THE COOPER UNION
FOR THE ADVANCEMENT OF SCIENCE AND ART

Albert Nerken
School of Engineering
ENGINEERING FOR THE
BENEFIT OF SOCIETY AND HUMANITY
The Cooper Union for the Advancement of Science and Art
Albert Nerken School of Engineering

Home to approximately 450 exceptionally talented undergraduate students, the Albert Nerken School of Engineering is a learning community of innovative builders, makers, and creative problem solvers.

Cooper students closely engage with their fellow classmates and Cooper’s distinguished faculty—with classes of 25 students in core courses and 10 students in elective courses. That tight-knit educational experience is defined by experimentation, collaboration, and innovation. Students delve into project-based learning and encounter rich opportunities for research and advanced coursework alongside professors and peers who care deeply and insist on making a difference in the world.

Faculty in the school of engineering are committed to preparing students to succeed in an increasingly complex world shaped by emerging technologies and global challenges. Cooper students are required to think broadly across disciplines and to work collaboratively.

Cooper Union’s engineering graduates are known for revolutionizing their disciplines and transforming society, with accomplishments ranging from the Nobel Prize–winning discovery of a binary pulsar, to developing the first Global Positioning System, to engineering the infrastructures that support everyday life in New York City. Our graduates are recruited by leading national and international corporations, cutting-edge consulting companies, new and disruptive startups, and top graduate schools.

Together we can reimagine engineering to benefit society and humanity.

Cooper at a Glance

- U.S. News and World Report 2021 Rankings: #1 Best Value for Its Region (North); #2 in Regional Colleges (North); #4 for Best Undergraduate Teaching; #10 in the Nation Among Undergraduate Engineering Colleges; #1 in Undergraduate Colleges in Chemical Engineering; #7 in Undergraduate Colleges in Both Civil and Mechanical Engineering; and #8 in Undergraduate Colleges in Electrical Engineering
- #11 in a National List of Best Value Colleges (Private) Released by the Princeton Review in 2021
- #7 in Money’s 2020 List of Best Small Colleges and Ranked #17 on the CNBC Make It List of Top 50 U.S. Colleges That Pay Off the Most in 2020
- 8 to 1 Student-to-Faculty Ratio in Engineering
- 450 Engineering Students with an Average Class Size of 22 Students
- 39 Fulbright Scholars Since 2001
- 13 National Science Foundation Graduate Research Fellowships Since 2004
- 40 Percent of Graduates Pursue Top-Ranked Graduate Programs
Undergraduate Majors

Chemical Engineering

From energy and the environment to nanotechnology and biomedicine, many important industries and professions require experts who can synthesize knowledge of physical and natural sciences, mathematics, and engineering. At The Cooper Union, Chemical Engineering majors acquire this foundational knowledge through hands-on training in the classroom, the lab, and the field, and apply it to complex problems from the atomic and molecular level all the way up to technologies designed for the industrial scale. Recent graduates are working on groundbreaking research and new technologies in topics like sustainable energy and pollution prevention, 3D printing and manufacturing of pharmaceuticals, and the latest advances in materials science.
Whether analyzing climate change resilience in New York City neighborhoods or researching sustainability through the green roof project at the Jacob K. Javits Convention Center, Cooper’s Civil Engineering students are at the forefront of addressing important societal issues and finding solutions to infrastructural challenges. The Civil Engineering department embraces a breadth of specialties, including structural, geotechnical, hydraulic, environmental, transportation, urban planning, and construction management, and exposes students to hands-on applications of cutting-edge technologies like augmented and virtual reality and 3D-printed structures. With more than 90% of Civil Engineering seniors passing the Fundamentals of Engineering (FE) Exam, the first step towards obtaining the Professional Engineering License (PE), Cooper students work to build a smarter and more equitable environment for all.
Focusing on the devices and processes that form the backbone of modern technology, the Electrical Engineering program tightly integrates electronics, signal processing, and computer science. Recent student projects reflect a wide range of applications: sustainable engineering, medical imaging, drone control, quantitative finance, wireless communications, hardware implementation of neural networks, and beyond. Students can take advantage of the department’s laboratories and computing resources, including a GPU cluster that supports computationally intensive projects involving large data sets. One of the many opportunities for gaining practical experience is joining the “Microlab Staff,” a student group responsible for maintaining the department’s computing facilities. Projects in autonomous technologies reimagine societies and systems to make them more economically, environmentally, and socially sustainable. Projects in machine learning and data science allow students to solve real-world, data-oriented problems related to equity, justice, health, and economic development.
Creativity, problem-solving, and design are all at the heart of Cooper’s Mechanical Engineering program, which is the broadest of the engineering majors. Students have the flexibility to study a variety of theoretical and technological interests, including solid mechanics, materials, fluid mechanics, vibrations and acoustics, heat transfer and thermodynamics, combustion, control systems, manufacturing, CAD/CAM, and robotics. With access to research facilities like the Maurice Kanbar Center for Biomedical Engineering and the Material Science Lab, students work on projects ranging from brain wave-controlled drones to designing zero-energy homes. Mechanical Engineering is an ideal foundation for careers in the aerospace industry, ocean engineering, marine engineering, biomedicine, the automobile industry, the power and utility industries, and virtually anything that requires analytical abilities combined with a strong background in design practice.
GENERAL ENGINEERING

The Bachelor of Science degree in General Engineering is designed for students who have a clear idea of their educational goals but require a more flexible, interdisciplinary course of study. Students who enter the General Engineering program at Cooper desire a strong, broad-based, and rigorous engineering background as preparation for fields such as biomedical engineering, business, chemistry, computer science, entrepreneurship, law, mathematics, or medicine. General Engineering majors may take engineering courses along with relevant courses from Cooper’s other professional schools to tailor their studies to a specific career path.

MINORS

The Engineering School offers minors in:
• Math
• Computer Science
• Bioengineering

The Faculty of Humanities and Social Sciences offers humanities minors in:
• Art History
• Literature
• Economics and Public Policy

• Interdisciplinary Studies
• Philosophy, History and Society

MASTERS PROGRAM

The Cooper Union offers master’s degrees in chemical engineering, civil engineering, electrical engineering, and mechanical engineering. The integrated bachelor/master of engineering program is intended to integrate work at the undergraduate and graduate levels and prepare graduates for entry into the engineering profession at an advanced level or for further graduate study.
Students are given opportunities to pursue advanced projects and conduct independent study and research, drawing knowledge and skills from across their engineering coursework.

The Vertically Integrated Projects (VIP) Program is an interdisciplinary course structure supporting student projects that are guided by faculty mentorship and professional research. VIP team members earn academic credit for their participation in design and discovery efforts that enable them to explore their interests through long-term projects.

Engineering Design and Problem Solving is an immersive experience in which all first-year students engage with a challenge faced by humankind. Students develop skills in teamwork, leadership, presentation and communication, and entrepreneurship while iterating through the engineering design process. Recent projects include building smarter and more resilient cities, developing therapeutic devices, creating shelters for refugees in flight, and making fuel from food waste.

The Benjamin Menschel Fellowship Program supports work in the fields of art, architecture, design, and engineering. Funding is given to exceptional students who propose scholarly, independent projects to be completed over the summer prior to their senior year. This body of work is featured annually in a prestigious public exhibition.

Senior Design is the culmination of each program in a year-long course that integrates the principles of the major and applies them to an open-ended project that meets a particular need. Advised and critiqued by faculty, seniors navigate the engineering design process in small groups for their final time at Cooper, focusing their skills on a comprehensive solution that is economical, sustainable, and professional.
Team-Based Projects and Travel

THE MOTORSPORTS TEAM builds a high performance, open-wheel racecar and competes in the annual Formula SAE international design competition. Students get hands-on experience with state-of-the-art design, engineering, and manufacturing techniques.

THE STEEL BRIDGE TEAM competes in the American Institute of Steel Construction Student Steel Bridge Competition, which challenges students to develop a scale-model.

THE CHEM-E CAR TEAM competes annually against college teams to design small-scale automobiles that operate by means of chemical reactions and must give a technical poster presentation describing their research.

INVENTION FACTORY is a six-week summer program in which students compete to invent a tangible product that meets a significant need. Teams of two conceive an invention, research, build, and iterate through prototypes. Students also file a provisional patent application and are scrutinized by a panel of distinguished designers, inventors, engineers, and patent attorneys who select the top invention.

THE SUMMER STUDY ABROAD PROGRAM provides students with the opportunity to conduct research or work on engineering-related projects at institutions around the world for the purpose of hands-on engineering practice, cultural immersion, and experience working on multicultural and interdisciplinary teams. Students have traveled to Iceland, Ireland, the United Kingdom, Belgium, Germany, Spain, Greece, Egypt, Ghana, Israel, Singapore, South Korea, and Japan.

Left to right, top to bottom: Hack Cooper Art, Architecture, Construction, and Engineering (AACE) Lab Invention Factory Motorsports Study Abroad
Support for Interdisciplinary Research

Students and faculty across disciplines participate in ongoing, large-scale projects, supported by special lab facilities and research programs.

**THE AUTONOMY LAB** is dedicated to interdisciplinary collaboration for the design, innovation, and development of solutions to reimagine our cities and systems as more economically, environmentally, and socially resilient. The lab focuses on areas in autonomous systems, urban agriculture, energy, and transportation. Students compete in the annual Intelligent Ground Vehicle Competition (IGVC) where autonomous driving technologies are implemented and tested in a real-world scenario.

**THE ART, ARCHITECTURE, CONSTRUCTION, AND ENGINEERING (AACE) LAB** serves as a catalyst for integration across the institution, with equipment supporting projects that involve “making”—from 3D printers to robotics arms to virtual reality technologies. The space will take advantage of one of Cooper’s longstanding salient qualities—translating intellectual activities into practical applications.

**THE MAURICE KANBAR CENTER FOR BIOMEDICAL ENGINEERING** provides facilities for tissue culture, genetic engineering, biomechanics, and related research. Topics of past research include biomedical devices, tissue engineering, protein synthesis, and obstructive sleep apnea biomechanics. Researchers also collaborate with several major New York City-based hospitals.
Student Life

First-year students can elect to live in the residence hall where the camaraderie and shared interests among art, architecture, and engineering students in our close-knit community shapes their lives and future experiences at The Cooper Union. Each year there are roughly 60 student clubs, including professional organizations, cultural and social groups, intramural sports teams, and a student newspaper. The Cooper Union’s historic location in the East Village of New York City enriches the student experience with an abundance of cafes, galleries, theaters, restaurants, and cultural institutions.
Life After Cooper

CAREER DEVELOPMENT
The Center for Career Development provides resources and opportunities including career fairs, mock interviews, and professional workshops to help prepare students for life after graduation. The center also helps connect students with employers, graduate programs, and members of The Cooper Union alumni network.

Most engineering students complete two or more internships during their undergraduate studies, and many pursue research programs at universities and labs across the country and around the world. Engineering students’ internships, research, and post-graduate studies and careers span a wide variety of fields including infrastructure, technology, energy, defense and aerospace, automotive, the environment, health and medicine, business, and more. Graduates are recruited by global corporations, consulting companies, new ventures, and graduate schools nationwide.

ALUMNI
The Engineering Alumni-Student Career Mentoring Program matches students with alumni mentors for year-long, one-to-one advisory relationships, providing students with professional networking and support. The nearly 13,000 alumni of The Cooper Union span professions, continents, and generations. Alumni are found in the top management and research leadership of major corporations; hold key positions in federal, state, and city agencies; and distinguish themselves on university faculties and administrations nationwide.

Preparing for Admission

Upon graduation, prospective students should ideally have completed four years of math, including Calculus, and at least one year of Physics, Chemistry, and Biology. Advanced coursework is highly encouraged if available.

UNDERGRADUATE APPLICATION REQUIREMENTS
• Common Application
• Application fee
• Official high school transcript
• High school counselor evaluation
• Two or three teacher recommendations
  (at least one STEM strongly encouraged)
• Common Application essay
• English Proficiency Official Test (TOEFL, IELTS or DET), if applicable
• Standardized test scores are not required

APPLICATION DEADLINES
UNDERGRADUATE
  EARLY DECISION: NOVEMBER 1
  REGULAR DECISION: JANUARY 5
GRADUATE
  MASTER OF ENGINEERING: FEBRUARY 15

Affordability
The Cooper Union was founded on the principle of providing access to higher education regardless of race, creed, gender, or financial means. Every admitted undergraduate student receives a half-tuition scholarship valued at $22,275 per academic year. Applicants will automatically be considered for additional merit-based scholarships. To be considered for need-based financial aid, students must submit the FAFSA (code: 002710).
Join our **mailing list**
Sign up for an **event or tour**
Take a self-guided **virtual tour**