

YOU'RE AN ENGINEER IF...

...you want to **make a difference** in the world.

...you open your family's old television (or car engine, microwave, or doorbell) just to **see how it works**.

...you created towers and bridges with **Legos** or blocks as a kid—and now dream about building them in the real world.

...you look at a computer, a cell phone, a skyscraper, and think: why was it made this way? **How could it be made better?**

...you **love to get your hands on a good problem**—the tricky, impossible-seeming kind.

...you like thinking of ways to **make life easier, happier, better**.

This is a book for people like you—curious, creative, problem-solvers who want to improve our world—a reminder that the person you are and the things you love have a name and a place in the world.



LAUREN MINCHES
Operations Research

“When I was younger, I didn't know what an engineer was. But it was obvious that I enjoyed being creative and working with puzzles. And one day my dad told me that an engineer is a problem-solver. The description just fit me.”

“Engineering is a way of thinking—and doing. I'm studying questions that affect people's daily lives: How can we work more efficiently? How can we make life more comfortable and convenient? If you're an engineer, you're using the skills you enjoy—and are good at—to improve society in a meaningful and significant way.”

DOES THIS SOUND LIKE YOU?

“It sounds like a cliché, but it's true: as a kid I was always building things, always messing up my parents' new gadgets. A lot of engineers start like that.”

“By the time I got to high school, thinking critically to solve problems had become second nature to me, and I learned I especially enjoyed the precision and logic behind math and science.”

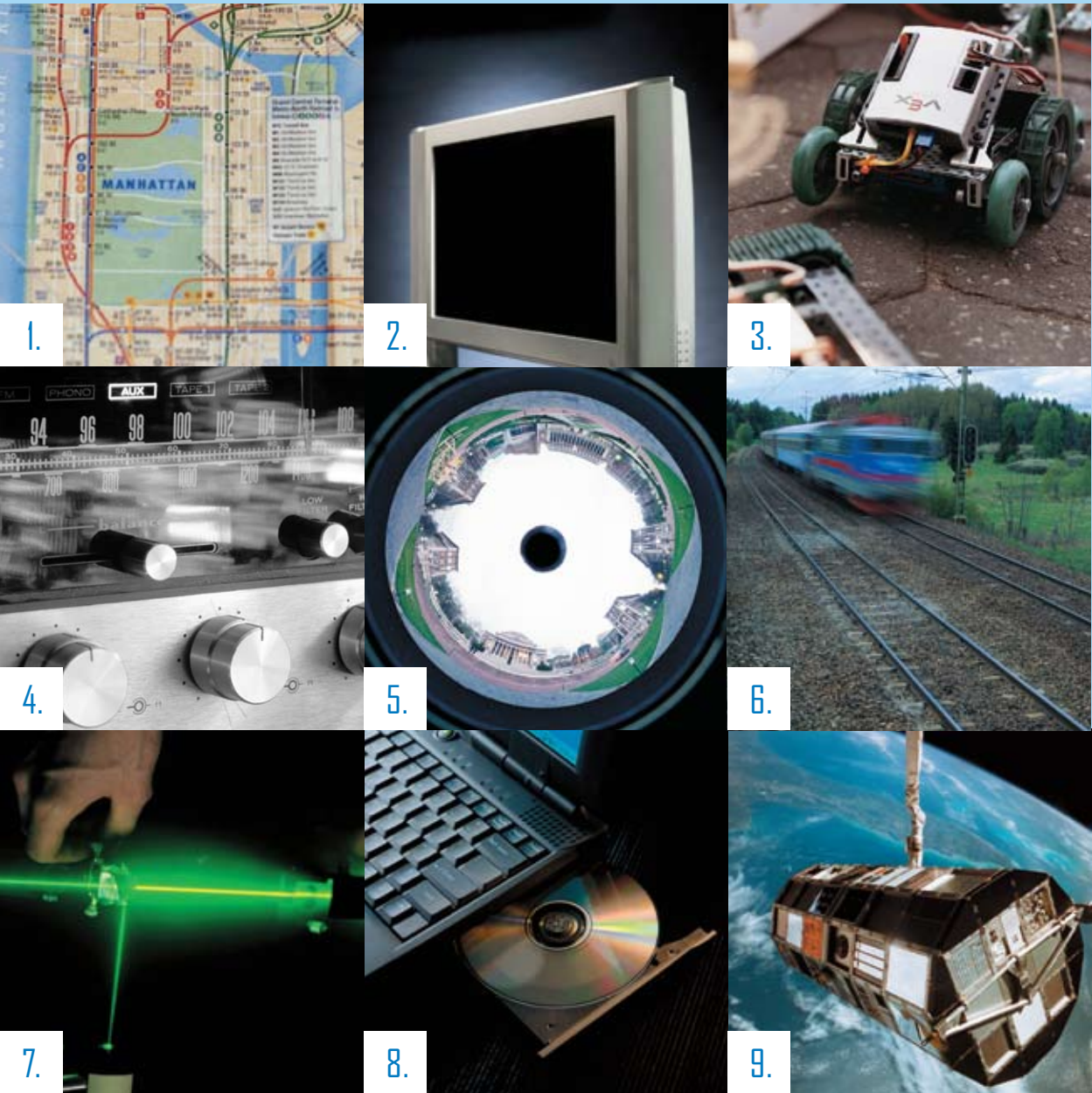


KEN YEARWOOD
Mechanical Engineering

SO, WHAT IS ENGINEERING?

Engineering is taking what we know about science and math and making something faster, taller, stronger, smaller, better for the world to use.

The images below represent technological innovations pioneered by Columbia engineers. Can you guess what they are? (Answers are below.)



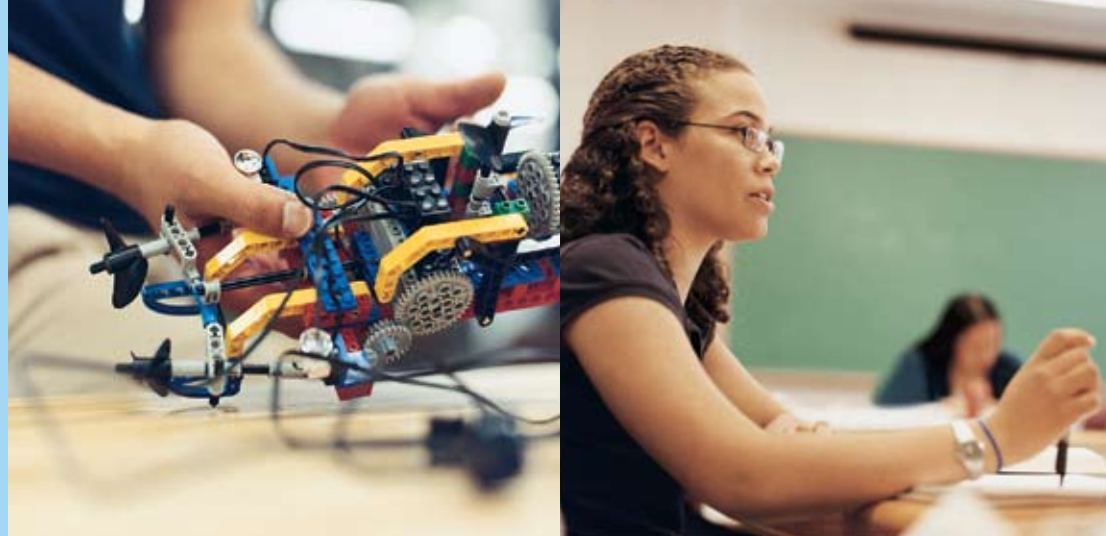
1.) New York City subway system—Chief Engineer William Parsons graduated from Columbia in 1882. 2.) Flat panel TV—Columbia Professor James Im developed sequential lateral solidification, a process that has revolutionized flat panel displays. 3.) Robotics—1946 Columbia graduate Joseph Engelberger is widely considered the “Father of Modern Robotics.” 4.) FM radio—invented by 1913 Columbia graduate Edwin Armstrong. 5.) 360° camera—invented by Columbia Professor Shree K. Nayar; here showing a view of Columbia’s campus. 6.) Railroad transportation—1768 Columbia graduate John Stevens built the pioneer locomotive and invented the steamboat. 7.) Laser—Columbia faculty-student collaboration led to the invention of the laser in 1957. 8.) Columbia Professor Dimitris Anastassiou’s invention of MPEG-2 makes possible DVDs, direct satellite TV and personal computer video. 9.) Satellite—The NASA Goddard Institute for Space Studies is part of Columbia, and 1984 Columbia graduate Michael Massimino is now both an engineer and astronaut.

What kind of engineer might you want to be?

IF YOU'VE ALWAYS WANTED TO KNOW...	THEN YOU JUST MIGHT WANT TO TRY...
...how to use math to predict hurricanes or create a currency system?	Applied Mathematics
...what happens to physics theories when applied to materials one billionth of a meter in size?	Applied Physics
...how to construct an artificial knee, heart, and perhaps one day a brain that works like a real one?	Biomedical Engineering
...how to create less expensive and more effective forms of fuel?	Chemical Engineering
...how to construct buildings that can withstand earthquakes?	Civil Engineering
...how to design the next generation of digital technology?	Computer Engineering
...whether we can create computers that actually think?	Computer Science
...how to build solar-powered cars?	Earth and Environmental Engineering
...how to make digital cameras smaller yet more powerful?	Electrical Engineering
...how to make the check-out line in the grocery store more efficient?	Engineering Management Systems
...how to build faster airplanes?	Engineering Mechanics
...how to use mathematical methods to make sound investment decisions?	Financial Engineering
...how to make 1,000 cell phones in the same time it used to take to make 10?	Industrial Engineering
...how to design sneakers that can make people jump higher?	Materials Science Engineering
...how to build a robot that can conduct major surgery from 3,000 miles away?	Mechanical Engineering
...how to start and run a business as productively, profitably and humanely as possible?	Operations Research



THIS IS COLUMBIA ENGINEERING



The Fu Foundation School of Engineering and Applied Science (Columbia Engineering) is one of the oldest engineering schools in the country and home to some of the world's most important technological discoveries. Today, Columbia's architecturally renowned campus in the heart of New York City is shared among 1,400 engineering students and more than 160 professors, working together in state-of-the-art labs, conducting cutting-edge research, and generally helping to make the world a saner, smarter, better place to live.

$$\text{COLUMBIA ENGINEERING} = \text{R}^2 + \text{C2C} + \text{HoP} + \text{LAB} + \text{NYC} + \infty \text{P} !$$

R² = REVOLUTIONARY RESEARCH:

- Nanotechnology: Work in one of the only national nanoscale research centers in the U.S. and discover how the entire Library of Congress can fit on a sugar cube-sized computer chip.
- Mobile Robotics: Join Columbia researchers to design a team of soccer-playing robots.
- Design of Smart Materials: Smart materials respond to their surroundings: make a jacket that gets warmer as the temperature gets colder.

C2C = COMMITMENT TO COMMUNITY:

- We guarantee all first-year students internships in the community, like designing a solar-powered "green" roof for a neighborhood school or inventing a wheelchair-accessible swing for parks around New York City.
- Become a mentor for the Columbia-created Harlem Robotics League and share your experience with local middle school students.
- Join Engineers Without Borders, a student-run organization helping to bring energy and clean water to rural towns around the globe.

HoP = HANDS-ON PROJECTS:

- Think you will just be solving math problems? Think again: through programs like the Undergraduate Research Involvement Program, hundreds of research positions are available **ONLY** to undergraduates, such as DNA cloning and creating 3-D virtual worlds.
- Learn how to start your own company through Columbia's entrepreneurship courses with the Business School or consult with companies in Hong Kong, Guatemala, Scotland and beyond.

LAB = LIBERAL ARTS BASE:

- What good is knowing math and science without knowing how it fits with the rest of the world? A liberal arts education promises a broad base of knowledge, training your mind for any profession.
- If engineers want to create a better world, they need to understand it—its culture, history, politics, philosophy, literature and art, in addition to math and science. That's why we offer thousands of classes in over 90 majors.

NYC = NEW YORK CITY:

- Walk around town and see some of the most famous buildings, bridges and skylines in the world—get inspiration for the building designs in your own imagination.
- Want a job even before you graduate? NYC is home to the largest stock exchange in the world; the nation's largest Gross Metropolitan Product (GMP) of over \$1.1 trillion; and one of the fastest growing software development, game design, and Internet service industries in the world.

∞P = INFINITE POSSIBILITIES!

From over 450 student clubs on campus to thousands of internships to the Center for Career Education helping you plan your career from day 1; from building a clinic in Thailand to researching endangered species in Brazil; from playing on one of Columbia's 31 Ivy League sports teams to joining the Science Fiction Club's Tour of New York...the possibilities for learning, research, and preparation for the future and just plain fun at Columbia are endless.

THIS IS YOUR FUTURE

You, with your imagination, your desire to better society, your thrill of figuring things out—the world needs people like you...to build satellites, prosthetic arms, MP3 players...to ask “Why not?” and to create a better world, a world that is yet to be.

So, meet some people a lot like you who chose Columbia Engineering to reach their dreams.

JEANE CHEN *Electrical Engineering, Columbia Engineering, 1990*
Executive Vice President for Engineering, Kintera Inc.

“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, and to raise the bar on intellectual satisfaction.”

VINCENT REPPUCCI, M.D. *Chemical Engineering, Columbia Engineering, 1979*
Ophthalmologist and Assistant Professor of Pharmacology, Cornell Medical College

“Columbia Engineering is uniquely positioned with access to Columbia’s prestigious medical school and hospitals, offering study in cell and tissue engineering, biomechanics, and biomedical engineering. My fellow graduates have gone on to become leaders within all engineering disciplines, as well as academics, business, finance, politics, law, entertainment, medicine, and public service.”

According to the U.S. Department of Labor and *Fast Company* magazine, some of the fastest growing jobs in the country are engineering-related.

SOME JOBS OF RECENT COLUMBIA GRADUATES

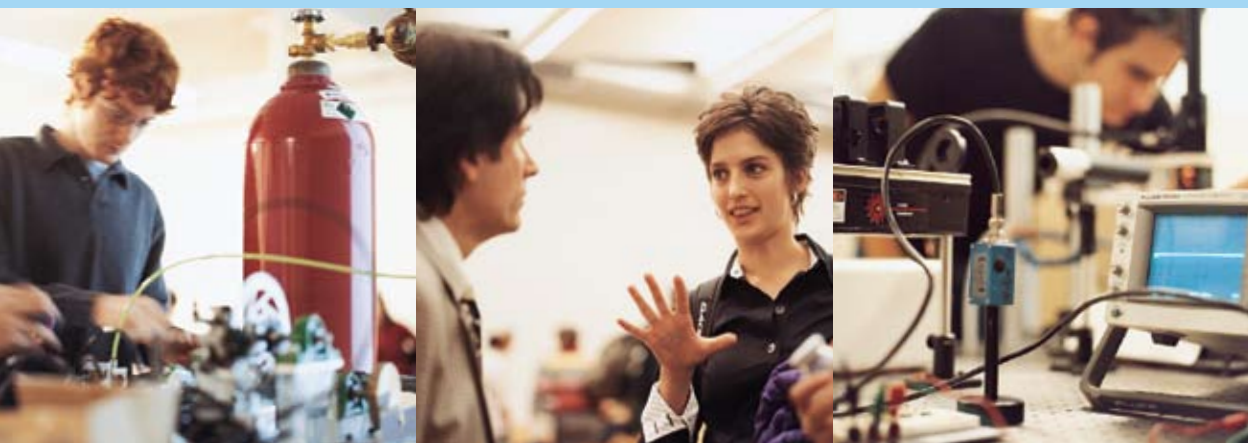
- Aircraft industrial engineer, Pratt & Whitney
- Associate consultant, Bain & Company
- Chemical engineer, Con Edison
- Design engineer, Jaros, Baum & Bolles Consulting Engineers
- Health Educator, Peace Corps, Kenya
- Investment banker, Goldman Sachs
- Patent attorney, Ropes & Gray, LLP
- Research and development, Bristol-Myers Squibb

JUST A FEW FAMOUS COLUMBIA UNIVERSITY ALUMS:

- Michael Idvorsky Pupin (1883), inventor of long distance telephone communication
- Irving Langmuir (1903), winner of the 1932 Nobel Prize in Chemistry
- Hyman Rickover (1929), father of the nuclear U.S. Navy
- Hazel Bishop (1929), chemist and inventor of innovative cosmetics
- Isaac Asimov (1939), author, scientist and master of science fiction
- Robert C. Merton (1966), winner of the 1997 Nobel Prize in Economics
- Jacqueline Barton (1979), pioneering researcher of DNA repair

COLUMBIA UNIVERSITY: BY THE NUMBERS

1754 = Year of founding of Columbia College	1864 = Year of founding of Columbia’s School of Mines (Columbia Engineering)	5,500 = Total # of undergraduate students
1,400 = Total # of undergraduate students in Columbia Engineering	77 = # of Columbia Nobel Prize winners (so far!)	6:1 = Ratio of students per faculty member
48 = % of female students in the current first-year class	100 = % of students guaranteed housing	55+ Million = Total dollars awarded in financial aid each year
100,000,000 = Degrees Fahrenheit Columbia’s fusion reactor can reach	50 = % of students of color in the current first-year class	3 = Minimum # of advisors per student
50 = # of U.S. states represented among students	91 = # of countries represented among undergraduates	500,000 = Pounds Columbia’s universal testing machine can withstand



BUT COLUMBIA IS MORE THAN NUMBERS!

Admission to Columbia Engineering is not just about using a simple formula.

The Admissions Office looks at **you as a whole person**—not just a brain, not just a grade, but a creative thinker, an orchestra member, a computer whiz.

Yes, we'll look at what grades you're getting in high school, but also important are the classes you've taken and what you've liked. If you've decided that engineering might be for you, **challenge yourself** with the math and science classes at your school. Contrary to popular belief, math and science don't have to be your favorite subjects for you to be a great engineer, but you do need a strong foundation in the subjects. Maybe you'll like algebra, geometry, biology, chemistry, physics, environmental science, computers, design, or something else entirely.

If you're interested in Columbia Engineering, here are some basic school schedule guidelines to keep you on track in high school. If these courses are not available at your school, ask your counselor and teachers what other options you might have.

- 4 years of mathematics
- 1 year of physics
- 1 year of chemistry
- 4 years of English
- 2-3 years of a foreign language
- 3-4 years of history and social studies

So what are the SAT and ACT tests? These are tests that college admissions offices use to get some sense of how students might do at their colleges. It's not that these tests are the only or most important measure of a student's academic ability or potential, they are just one factor among many. And while they do provide a standardized gauge for admissions offices to look at students from all over the planet, **we know that you are not standardized!** Even so, ask a counselor for more information, because it's important to take these tests.

- 10th or 11th grade—Take the **PSAT** or **ACT Plan** tests.
- 11th or 12th grade—Take the **SAT** or **ACT** tests and **SAT Subject Tests** in math and science.

But remember, we don't only want school smarts. **We want minds with imagination!** Ask a teacher or counselor for clubs or organizations in your school, around your community, or across the world that teach students about engineering. You can find more information on the Undergraduate Admissions website: www.studentaffairs.columbia.edu/admissions.

We even have programs here at Columbia just for high school students who want to give engineering and science a try. Visit this website for more information: www.ce.columbia.edu/hs/.

In the end, just don't forget to have fun and keep learning. **Read everything**—books, magazines and websites highlighting science, computers, nature, architecture, politics, cars, art, design, business, math, literature, psychology, sports...anything and everything that fires up your imagination. Keep figuring out how things work, keep asking the hard questions, and **keep your creative, open mind alert and alive.**

Paying for Columbia Engineering is also not just about a simple formula.

Columbia is truly affordable. If you are admitted to Columbia, you are clearly a standout among your peers, and we want to make it possible for you to join our community. The Columbia Office of Financial Aid and Educational Financing supports families from all kinds of backgrounds to help make Columbia affordable for them. In fact, Columbia is committed to meeting the full demonstrated need for all four years of every single first-year student we admit. That means we calculate how much a student and his or her family can afford to invest in a Columbia education, and then we help you cover the rest in a variety of ways, including need-based scholarships and/or a job on campus. **Columbia has eliminated loans for all students receiving financial aid** and replaced them with University grants; students from families with incomes below \$60,000 (with typical assets) are not expected to contribute to tuition, fees, room or board; students from families with incomes between \$60,000 and \$100,000 (with typical assets) will have a significantly reduced parent contribution. Do your research about which colleges you like and what financial aid policies they have, but don't let the price scare you away. We at Columbia believe that **cost should not be a barrier** to pursuing your educational dreams.

More financial aid information can be found at: www.studentaffairs.columbia.edu/finaid.

REQUEST INFORMATION The fastest way to get on our mailing list is to visit: www.studentaffairs.columbia.edu/admissions. If you do not have access to the Internet, feel free to contact the Office of Undergraduate Admissions at the number and address below:

Columbia University in the City of New York
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





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, gender, pregnancy, religion, creed, marital status, partnership status, age, sexual orientation, national origin, disability, military status, or any other legally protected status in administration of its educational policies, admissions policies, scholarship and loan programs, and athletic and other University-sponsored programs.





A DAY IN THE LIFE
OF A COLUMBIA
ENGINEER

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

8AM		
9AM	Quick run in Central Park	
10AM	Class—Computer Game Design	- work on 3D animation of main character
11AM		
NOON	Go with jazz band members to lunch at Ollie's Noodle Shop on Broadway	
1PM	Class—Physics of the Human Body	Assignment: figure out how the circulatory system is like a freeway or bus route
2PM		
3PM	Research with professor—design research project to create DNA-specific drugs to prevent Parkinson's disease	
4PM		→ Remember to get PAYCHECK for research!
5PM		
6PM	Try out that new virtual reality video game with friends from Ultimate Frisbee team	
7PM	7:30 7:30—Dinner w/ roommates at John Jay Dining Hall	
8PM	8:30—Meet with Engineers Without Borders	Need to discuss design of water filtration plant for trip to Ghana
9PM	meet w/ study group and discuss homework	
10PM	meet Jason and Alicia at Lerner Hall for comedy improv show - get there early!	
11PM		