Carnegie Mellon

Engineering

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Carnegie Institute of Technology

Carnegie Mellon's College of Engineering, Carnegie Institute of Technology (CIT), is distinguished by its commitment to undergraduate education, graduate education and research. Its combination of teaching, outstanding faculty and significant research greatly affects your undergraduate experience. Our vision for our students is to be able to enable, manage and deploy innovation in multiligual, multicultural and multinational distributed environments.

Each year, approximately 400 first year students enroll in the College of Engineering. CIT combines the close personal contact between students and professors found at small universities with the extensive, up-to-date facilities and opportunities for involvement in cutting edge research found at much larger schools.

The CIT education is based on engineering and science fundamentals that give you the skills to face new and challenging situations. The freshman year in engineering provides a broad foundation upon which a curriculum in your eventual major area will be built. Since students in the College of Engineering do not select a major until the end of the first year, all share a common first-year experience. This consists of introductory courses offered in all of the engineering majors (freshmen choose two of these courses), calculus, physics, other science courses which complement specific introductory engineering courses and courses in liberal arts and fine arts. This curriculum helps you make an informed decision about your final major.*

The engineering program at Carnegie Mellon enables you to experiment with course options and combinations of academic interests. Some students in CIT are working on double majors in such diverse areas as design, business administration and architecture. Other students are fulfilling depth sequences (a concentration of courses) in areas such as music, painting or architecture in the College of Fine Arts (CFA), or global politics, economic, modern languages or writing in the College of Humanities and Social Sciences (H&SS). Because of the flexibility in the engineering curriculum, students are welcome to pursue depth sequences, minors and reasonable double majors.

All engineering students are required to take eight general education courses in H&SS and CFA. As a result, CIT students graduate with a clear advantage: strong technical skills as well as an innovative global engagement with the capacity to interact and manage teams of diverse backgrounds.

Your engineering education is also supplemented by the tier-1 research environment that is an integral part of CIT. Undergraduates are readily incorporated into faculty research throughout all four years, through individual research projects for credit, the honors research program and senior project courses. Although not all students become directly involved in faculty research, each student's education is enhanced by the cutting-edge innovative research taking place at Carnegie Mellon.

** Please note that due to the competitiveness of electrical and computer engineering, some engineering students are notifed at the time of their admission decision that they can enroll in any engineering program except electrical and computer engineering.*

Undergraduate Majors
Chemical Engineering
Civil Engineering
Electrical and Computer Engineering
Materials Science and Engineering
Mechanical Engineering

Double Major Options
Biomedical Engineering
Engineering and Public Policy

Designated Minors
Automation and Control Engineering
Biomedical Engineering
Colloids, Polymers and Surfaces
Data Storage Systems Technology
Electronic Materials
Engineering Design
Environmental Engineering and Sustainability
International Engineering Studies
Manufacturing Engineering
Materials Science and Engineering
Mechanical Behavior of Materials
Robotics

Biomedical Engineering

Biomedical engineers apply engineering principles to advance our understanding of living systems and to improve human health through development of medical devices and systems. They are employed in the pharmaceutical, biopharmaceutical, biotechnical and medical device industrial sectors as well as in clinical healthcare settings. A significant number of graduates also choose to pursue graduate studies or a medical career. The Biomedical Engineering (BME) curiculum at Carnegie Mellon reflects our belief that successful biomedical engineers in these sectors and settings will be deeply trained in both engineering and the life sciences. To underscore this, we use a double major B.S. degree format for our undergraduate education program that is designed to be completed in four years.

The curriculum comprises three parts: the BME core, the BME track elective system and the BME capstone design course. The core includes a broad exposure to the many facets of biomedical engineering and to the underpinning life sciences. The track elective system permits students to explore the biomedical imaging, biomechanics, tissue engineering, biomaterials and cellular or molecular biotechnology aspects of biomedical engineering in-depth. These track areas reflect leading research strengths at Carnegie Mellon along with opportunities for student participation in research. In the BME Design course, students from all engineering backgrounds team up to tackle industry- and clinic-sponsored projects to solve problems and develop product, device and therapy concepts relevant to human healthcare and the life sciences.

Chemical Engineering

Chemical engineering combines chemistry and other sciences with engineering and mathematics for development of new chemical and biochemical products and processes that

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serve society. This close tie between chemical engineering and the basic sciences ensures that chemical engineers will always be at the forefront of the innovation and implementation of new technologies. Exciting new opportunities exist for chemical engineers in the renewable energy industry, the pharmaceutical industry, medical technology, semiconductor processing and environmental technology, in addition to the traditional areas of fossil energy and commodity chemicals.

Computing is also an integral part of chemical engineering. Some of the first large-scale scientific and engineering computational calculations were performed by chemical engineers involved in the research and design of petroleum refineries and chemical plants. Such innovation has thrived at Carnegie Mellon with the development of process simulation programs that allow prediction and optimization of the performance of complex chemical systems.

Civil and Environmental Engineering

Civil and environmental engineers plan, design and manage facilities used daily by the public and industry — for example, buildings, airports, highways, ports and harbors, water supply systems and waste management systems. Today's civil and environmental engineers are also called upon by government and industry to provide leadership on complex technical and societal issues, such as demands for infrastructure improvement in our cities, for improved design of consumer products to promote recycling and for incorporation of environmental safeguards in facility designs. Because of the complexity of large projects and the need to interact with many people (other engineers, lawyers, politicians and the public), civil and environmental engineers must have broad technical training and strong communication skills.

The CEE department offers an undergraduate curriculum for a B.S. in Civil Engineering that provides exposure to the breadth of civil engineering and opportunity for in-depth study of particular sub-fields such as construction, structural engineering or environmental engineering. Students can pursue minors in a number of areas including Engineering Design, Environmental Engineering and Sustainability and Materials Science and Engineering. Graduates have pursued a wide range of career paths in civil and environmental engineering, business, law, medicine, government and other fields.

Electrical and Computer Engineering

Electrical and computer engineering encompasses a diverse set of areas impacting society in many ways. These include, computer systems, computer and network security, energy systems, embedded and real time systems, communication and network systems, information storage systems, circuit and silicon systems design, microelectromechanical systems, signal and information processing and nanotechnology. The department is an internationally recognized leader in both education and research in all these areas.

Carnegie Mellon provides electrical and computer engineering students with a unified view of electrical and computer engineering as an integrated discipline. The program's flexibility allows students to explore the wide range of areas both within and outside electrical and computer engineering, while also providing a solid foundation in the core concepts in electrical and computer engineering. This broad and deep education prepares students for a creative professional career in both traditional and nontraditional directions allowing graduates to pursue further opportunities in academia and industry and to have an impact in addressing many of today's most important challenges.

Engineering and Public Policy

There was a time when engineers produced technologies without giving much thought to how they would interact with or affect society. But our technologies have grown more powerful and more complex, and society has grown more interdependent. Engineers have begun to learn that the interface between technology and society can be as important as, and sometimes even more important than, the technologies themselves.

Carnegie Mellon's unique program in Engineering and Public Policy (EPP) is designed to provide you with the skills and insights that are necessary to understand and deal with issues that lie at the interface between technology and public policy. Such problems involve managing technological innovation and industrial development as well as controlling undesired impacts of technology.

The department offers a joint B.S. program with each of the five traditional engineering disciplines in CIT as well as Computer Science. Most graduates with this joint degree go on to pursue conventional engineering careers. But they are engineers with a difference. Their career flexibility enables EPP graduates to deal with the social and ethical responsibilities of the field.

Materials Science and Engineering

Solid materials are the foundation of the technological systems that are, and will continue to be, essential for our economic vitality and security. For example, engineered materials enable advances in the fields of nanotechnology, energy technology, biomedical technology, transportation, environmental sustainability, communications and information technology.

The Materials Science and Engineering degree program at Carnegie Mellon provides students with a fundamental education so that graduates are able to discover, design, engineer and manufacture materials for the diverse range of applications cited above. The department's curriculum includes technical topics associated with biomaterials, nanomaterials, polymers, semiconductors, metals, ceramics and glasses.

Our graduates are employed in almost every industry to devise and improve methods for the processing and manufacturing of materials, to select among competitive materials and to predict the properties of materials under different operating conditions.

Mechanical Engineering

Mechanical engineering involves the invention and development of devices, machines and systems ranging from small components to large power plants, machinery and vehicles. Mechanical engineers must consider utility, safety, cost, efficiency and reliability as well as environmental impact when designing products. In order to educate mechanical engineers who will be leaders in innovation, the Mechanical Engineering department focuses on basic problem solving in thermodynamics, solid and fluid mechanics, dynamics, heat transfer, controls and design, with the curriculum culminating in the "capstone" engineering design course which provides students with an opportunity for their own creative development of a solution to a problem of engineering importance. Additionally, mechanical engineers need to understand the uses of the devices they design, which requires a broad understanding of the humanities, social sciences, business and finance.

Our graduates work in nearly all sectors of industry and in many technological areas, including aerospace, automotive, bioengineering, construction, energy and the environment, HVAC (heat, ventilation & air conditioning), instrumentation, manufacturing and nanotechnology.

Minor in Engineering Studies

Carnegie Mellon undergraduate students enrolled in colleges other than the College of Engineering can complete a minor in engineering studies in addition to their regular majors. Students pursuing this minor are required to complete courses from at least two different engineering departments in order to assure some breadth of exposure to engineering. In addition, the minor provides the student wishing to do so the opportunity to pursue an in-depth concentration in a particular field of engineering.

For more information

Visit <www.cit.cmu.edu>.