test new materials for bridge wires.

After a night spent working on a new single-crystal film for a flat-panel display, a professor and his team of students lay the groundwork for one day putting an entire computer on a single sheet of glass.

THE UNDERGRADUATE RESEARCH INVOLVEMENT PROGRAM (URIP)

Faculty take an active role in research, and encourage undergraduates to collaborate on groundbreaking projects with them. URIP enables even first-year students to participate in cutting-edge research for a stipend or course credit.

A SAMPLING OF URIP PROJECTS

Space physics, microwave heating and plasma sources
Anthropogenic climate change and the Arctic oscillation
Tissue engineering of cartilage-bone interface
Electrophysiological measurements and signal processing
Seismic behavior of reinforced soil structures
Modeling and simulation of genetic networks
Nanotechnology for solar energy and fuel cells
Laser probe of thin films and thin film processing

A SAMPLING OF COLUMBIA UNIVERSITY'S INTERDISCIPLINARY RESEARCH CENTERS

Center for Applied Probability
Center for Computational Learning Systems
Columbia Center for Electron Transport in Molecular Nanostructures
Columbia Center for Integrated Science and Engineering
Columbia Center of Excellence in Genomic Science
Computational Optimization Research Center
Earth Engineering Center
Environmental Molecular Science Institute
Langmuir Center for Colloids and Interfaces
Materials Research Science and Engineering Center
National Science Foundation Industry/University Cooperative Research Center for Advanced Studies in Novel Surfactants

OUR STUDENTS CONDUCT RESEARCH IN:

Artificial Organs Research Laboratory
Site of novel research on regenerative medicine and innovations in creating and successfully implanting artificial kidneys, livers and lungs.

Botwinick Multimedia Learning Lab
Innovative multimedia facility featuring one gigabit of network speed at each desktop.

Brookhaven National Laboratory
Home of the National Synchrotron Light Source, generating short-pulse optical radiation for spectroscopy and photochemistry experiments.

Carleton Lab
Features machines designed to test building components under high compression and tension, including a full-size mock-up of a local bridge anchor for training and teaching.

Lamont-Doherty Earth Observatory
Renowned home to more than 200 researchers studying the origin, evolution and future of the natural world. Site where the concept of plate tectonics was formulated.

Laser Diagnostics and Solid-State Physics Laboratory
Site of groundbreaking work in semiconductor thin films.

Microelectronics Sciences Laboratories/Columbia Radiation Laboratory
Developed molecular beam techniques and laser etching methods. Currently home to pioneering work in electronics and optics circuitry.

Morris A. Schapiro Center for Engineering and Physical Science Research
Major research centers established by the National Science Foundation and laboratories devoted to microelectronics, medical informatics and other emerging technologies.

Plasma Physics Laboratory
Columbia engineers research projects conducted with the Columbia High-Beta Tokamak fusion reactor, under support from the U.S. Department of Energy Office of Fusion Energy, the NSF, NASA and the Office of Naval Research.

Scanning Electron Microscope/X-ray Microanalysis Facility
Home of one of the first electron microscopes in the U.S., this laboratory is able to view objects smaller than subatomic particles of light in 3-D and without distortion.

Students learn both fundamentals and practical applications of fluid mechanics with Professor Patricia Culligan.

curriculum

Engineering has been called the newest liberal art. At Columbia Engineering, students not only study science and mathematics and gain technical skills, but also study Columbia College's renowned core curriculum and can minor in a growing list of liberal arts minors or new, emerging engineering minors like Entrepreneurship and Sustainable Engineering. They conduct hands-on research in labs run by award-winning faculty and at firms and organizations throughout the city and the world. It's an education for the real world: an enlightened approach to engineering as part of a web of larger concerns: social and economic, political and cultural.

SNAPSHOTS

In the dark hush of a Paris cathedral, a computer science professor explains the connection between archaeology, religion and engineering.

After a raucous meeting with her Digital Systems Lab partners, an electrical engineer rushes off to join her Music Humanities class at the Metropolitan Opera House.

An 8 a.m. meeting with his advisor leads an applied physics major to his next research project: a study of the link between international politics and nuclear physics.

DEPARTMENTS

Applied Physics and Applied Mathematics

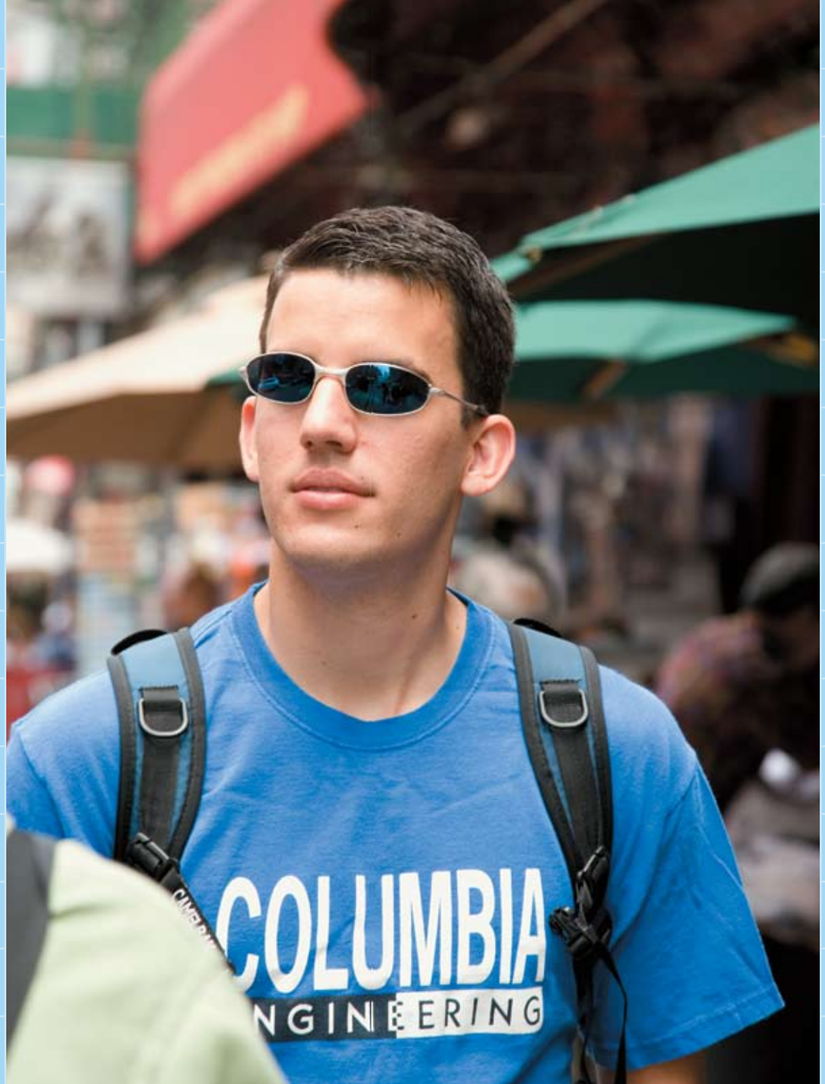
The department examines the basic physics that underlies engineering, the mathematical tools used by physicists and engineers and the materials and processes that govern electronic, structural and other applications. Faculty have won major awards and prizes—including the Sloan, the Guggenheim and the Nobel—and play leading roles in research centers sponsored by the National Science Foundation and the Department of Energy. Students pursue intensive, multidisciplinary coursework and join professors in pathbreaking research, including ongoing work in nanoscale science, advanced scientific computing, earth science, plasma physics, and materials for information technologies. The department collaborates with many of the country's leading research centers, including the NASA Goddard Institute for Space Studies, the Geophysical Fluid Dynamics Laboratory and the National Center for Atmospheric Research. **Majors: applied physics, applied mathematics and materials science and engineering.** www.ap.columbia.edu

Biomedical Engineering

Biomedical engineering stands at the intersection of engineering, physical science and biological science. Columbia's Department of Biomedical Engineering prepares students to solve problems in biology and medicine, to understand living systems and their behavior and to develop biomedical systems and devices. The department's rigorous curriculum includes courses in the University's renowned graduate schools and leads to concentrations in biomechanics, cell and tissue engineering and biomedical imaging. Students and faculty work together in the department's extensive new facilities, including an undergraduate wet laboratory devoted to biomechanics and cell and tissue engineering and a biomedical imaging and data processing laboratory. Major research labs supervised by the department's faculty are supplemented by core facilities, including a machine shop, a tissue culture facility, a histology facility, a confocal microscope, and an atomic force microscope. **Major: biomedical engineering.** www.bme.columbia.edu

Chemical Engineering

Chemical engineering is a highly interdisciplinary field concerned with materials and processes at the heart of a broad range of technologies—from synthetic fibers to artificial organs, from semiconductors to pharmaceuticals. In its pioneering research and



its broad-based curriculum, Columbia's Department of Chemical Engineering draws on nearly every major discipline in engineering: chemistry, physics, mathematics, biology, computing. Areas of special interest to the department's students and faculty include the science and engineering of polymers and soft materials, genomics engineering, biophysics and soft matter physics, bioinductive and biomimetic materials, and interfacial engineering and electrochemistry. The department offers an extensive collection of instrumentation in all its fields of specialization, including an expansive polymer and soft matter research facility and the Columbia Genome Center, which features state-of-the-art facilities for DNA analysis and synthetic chemistry. **Major: chemical engineering.** www.cheme.columbia.edu

Civil Engineering and Engineering Mechanics

Civil engineering deals with the planning, design, construction, and maintenance of structures and infrastructure—from buildings to bridges, from power plants to transportation facilities. A related discipline, engineering mechanics, studies the mechanical properties of materials, structures and biological systems. Columbia's Department of Civil Engineering offers intensive theoretical training and hands-on experience with some of the world's most urgent concerns. The department's renowned faculty conduct essential research in a broad range of areas: environmental, earthquake and geotechnical engineering; structural control and health monitoring; flight structures and construction materials; infrastructure delivery and management; and solid, fluid and probabilistic mechanics. Students conduct advanced research with faculty in laboratories dedicated to hydrologic research, structural deterioration and soil mechanics; and research centers dedicated to flight structures and infrastructure studies. **Majors: civil engineering, engineering mechanics.** www.civil.columbia.edu

Computer Science

Computer science is one of the 21st century's essential disciplines; it's concerned with the efficient processing of information, a task with implications for every field of human activity. The award-winning faculty in Columbia's Department of Computer Science oversee a curriculum that offers a rigorous investigation of theoretical computer science and practical experience with experimental computer technology. Students receive training in the fundamentals of the discipline and pursue focused study through a broad range of advanced courses, including courses in artificial intelligence, computer architecture, computer communications, optimization, and software systems. The depart-

ment's well-equipped labs support specialized research in more than a dozen fields, including 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, and real-time multimedia. **Majors: computer science, computer engineering.** www.cs.columbia.edu

Earth and Environmental Engineering

Earth and environmental engineering is devoted to the sustainable development, use and integrated management of Earth's resources. Columbia's renowned Earth and Environmental Engineering Department is concerned especially with the environmentally sound extraction and processing of primary materials (minerals, fuels, water), the management and development of land and water resources and the recycling or disposal of used materials. The department offers a forward-thinking curriculum, an innovative research program and an array of internship and research opportunities for undergraduates. Faculty and students collaborate with the Lamont-Doherty Earth Observatory, the Center for Environmental Research and Conservation, the International Research Institute for Climate Prediction, and the Earth Engineering Center. **Majors: earth and environmental engineering, materials science and engineering.**
www.seas.columbia.edu/krumb

Electrical Engineering

Electrical engineering addresses one of the world's critical challenges: the need for increasingly faster and more sophisticated methods of handling information. In its wide-ranging research program and its challenging curriculum, the Electrical Engineering Department at Columbia University allows students to participate in the development of the new materials, devices, systems, and network concepts that will build the advanced communications and information handling systems of the future. The curriculum offers a thorough grounding in fundamental concepts and analytical tools and opportunities for specialized study in disciplines such as telecommunications, microelectronics, digital systems, and photonics. Students join faculty in the department's ambitious research program, conducted in more than a dozen well-equipped laboratories, including facilities dedicated to multimedia networking, lightwave communications, image and advanced television, laser processing, and microelectronics fabrication. **Majors: electrical engineering, computer engineering.** www.ee.columbia.edu

Industrial Engineering and Operations Research

The burgeoning fields of Engineering Management, Financial Engineering, Industrial Engineering, and Operations Research are concerned with the production, management and control of commercial resources. The Department of Industrial Engineering and Operations Research at Columbia conducts research in the four areas, sponsored by leading institutions and government agencies. In engineering management and industrial engineering, specializations include logistics, routing, production and supply chain management, revenue management, and quality control. In operations research: mathematical programming, computational and mathematical finance, queueing theory, reliability. In financial engineering: portfolio management, option pricing, computational finance, data mining, and risk management. Students and faculty also are involved in the work of major research centers, including the Center for Applied Probability, Center for Financial Engineering, and the Computational and Optimization Research Center. **Undergraduate tracks: engineering management systems, financial engineering, industrial engineering, and operations research.**
www.ieor.columbia.edu

Mechanical Engineering

Mechanical engineering is concerned with the design and manufacture of objects and systems—from micro-scale sensors to spacecraft, from inkjet printer nozzles to machine tools, from fuel cells to robots. Columbia's Department of Mechanical Engineering offers an immersive experience in this broad, diverse discipline, including foundational and advanced coursework guided by renowned professors, and a far-reaching research program that makes use of the most advanced tools and labs. The department's current research areas include controls and robotics, energy and micro-power generation, fluid mechanics, mechanics of materials, manufacturing, material processing, nanotechnology, and orthopaedic biomechanics. The undergraduate laboratories, occupying nearly 6,000 square feet, offer opportunities for training in basic instrumentation and for advanced experimentation in specialized fields—automatic controls, heat transfer, stress analysis, and microcomputer-based data acquisition. **Major: mechanical engineering.**
www.columbia.edu/cu/mechanical

COLUMBIA ENGINEERING CORE CURRICULUM

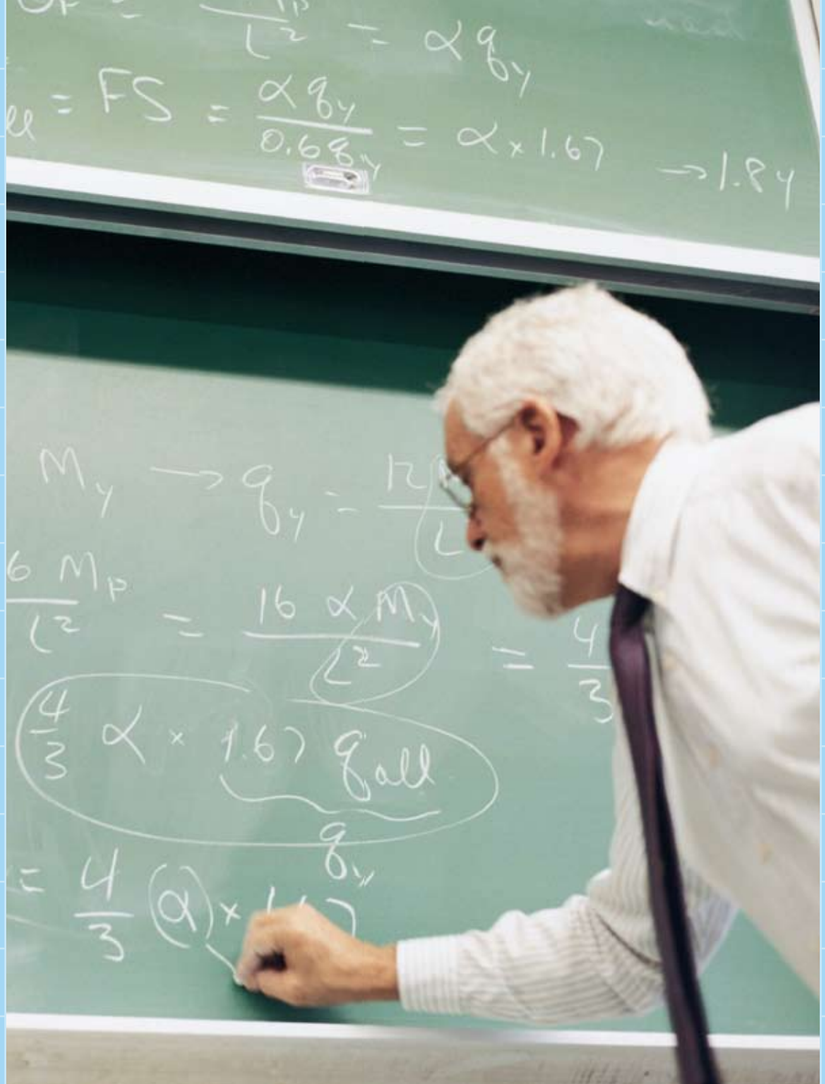
Calculus
Chemistry
Computer Science
Gateway Class
Masterpieces of Western Literature and Philosophy or Introduction to Contemporary Civilization or a Major Cultures Sequence
Masterpieces of Western Art or Masterpieces of Western Music
Physics
Physical Education
Principles of Economics
Professional-Level Course
University Writing

LIBERAL ARTS MINORS

American Studies
Architecture
Art History
Dance
East Asian Languages and Culture
Economics
English and Comparative Literature
French
French and Francophone Studies
German
Greek or Latin
Hispanic Studies
History
Middle East and Asian Languages and Culture
Music
Philosophy
Political Science
Psychology
Religion
Sociology

THE FIRST YEAR: A SAMPLE SCHEDULE

COURSE	FALL	SPRING
CORE	University Writing	Engineering Design (Gateway Class)
CALCULUS	Calculus I	Calculus II
CHEMISTRY	General Chemistry I or Intensive General Chemistry	General Chemistry II
PHYSICS	Introduction to Mechanics and Thermodynamics; Mechanics and Relativity; or Accelerated Physics I	Introduction to Electricity, Magnetism, and Optics; Thermodynamics, Electricity, Magnetism; or Accelerated Physics II
PHYSICAL EDUCATION	Tai Chi	Cardio Sculpt
PROFESSIONAL COURSE		Design of Buildings, Bridges and Spacecraft



COMBINED PLAN PROGRAMS

Columbia's dual degree engineering program was the first of its kind in the United States.

3-2 Combined Plan Program:
Students have the opportunity to receive both a B.A. degree from an affiliated liberal arts college and a B.S. degree within five years. Columbia Engineering maintains a cooperative relationship with nearly 100 liberal arts colleges nationwide including Columbia College. Students complete the requirements for their liberal arts degree along with a pre-engineering course of study in three years at their college and then complete two years at The Fu Foundation School of Engineering and Applied Science.

4-2 Combined Plan Program:
Students may also pursue a 4-2 B.S. degree program, designed to allow students to graduate from their liberal arts college with a B.A. degree and then transfer to Columbia Engineering to complete a B.S. degree in two years.

4-1 Combined Plan Program:
Students who are admitted as first-year students to The Fu Foundation School of Engineering and Applied Science have the opportunity to apply for admission to either Columbia College or Barnard College for one additional year of study to receive the Bachelor of Arts degree.

PROFESSIONAL-LEVEL COURSES

Columbia Engineering is committed to educating the whole person to ensure students have both the technical knowledge and professional skills required to succeed in our rapidly changing technological environment. Our professional-level courses expose students to different engineering fields and help first- and second-year students choose their major.

Atomic-scale engineering of new materials
Design of buildings, bridges, and spacecraft
Earth resources and the environment
Engineering in medicine
Physics of the human body
Introduction to electrical engineering, with laboratory in circuit design
Introduction to computational mathematics and physics
Mechanical engineering: micromachines to jumbo jets
Molecular engineering and product design

SOME FIRST JOBS FOR COLUMBIA ENGINEERING GRADUATES

Aircraft Industrial Engineer, Pratt & Whitney
Associate Consultant, Bain & Company
Chemical Engineer, Con Edison
Consultant, Port Authority of New York and New Jersey
Design Engineer, Jaros, Baum & Bolles Consulting Engineers
Investment Banker, Morgan Stanley
Research and Development, Bristol-Myers Squibb

In addition to the employment recruiters who visit Columbia every day, the Columbia Engineering Consortium Career Fair welcomes hundreds of companies to recruit on campus every fall. Participants include:

Adobe Systems
Alcatel-Lucent
American Express
BASF, The Chemical Company
Broadcom Corporation
Flack + Kurtz - Consulting Engineers
GZA GeoEnvironmental, Inc.
Jaros, Baum & Bolles Consulting Engineers
Langan Engineering & Environmental Services, Inc.
Lehman Brothers
Lime Wire LLC
Merrill Lynch
Microsoft
Morgan Stanley & Co
New York State Department of Transportation
Northrop Grumman
U.S. Patent and Trademark Office
U.S. Department of State

Students in the Society of Automotive Engineers design and build a car which competes with other clubs from all over the world.

Columbia Engineering students celebrate Homecoming at an Ivy League football game at Baker Field, named by *Sports Illustrated* as one of the most beautiful places in America to watch a football game.

campus life

A small, close-knit school in the heart of one of the world's great research institutions, atop one of the world's great cities. A community that prides itself on being broad-minded and open-hearted. Every day, every hour, a campus electric with possibility.

SNAPSHOTS

After the curtain falls on the last performance of the *Varsity Show*, three engineers responsible for designing a cutting-edge lighting system decide to take their act to Broadway; they'll form a start-up stage design company.

An evening meeting of Columbia's National Society of Black Engineers (NSBE). American Express speaks about job opportunities, a Morgan Stanley representative critiques your technical resumé, and afterwards, you grab a bite to eat at Tom's Diner on Broadway.

Seeing New York through SEAS NY. You and your fellow engineers see *Carmen* at the New York City Opera or *Spring Awakening* on Broadway or the New York Philharmonic perform at Lincoln Center. All for free. All at your fingertips.

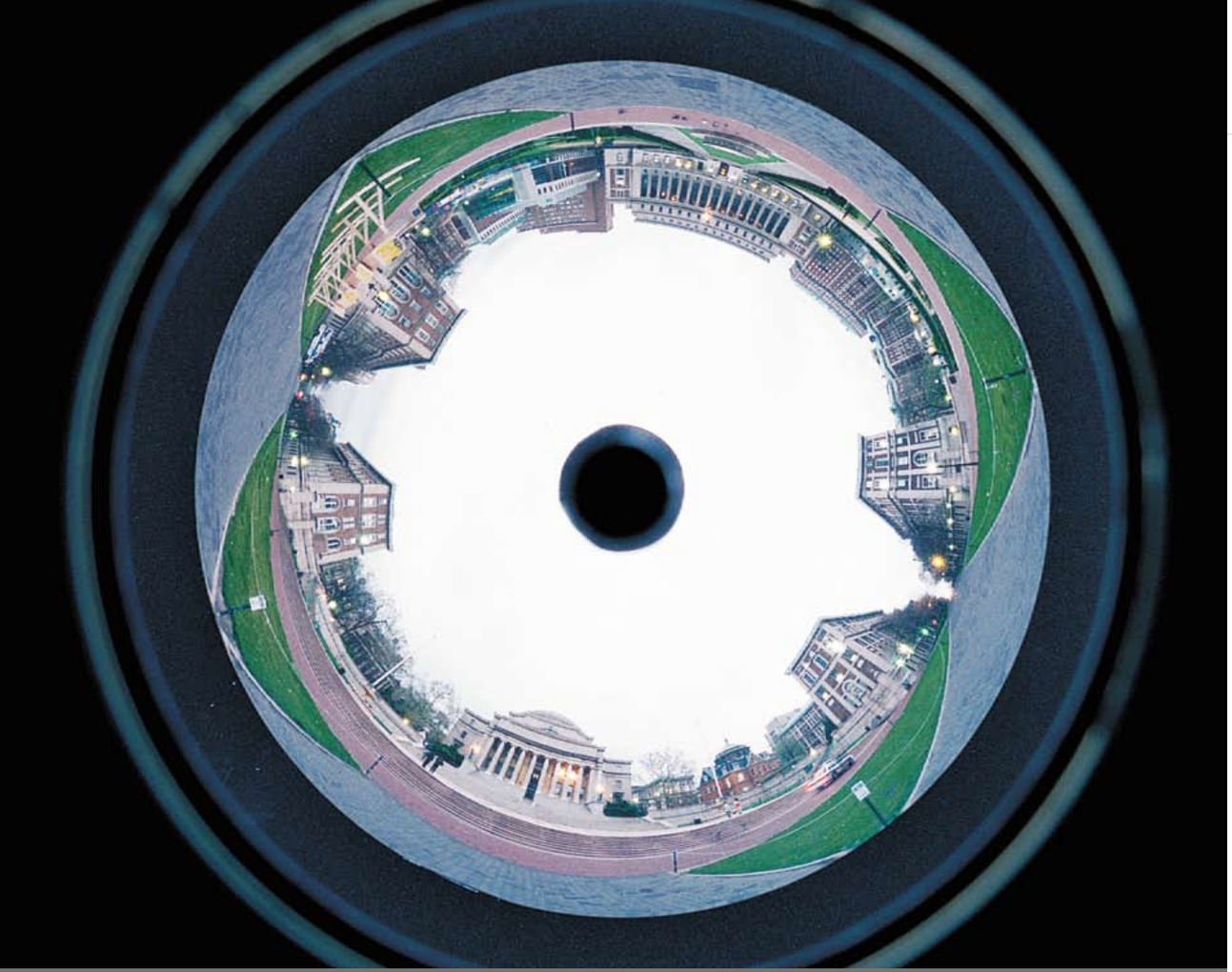
A SAMPLING OF COLUMBIA CLUBS AND PROFESSIONAL ORGANIZATIONS

American Institute of Aeronautics and Astronautics
American Society of Civil Engineers (ASCE)
Asian American Society of Engineers (AASE)
Association for Computing Machinery (ACM)
Bach Society
Biotech Association
Columbia Television (CTV)
Engineering Student Council
Engineering Week
Financial Investment Group
Forum for Society, Science and Religion (CFSSR)
Global Medicine Group
Institute of Electrical and Electronic Engineers (IEEE)
Institute of Industrial Engineers (IIE)
National Society of Black Engineers (NSBE)
Neuroscience Society
Opera Ensemble
Organization of Rising Entrepreneurs (CORE)
Quiz Bowl
Scientists and Engineers for a Better Society
Society of Automotive Engineers (SAE)
Society of Hispanic Professional Engineers (SHPE)
Society of Women Engineers (SWE)
Solar Splash
WKCR-FM (Columbia University Radio)
Uptown Vocal

UNDERGRADUATE CAMPUS LIFE: THE FACTS

Students in Columbia College: 4,100
Students in Columbia Engineering: 1,400
Combined Colleges' percentage of women: 48%
Combined Colleges' percentage of students of color: Over 40%
Incoming Engineering class' percentage of women: 37%
Incoming Engineering class' percentage of students of color: 57%
Percentage of students living on campus: 95%
Student organizations: More than 450
Division I athletic teams: 29
States represented in the student body: 50
Countries represented in the student body: 86

Columbia students can participate in dozens of music ensembles from the Columbia University Orchestra to jazz ensembles to the Bluegrass Band.



A unique view of campus using the revolutionary computational camera invented by T.C. Chang Professor of Computer Science Shree Nayar.

eye on the future

At Columbia, we're not only preparing engineering leaders but also leaders in medicine, law, research, business, and every other field imaginable. Our technical training and broad-based engineering and liberal arts education prepare students for a wide range of careers. Just as Columbia scientists rose to meet the challenges of the space program, digital technology and better use of environmental resources, today's graduates are better equipped than ever to meet the challenges of the 21st century.

Jeff Bleustein, '62, Chairman of the Board of Harley Davidson, served on the President's Council on the 21st Century Workforce. He serves on a number of boards, including the Florentine Opera Company, the Milwaukee Jewish Federation and the Greater Milwaukee Committee where he leads a Task Force on Diversity; he is a Regent Emeritus of the Milwaukee School of Engineering. He majored in mechanical engineering.

Aziza Chaouni, '00, a civil engineering major, co-founded KuoChaouniDesign, a multi-disciplinary design collaborative that focuses on projects in the United States, Europe and Morocco, and also directs the research board of an international organization that seeks to preserve Morocco's modern heritage. She recently was featured on the cover of ARCHITECT Magazine as the winner of the international "Progressive Architecture Award" for her research on repairing the medina of Fez, a UNESCO World Heritage site.

Robert C. Merton, '66, one of the first students in Columbia's engineering mathematics program, won a Nobel Prize in 1997 for his role in developing a pioneering formula for the valuation of stock options. His work resulted in both new types of financial instruments and increased efficiency in risk management. Equally devoted to his liberal arts courses, Merton's first published work was actually a paper on *Gulliver's Travels.*

Carmen Zapata, '05, an operations research major, is just starting her career but already making a difference. After constructing a medical clinic in Thailand as an undergraduate with Engineers Without Borders and researching social development issues, she received a prestigious 5-year fellowship from the Institute of International Public Policy and plans to earn her master's degree in engineering and public policy. She currently works at the Inter-American Development Bank in Washington, D.C.

ADMISSION

Admission to Columbia is broad-based but highly selective. Please consult our website for admissions criteria and the secondary school preparation we recommend. Fifty percent of the students admitted to The Fu Foundation School of Engineering and Applied Science scored between the low 1400s and the low 1500s on the Math and Critical Reading sections of the SAT (the mid-30 range on the ACT). Over 90 percent of admitted applicants were in the top 10 percent of their high school class (in schools that provided a class rank). Applicants are strongly encouraged to apply online: www.studentaffairs.columbia.edu/admissions.

FINANCIAL AID

Admission to Columbia is need-blind, which means that we will consider your application without regard to your financial need. Columbia is also committed to meeting the full need of all applicants admitted as first-year students. About half of all enrolled students receive some type of aid from Columbia or outside sources. The need-blind application policy is in effect for candidates who, regardless of place of schooling or residence, are U.S. citizens or permanent residents, are Canadian or Mexican citizens or qualify for a refugee visa. Financial aid is available for foreign students, but students should be aware that their admissions applications are read in a more selective process than are other candidates'.

If you are admitted to Columbia, you are clearly outstanding among your peers, and we want to make it financially possible for you to join our community. We understand the challenges all students and their families face in financing an undergraduate education. Though a private education at this level must be looked upon as a long-term investment, Columbia's Office of Financial Aid and Educational Financing will work with you to try to come up with a financial plan that will address your short-term concerns. Columbia's financial aid philosophy allows us to attract a student body not only diverse in interest, but also in background and experience. We believe that cost should not be a barrier to pursuing your educational dreams.

LIST OF HELPFUL WEBSITES

The Fu Foundation School of Engineering and Applied Science:
www.engineering.columbia.edu

Undergraduate Admissions:
www.studentaffairs.columbia.edu/admissions

Columbia Engineering Course Bulletin:
www.engineering.columbia.edu/bulletin

Undergraduate Research Involvement Project (URIP):
www.engineering.columbia.edu/students/academics/research

Campus Life:
www.studentaffairs.columbia.edu

Center for Career Education:
www.cce.columbia.edu

Office of Pre-professional Advising:
www.studentaffairs.columbia.edu/preprofessional

Research at Columbia:
www.columbia.edu/research/index.html

STATEMENT OF NON-DISCRIMINATION

Columbia University admits students of any race, color, national or ethnic origin to all the rights, privileges, programs and activities generally accorded or made available to students at the University. It does not discriminate on the basis of race, color, sex, handicap, age, sexual orientation, national or ethnic origin in administration of its educational policies, scholarships or loan programs and athletic and other University-administered programs.

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

For more information, please contact

The Fu Foundation School of Engineering and Applied Science

Office of Undergraduate Admissions
212 Hamilton Hall, MC 2807
1130 Amsterdam Avenue
New York, NY 10027
Phone: 212-854-2522
Fax: 212-854-1209
www.studentaffairs.columbia.edu/admissions