ÉCOLE POLYTECHNIQUE

IP PARIS

COLUMBIA ENGINEERING

Global Dual Degree in Engineering

Bachelor & Master

ÉCOLE
POLYTECHNIQUE
POUR LA PATRIE LES S
COLUMBIA
ENGINEERING

Ecole Polytechnique and The Fu Foundation School of Engineering and Applied Science at Columbia University have joined forces to offer a prestigious engineering program for students passionate about addressing the world's most urgent challenges. This elite five-year program is highly competitive and leverages the strengths of two world-class academic institutions to deliver a holistic curriculum that emphasizes mathematics, research, and a global mindset. The program prepares graduates to pioneer novel solutions in a range of fields, including sustainability, environmental conservation, resource management, climate change, and AI.

The program is taught entirely in English and tailored to academically inclined students with a strong interest in mathematics and science and an awareness of global challenges.

During the three first years, École Polytechnique allows students to develop a solid academic background in science, while opening students to current issues and humanities.

École Polytechnique favors small class sizes a highly beneficial beneficial student-to-staff ratio. Our students enjoy a truly international setting. École Polytechnique and Columbia Engineering offer a multicultural environment promoting diversity and nourishing intercultural dialogue. The study of at least one foreign language is a mandatory part of the curriculum.

École Polytechnique at a Glance

Founded in 1794, École Polytechnique is France's leading institution in science and technology.

Over two centuries, alumni have profoundly marked the history of science and industry and contributed to the great advances in their fields that have shaped the world as we know it today.

Since its founding, the university has held a long standing tradition of scientific excellence. Researchers, professors and alumni from École Polytechnique have received prestigious awards and distinctions, including Nobel Prizes and Fields Medals.

Located in a world-renowned science and technology ecosystem

The École Polytechnique campus is situated less than an hour from central Paris at the heart of the Paris Saclay research and business cluster. It encompasses research facilities, numerous higher education institutions and over fifty research centers of private companies.

International Reputation

Best University in France
QS 2024

Best small University in the world
Times Higher Education 2021

International University
QS 2024

Worldwide in terms of graduate employability
QS ranking 2024

Columbia univeristy at a Glance

Located in the heart of New York City, Columbia Engineering has been the birthplace of impactful engineering innovations for over 150 years. Rigorous interdisciplinary curricula are paired with unparalleled resources, prestigious innovation centers, and top research hubs to deliver an irreplaceable learning experience. Strong connections across major industries and a world-class alumni network open doors to successful futures as scholars, entrepreneurs, and innovators.

Since 1864, the Fu Foundation School of Engineering and Applied Science at Columbia University has been a resource to the world for major advances in human progress.

Today, Columbia Engineering is the top engineering school in New York City and among the Ivy Leagues. As a nexus for high-impact research, the school convenes more than 250 faculty members and more than 6,000 undergraduate and graduate students from around the globe to push the frontiers of knowledge and solve humanity's most pressing problems.

We derive our diversity, energy, and entrepreneurial spirit from our seat in the capital of the world: New York City. Just like our city, we are a magnet for global talent and a compact nucleus of activity that has a major impact on the world.

International Reputation

World University Rankings
Times Higher Education 2023

US College Rankings
Times Higher Education 2022

World Reputation Rankings
Times Higher Education 2022

Global Academic Ranking
QS 2022

Global challenges in a global world

A multidisciplinary and international approach through a 5-year program: a Bachelor's degree (3 years) at Ecole Polytechnique and a Master's degree (18 months) at Columbia Engineering through one of nine Masters of engineering. Students joining our program will benefit from a demanding and challenging multidisciplinary scientific curriculum focused on mathematics, computer science, economics, and physics. They also attend classes in foreign languages, biology, chemistry, humanities, and physical education.

Bachelor of Science Degree : Three Double Tracks

Ecole Polytechnique's Bachelor Program offers students the choice of three double tracks allowing them to customize their academic journey with a specialization: mathematics and economics, mathematics and computer science or mathematics and Engineering and Physical Science.

Master of Science Degree : Nine Options

Columbia's Master's Program offers students the choice of nine Masters according to the double track chosen during their Bachelor's degree.

Academic program

Global Dual Degree in Engineering

Professional Development **Part 1**

3 years

Ecole Polytechnique
Bachelor of Science Program

Methodology, Maths,
Global Engineering, Focused track

Final Bachelor Semester
Individualized learning path
on or off campus
and a research project

Professional Development **Part 2**

18 months

Columbia
Master of Science Programs

BS Degree Ecole Polytechnique

Academic program

3 years

Ecole Polytechnique
Bachelor of Science Program

CORE COURSES

Mathematics

- Real Analysis
- Algebra and Linear Algebra
- Discrete Mathematics
- Vector and Fourier Analysis
- Topology and Multivariable Calculus
- Numerical Analysis
- Probability and Statistics
- Differential Equations
- Measure and Integration
- Optimization and Optimal Control

Global Engineering

- The Art of Engineering
- Mechanics and Heat
- Discovery Labs
- Computer Programming
- Languages and Foreign Cultures
- Introduction to Economics
- Fundamental of Organizations
- Sustainable Development
- Resource Management
- Entrepreneurship and Design

Academic program

FOCUSED TRACKS

1 among 3 during BS

Computer Science Track

- Object Oriented Programming
- Design and Analysis of Algorithms
- Machine Learning
- Computer Architecture
- Introduction to Networks
- Compilers
- Functional/Constraint Logic Programming
- Project

Economics Track

- Topics in Economics
- Intermediate Microeconomics
- Intermediate Macroeconomics
- Introduction to Econometrics
- Introduction to Finance
- History of Economy
- Advanced Microeconomics
- Advanced Macroeconomics

Engineering and Physical Science Track

- Electromagnetism and Light
- Classical Mechanics
- Physics Labs
- Wave Optics and Radiation
- Quantum Physics I
- Thermodynamics
- Solid Mechanics
- Fluid Mechanics

Driving Tomorrow's Science and Technological Innovation

At the heart of a vibrant scientific community, our students interact with internationally renowned scientists, engineers, managers, entrepreneurs and CEOs of major companies.

The Research Center

École Polytechnique's Research Center combines the most fundamental aspects of research with the pursuit of progress in the main applied fields in order to meet future scientific, technological and societal challenges. Bachelor students have the opportunity to discover the laboratory environment from day one of their Program, providing an exceptional learning experience. Students have the opportunity to do lab research projects in one of the numerous labs.

Internships

Students have the opportunity to do a 4- to 8-week internship during the summer in a lab or in a company and are expected to conduct a research project in preparation of their Bachelor Thesis. This opportunity enables students to experience both the corporate and research worlds.

Entrepreneurship and Innovation

The Drahi X-Novation Center is dedicated to entrepreneurship and innovation at École Polytechnique. This unique space provides students with a business incubator and accelerator where startups can expand and improve their business models. Bachelor students can take advantage of this center, which fosters creativity and promotes experimentation from their first year onwards.

E4C Center

École Polytechnique is constantly adapting its academic programs to prepare all of its students for the new situation of the ecological transition so that they can understand and measure the issues at stake, and so that they are able to pursue their commitment and act. The following set of actions have recently been instituted along those lines:

- The release of École Polytechnique's Climate Plan underscores its commitment to help build a more sustainable world. The Climate Plan sets out objectives that aim to train and engage, develop and innovate, and reduce and empower - to profoundly transform behaviors and contribute to the advent of a responsible and sustainable prosperity.

- Creation of the Energy4Climate (E4C) Center: The center brings together 25 partner laboratories that join forces to conduct research projects to address the climate challenge by bringing together researchers, start-ups and SMEs. The center also aims to offer a unique international pathway and train a new generation of tomorrow's energy leaders.

MS Degree Columbia

COLUMBIA ENGINEERING

Columbia University Master Programs

18 months

Promotion to Columbia's master's degree programs will be decided by the Student Progression Committee, based on academic performance and project requirements.

10 Master Programs*	3 BS Double tracks		
	Engineering and Physical Sciences BS Double track	Maths Computer Science BS Double track	Maths Eco BS Double track
■ Applied Mathematics	✓	✓	✓
■ Data Science	✓	✓	✓
■ Biomedical Engineering	✓		
■ Mechanical Engineering	✓		
■ Earth and Environmental	✓		
■ Materials Science and Engineering	✓		
■ Computer Science		✓	
■ Applied Physics	✓		
■ Financial Engineering		✓	✓
■ Operations Research		✓	✓

MS Degree Columbia

Applied Mathematics	(APAM)
Applied Physics	(APAM)
Earth and Environmental Engineering	(EAEE)

Applied Mathematics

The Program in Applied Mathematics at Columbia University sits in the Department of Applied Physics and Applied Mathematics (APAM) of the Fu Foundation School of Engineering and Applied Sciences (SEAS). The core group of faculty members of the Applied Mathematics Program, many of whom have joint appointments over different departments in SEAS, have research expertise covering mathematical analysis, partial differential equations, numerical analysis, probability, dynamical systems, multiscale modeling, high performance scientific computation, and numerical optimization with applications in optics and photonics, material science, machine learning, data science, imaging science, biology, and climate modeling, to name some examples.

Applied Physics

The Applied Physics Program, while emphasizing continued work in basic physics, permits many options in several applied physics specialties. The program may be considered simply as additional education in areas beyond the bachelor's level, or as preparatory to doctoral studies in the applied physics fields of plasma physics, laser physics, or solid-state physics. Specific course requirements for the master's degree are determined in consultation with the program adviser, but must include four of the six core courses listed below.

Earth and Environmental

The Earth and Environmental Engineering program fosters education and research in the development and application of technology for the sustainable development, use, and integrated management of Earth's resources. Resources are identified as minerals, energy, water, air, and land, as well as the physical, chemical, and biological components of the environment. There is close collaboration with other engineering disciplines, the Lamont-Doherty Earth Observatory, the International Research Institute for Climate Prediction, the Center for Environmental Research and Conservation, and other Columbia Earth Institute units.

MS Degree Columbia

Mechanical Engineering	(MECE)
Computer Science	(COMS)
Data Science	(COMS, IEOR,STAT)

Mechanical Engineering

The department is home to such diverse research activities as biomechanics, mechanics of materials, fluid mechanics, heat transfer, control and robotics, manufacturing, energy systems, MEMS, and nanotechnology. Our faculty members have distinguished themselves internationally through a wide-ranging array of groundbreaking research areas and activities, including: robotics, smart machines, nanomaterials, morphogenesis and tissue development, and sustainable systems.

Computer Science

The computer science curriculum at Columbia places strong emphasis both on theoretical computer science and mathematics and on applied aspects of computer technology. A broad range of upper-level courses is available in such areas as artificial intelligence, machine learning, computer graphics, computer vision, robotics, computational complexity and the analysis of algorithms, combinatorial methods, computer architecture, computer-aided digital design, computer communications, databases, mathematical models for computation, optimization, and software systems.

Data Science

Ours is one of the most highly-rated and sought-after advanced data science programs in the world. Columbia offers students in-depth training in data science and the opportunity to work closely with diverse faculty members and our industry affiliates through part-time or full-time studies.

MS Degree Columbia

Financial Engineering	(IEOR)
Operations Research	(IEOR)
Materials Science and Engineering	(APAM)

Financial Engineering

Financial Engineering is a multidisciplinary field involving financial theory, engineering methods, mathematical tools, and programming. At Columbia, the FE Program provides full-time training in the application of engineering methodologies and quantitative methods in finance. It is designed for students who wish to work in industries such as securities, banking, and financial management and consulting, or general manufacturing and service firms.

Operations Research

The Master of Science in Operations Research (MSOR) is a 30-credit STEM program for students to concentrate in areas such as mathematical programming, stochastic models, and simulation, through domain specific courses in logistics, supply chain management, revenue management, financial engineering, risk management, entrepreneurship, and general management.

Materials Science and Engineering

Materials science and engineering is concerned with synthesis, processing, structure, and properties of metals, ceramics, polymers, and other materials, with emphasis on understanding and exploiting relationships among structure, properties, and applications requirements.

The École Polytechnique Experience

Conveniently located only 20 kilometers south of Paris, our campus is nestled among 160 hectares of nature, with easy access to one of the world's most exciting cities. On our campus, no matter what your interest might be, you'll find a way to get involved.

On-campus Accommodation

All students in the Bachelor Program are housed on campus for the duration of the Program, which allows students to fully partake in our vibrant community, while developing team spirit and solidarity. Students (including international students) can be eligible to receive a monthly housing allowance from the French government.

The Bachelor Student Organization

The Bachelor student organization (L'ORE) contributes to every aspect of Bachelor students' life on campus, including events, sports, orientation, student trips, social events, and so on. The L'ORE helps new students figure out everything there is to know about the campus and makes sure that student life is as exciting as they could have imagined. It also manages the creation of student committees designed for and by Bachelor students, in order to foster a diverse, dynamic and inclusive student life that fits with their schedule and workload!

International Student Office

At École Polytechnique, we have a dedicated office whose job is to make sure that all international students have the support they need before arriving and for the duration of their study Program.

Preparing your arrival

All non-EU students receive personalized advice about visa procedures in relation to their country of residence, as well as the insurance they will need to take out in order to be fully covered for their personal belongings and healthcare.

During your stay in France

- Welcome to France Information Sessions.
- Organization of events throughout the year with the Bachelor team.
- Giving general advice on aspects of living in France and supporting students with any administrative procedures they may have to manage, such as visa renewals.

EXPERIENCE COLUMBIA

New York City is an international crossroads and a capital of culture, as well as a hub for research, innovation, and entrepreneurship. And when you need a little peace and tranquility, there are a multitude of public parks and other recreational sites waiting for you to explore.

Accomodations

The New York City housing market can be overwhelming, but Columbia is dedicated to helping its students find safe, affordable housing. Incoming Columbia Engineering graduate students can leverage many resources to secure housing, both On and Off-campus. Please keep in mind that Columbia Housing is highly competitive with the majority of our masters students living off-campus.

Research Facilities

At Columbia Engineering in New York City, you'll gain important academic advantages available nowhere else. Our affiliations with renowned labs such as Brookhaven National Laboratory, Nevis Laboratories, and the Lamont-Doherty Earth Observatory widen your research horizons. Our campus is also home to a vast array of state-of-the-art centers of excellence and multidisciplinary research groups, complemented by one of the very best academic library systems in the country.

Engineering Student Affairs

The Professional Development and Leadership course offers special workshops, labs, competitions, and courses that build your professional skills, your network, and your confidence. We offer over 300 sessions annually for our BS, MS and PhD students. This is a degree requirement for our MS students.

Engineering Wellness provides resources and services in order to promote general wellness for students. Engineering Wellness is a part of the Engineering Student Affairs (ESA).

Columbia Engineering fosters a student environment that meets the needs of its intellectually curious, diverse, and engaged student body. From student clubs to design competitions to networking events, we offer countless co-curricular activities as well as opportunities for community service and outreach. In short, Columbia Engineering offers the best of campus life along with easy access to all the attractions of New York City.

Admission

General Admission Requirements

Applicants must meet one of the following requirements

– They must currently be enrolled in their last year of secondary education, which must be completed before the start of the Bachelor Program.
– Or have recently graduated from secondary education (either currently taking a year off or be currently enrolled in post-secondary education).

Students are firstly selected on their strong academic background, especially in mathematics and science. They must also demontrate motivation and interest for adressing the world's most urgent challenges. The Program also values exemplary, extensive achievement in any intellectual or creative endeavor. This includes accomplishments in extracurricular activities such as performing arts or athletics, scientific competitions, internships, leadership in your school or community, volunteering, etc.

Specific Admission Requirements

Admission to École Polytechnique's Bachelor Program is highly competitive and is designed for top students with very high potential, who are capable of following a rich and demanding curriculum.

Applicants to the Program should also meet the following specific requirements:

- have an overall strong academic average
- have taken advanced mathematics courses, and at least one advanced science course
- have a good level of English (Common European Framework of Reference for Languages level C1).

Promotion to Columbia's master's degree programs will be decided by the Student Progression Committee, based on academic performance and project requirements.

Admissions requirements by high school curriculum

French Baccalaureate

For students taking the Baccalaureate exam in 2023 and after: advanced Mathematics and another scientific subject to be chosen in *1ère* and to be kept in *Terminale*. The third optional subject for *1ère* is up to the student.

International Baccalaureate

Mathematics and at least one science course should be Higher Level.

North American education

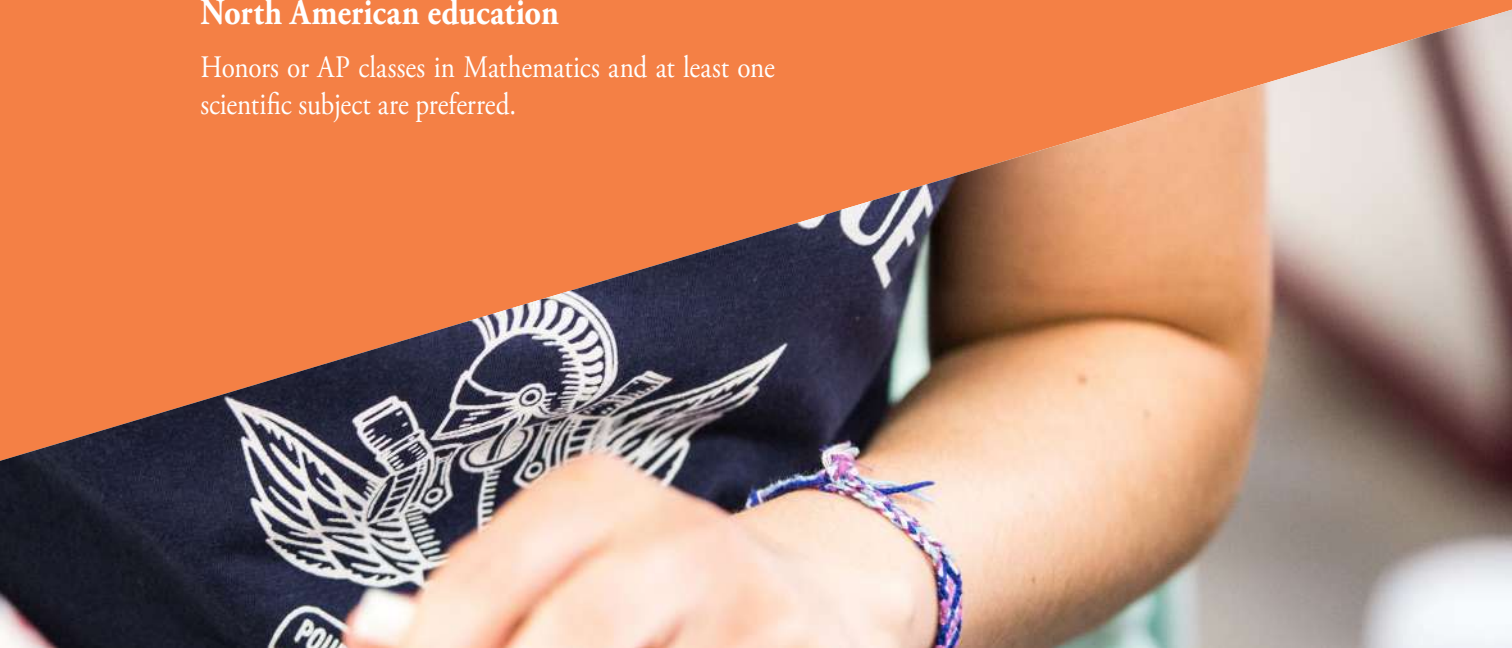
Honors or AP classes in Mathematics and at least one scientific subject are preferred.

British-patterned education

A-level program: Mathematics and at least one science course should be Higher Level.

Other curriculum

Other curricula are also accepted if applicants have studied mathematics at high level and another scientific subject.



How to Apply?

Your application must be submitted online and must include the following:

1. Scanned copies of your transcripts for the last four academic years, completed and in progress (i.e. if you are currently in 12th Grade, please provide your transcripts from 9th, 10th and 11th Grade)
2. Two references (preferably academic)
3. Personal statements (form to be completed in the online application)
4. CV/Resume (form to be completed in the online application)
5. English language certificate: IELTS, TOEFL iBT or Cambridge English tests (Advanced (CAE) and Proficiency (CPT))

Shortlisted applicants are invited to a 50-minute interview via videoconference.
The interview is conducted entirely in English and is divided into 2 parts:

20 minutes: general scientific culture and motivation for joining the Program
30 minutes: mathematics questions based on the secondary education curriculum
Admissions decisions are based on the quality of the application file and the interview score.

Admissions Calendar

Round	Application Deadlines	Interview Dates (for shortlisted candidates only)	Final Admission Results
	October 8 - December 10, 2024 Included (CET)	February 2025	March 2025

Candidates can only apply once per academic year to the Bachelor Program, via Ecole Polytechnique's online application system.

Application fees: An application fee of €95 is required upon application submission.
This can be paid by credit card or bank transfer.

Tuition Fees for the Bachelor program

Tuition Fees

2025 Annual Tuition Fees:
> €15,750 per year* for EU and EEA students
> €18,800 per year for students from outside the EU

Financial Aid

At École Polytechnique, we admit the most talented undergraduate students from all over the world and we strive to attract and reward the very best students, regardless of their financial situation. To this end, eligibility for excellence scholarships and tuition waivers is reserved for students who are admitted with honors in each round of admission. There are two categories of financial aid: merit-based and need-based. These categories are not mutually exclusive.

Merit-based financial aid

Excellence Scholarship

The École Polytechnique Foundation offers a limited number of scholarships based on academic excellence to help us attract and reward the very top students worldwide. Each scholarship award can be up to €4,000 per year for 3 years. The Excellence Scholarship's renewal is subject to academic success and attendance in the Program.

Need-based financial aid

Tuition Waivers

École Polytechnique offers tuition waivers based on students' financial needs. Tuition waivers range from €1,000 up to €14,400 (depending on a student's tuition fees). Please note that even the highest tuition waiver requires a €1,400 annual tuition fee. Tuition waivers only cover tuition costs; any other expenses are the responsibility of the student.

Women in Science Scholarship

Historically, women have been underrepresented in scientific fields of study. At École Polytechnique we take this issue seriously and strive to promote gender equality. To this end, the École Polytechnique Foundation has created a specific scholarship for exceptional female students admitted to the Program. The scholarship award is €4,000 (for a year) and paid in 10 monthly installments and only offered during the first year.

Available to all female students, not only admitted with honors.

Interest Free Loans via the École Polytechnique Foundation

Available to all students, not only students admitted with honors.

Tuition Fees for Master's Programs

Estimated Tuition Fees for Master's programs 2022-2023: $63, 160
Additional fees may apply.
Information on Master's Programs available upon request.

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