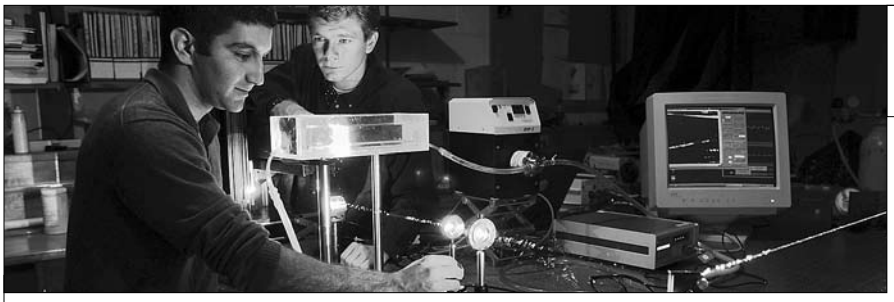

VirginiaTech
Invent the Future

COLLEGE OF
Engineering

VIRGINIA TECH is home of the commonwealth's leading college of engineering, known in Virginia and throughout the nation for the excellence of its programs in engineering education, research and public service. It is the state's largest engineering college, and consistently ranks in the top ten nationally for undergraduate degrees awarded.

America's Best Colleges 2009 survey released by *U.S. News & World Report* ranked the Virginia Tech College of Engineering's undergraduate program 14th in the nation among all accredited engineering schools that offer doctorates, and eighth among those at public universities. Eight of the college's undergraduate engineering programs were ranked among the top 25 of their peer programs, seven of which were in the top 17. The National Science Foundation lists the college as 11th in total research expenditures.

The College of Engineering is known for its "Hands On, Minds On" leadership in transforming engineering education. One example occurred in fall of 2006 when it took the bold step of requiring Tablet PCs for its entering freshmen. The national engineering magazine, *Prism,* described this initiative as having the "potential to redefine the way engineering is taught." (Dec. 2006 issue)

Majors:
aerospace engineering
biological systems engineering
chemical engineering
civil engineering
computer engineering
computer science
construction engineering and management
electrical engineering
engineering science and mechanics
industrial and systems engineering
materials science and engineering
mechanical engineering
mining engineering
ocean engineering

HIGH SCHOOL PREPARATION & ADMISSION TO THE COLLEGE

A challenging college preparatory curriculum is your foundation for success in Virginia Tech's College of Engineering. Specifically, you must present a minimum of 18 units. Four units of English is the standard requirement. The university requires three units of math (including algebra I, algebra II, and geometry), but College of Engineering students must have a fourth unit beyond these three. (The fourth unit must be in a higher-level math such as trigonometry or pre-calculus.) Two units of social science are required. The university requires two years of laboratory science (biology, chemistry, or physics), but engineering students must have at least three years, with physics and chemistry preferred.

Other ways to prepare for engineering studies include taking engineering foundations, computer programming, and advanced placement courses, and participating in math and science clubs and fairs.

In addition to your transcript, SAT or ACT (plus writing) scores are required of freshman applicants.

CURRICULUM & OPPORTUNITIES

First-year students are admitted into general engineering, where they complete introductory coursework and learn the basics of design, teamwork, and technical communications.

All entering students are required to have a tablet PC. The curriculum emphasizes the use of computers in the analysis and solution of problems. Detailed specifications on the type of computer required differ from the rest of the university, and are announced in late spring. For more information, visit the web site at *www.eng.vt.edu/academics/comp_require.php.*

Each engineering degree requires a senior capstone design experience to allow students to draw on their creativity, imagination, and motivation, as well as their undergraduate education. Qualified students may complete a combined B.S./M.S. degree in five years.

College of Engineering students participate in a variety of activities, including projects and competitions on local, regional, and national levels. Members of student organizations coordinate events which include speakers, conferences, a college-wide open house, and an annual engineering exposition. Virginia Tech College of Engineering students are leaders in many organizations and athletic teams both on- and off-campus. Students can also participate in residential theme housing programs designed for engineering students. For more information on Hypatia or Galileo, see *www.eng.vt.edu/academics/ceed_learn_com.php.*

All undergraduate engineering degree programs in the College of Engineering, except construction engineering and management, are accredited by the Engineering Accreditation Commission or the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; phone: 410/347-7700.

The construction engineering and management program was initiated in Fall 2007 and will graduate its first class in Spring 2009. It will seek accreditation by the Engineering Accreditation Commission of ABET immediately thereafter.

FACULTY & FACILITIES

Virginia Tech is one of a handful of schools offering a formal freshman engineering program, taught by full-time faculty members whose primary responsibility is to teach and advise entering freshmen. By providing a solid foundation, this first-year program helps freshmen choose and succeed in a College of Engineering degree program.

Undergraduate students in the College of Engineering at Virginia Tech have two facilities of their own for hands-on work. In the Frith Freshman Engineering Design Lab, students participate in a variety of practical experiences involving reverse engineering, measurements, and activities ranging from robotics to fuel cells. In the Joseph F. Ware, Jr. Advanced Engineering Laboratory, undergraduates from all College of Engineering departments design and construct their own projects, including the human-powered submarine, hybrid-electric and fuel-cell-powered vehicles, Formula SAE race cars, radio-controlled airplanes, and Baja SAE all-terrain vehicles.

The computer requirement for Virginia Tech College of Engineering freshmen has been changed from a laptop to a convertible tablet PC to reflect the increased technology needs of students. Tablet PCs enable students to take their computers everywhere.

AT A GLANCE:

Programs of Study

AEROSPACE ENGINEERING

The aerospace engineering curriculum includes the areas of aerodynamics, flight dynamics and controls, propulsion, and aerospace structures. The program culminates in a nationally recognized senior-level design sequence including analysis and design of aircraft, spacecraft, and their related technologies.

The program is closely related to ocean engineering, and the two programs share a major portion of their course requirements. A double aerospace and ocean engineering major is available to students desiring this combination.

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BIOLOGICAL SYSTEMS ENGINEERING

Biological systems engineering combines biology, chemistry, and engineering to solve problems associated with environmental protection, conservation of natural resources, the environmentally sound production of renewable resources, and the conversion of these resources to food and non-food products. The curriculum differs from other engineering programs in its focus on natural resources and biological materials. Students may specialize in one of two department options: land and water resources engineering or bioprocess engineering. The land and water resources engineering option is designed for those interested in environmental protection and management. The bioprocess engineering option prepares graduates for the design and development of processes for environmentally responsible manufacturing of biofuels and value-added products such as food, pharmaceuticals, polymers, and non-biological materials. Students can also use the 18 credit hours of electives in the curriculum for pre-medical/dental and pre-veterinary programs.

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CHEMICAL ENGINEERING

Chemical engineering students learn to skillfully and creatively apply the principles of chemistry, biochemistry, biology, mathematics, and physics to problems involving energy, food, health, electronics, consumer products, and environmental quality.

Students must complete a minimum of 16 credit hours in advanced chemistry, including organic chemistry plus lab and physical chemistry plus lab. Several concentration areas are offered, including polymers, biomedical, and chemical distribution and marketing. Common minors for chemical engineering students include chemistry, mathematics, and microelectronics engineering.

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CIVIL & ENVIRONMENTAL ENGINEERING

Civil engineers are the principal designers, constructors, operators, and maintainers of many of the constructed facilities in our society. The Charles E. Via, Jr. Department of Civil and Environmental Engineering strives to prepare its graduates to meet evolving infrastructure challenges while continuing the tradition of public service associated with civil and environmental engineering.

The department offers educational programs in all major areas of civil engineering practice, including construction engineering and management, environmental and water resources engineering, geographic information systems and land development, geotechnical engineering, structural engineering and materials, and transportation and infrastructure systems engineering.

MORE INFO
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COMPUTER ENGINEERING

The Bradley Department of Electrical and Computer Engineering administers the degree in computer engineering (CPE). CPE provides the critical technology base for a broad range of industries, including bioinformatics, computing hardware, computer networking and security, embedded computing, telecommunications, and video/image processing. The program builds on a strong foundation in mathematics, physical science, and computer programming.

The curriculum covers a variety of technical areas, including computer architecture, digital system design, VLSI, embedded systems, networking, real-time systems, and artificial intelligence. The program emphasizes hands-on experiences and opportunities for undergraduate research and co-op/internships in industry.

MORE INFO
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www.ece.vt.edu

COMPUTER SCIENCE

Computer scientists study the design, implementation, performance and usability of computer systems. The program emphasizes software—the aspect of computation that makes computing the powerful and transforming technology it is.

Students acquire a strong foundation in algorithms, problem-solving and software development. A diverse set of elective courses provides experience with emerging technologies in areas such as artificial intelligence, bioinformatics, graphics, human computer interaction, Internet programming, networking and software engineering. A computer science degree prepares students for a wide range of employment options; the degree also serves as good preparation for students interested in advanced degrees in law or business.

MORE INFO
Terry Arthur
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Phone: 540/231-3984
arthurt@vt.edu
www.cs.vt.edu

CONSTRUCTION ENGINEERING & MANAGEMENT

The construction engineering and management program is administered by the Myers-Lawson School of Construction. Graduates possess the requisite technical, managerial and business knowledge to design construction operations and processes that are safe, efficient, cost effective, environmentally sensitive and socially aware. They are prepared to integrate and manage the technical, material, financial and human resources that support construction operations and lead project teams toward common objectives with an emphasis on values-based principles.

The degree draws the majority of its courses from existing curricula in civil engineering and building construction with complementary courses from the Pamplin College of Business providing the balance.

MORE INFO
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www.mlsoc.vt.edu

ELECTRICAL ENGINEERING

The Bradley Department of Electrical and Computer Engineering administers the degree in electrical engineering (EE). EE provides the fundamental basis for many key industries, including bioengineering, micro/nanoelectronics, power systems, robotics, and telecommunications. The program builds on a strong foundation in mathematics, physical science, and computer programming.

The curriculum covers a variety of technical areas, including control systems and robotics, communications, digital design, networking, electromagnetics, electronics, power systems, and signal processing. The program emphasizes hands-on experiences and broad opportunities for undergraduate research and co-op/internships in industry. The department also offers a concentration in power electronics and a minor in microelectronics.

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ENGINEERING SCIENCE & MECHANICS

Engineering science and mechanics (ESM) uses fundamental principles to develop engineering solutions to contemporary problems in the physical and life sciences. As a result, ESM graduates are ideally adaptable to 21st century needs.

Ideal ESM students want to know not only the *what* of engineering, but also the *how* and the *why*. They wish to work on the cutting edge of engineering, applying a knowledge of science and mathematics. During their academic studies, ESM students work in small groups in state-of-the-art laboratories. Electives provide students the opportunities to focus in areas such as biomechanics, developing energy solutions, and advanced materials (including nanotechnology).

MORE INFO
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INDUSTRIAL & SYSTEMS ENGINEERING

Industrial engineering is concerned with the design, development, improvement, implementation and evaluation of integrated work systems comprised of people, information and knowledge, equipment, energy, materials, and processes. The industrial and systems engineering department utilizes innovative and creative practices and technologies to achieve the highest quality of instruction and student learning.

Coursework encompasses operations research, manufacturing systems engineering, human factors engineering and ergonomics, and management systems engineering. The curriculum addresses not only the physical and technical aspects of systems, but also the organizational, economic, business, and human elements of systems.

Students develop not only technical capabilities but also professional skills such as teamwork, communication, ethics, and lifelong learning.

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MATERIALS SCIENCE & ENGINEERING

Materials science and engineering pertains to the structure, properties, design, development, manufacture, and engineering application of materials of all types. Students may specialize in a number of materials technology areas including ceramics, metals, polymers, or electronic and photonic materials. Students also can design a special program of elective study, such as biomaterials or green engineering, among others.

Graduates are employed in aerospace, automotive, chemical and material, communications, electronics, petroleum and energy, and basic materials-producing industries. Students may qualify for graduate study in engineering, the sciences, medicine, law, and business.

MORE INFO
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www.mse.vt.edu

MECHANICAL ENGINEERING

Mechanical engineering is perhaps the broadest of the engineering disciplines with students working in a wide range of technical areas. These include acoustics, biomechanics, computer aided design and analysis, controls, energy conversion and management, mechanical design, mechatronics, and propulsion, among many others. Several courses in nuclear engineering have been added in the mechanical engineering program in recent years. The curriculum provides a strong fundamental background in the engineering sciences as well as mathematics, statistics, thermal-fluid engineering, vibrations and controls, and mechanical design. This background is strengthened with instructional laboratories and design courses. Graduates are prepared for professional engineering careers or graduate study.

MORE INFO
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www.me.vt.edu

MINING ENGINEERING

Mining engineering is a field where aspects of geosciences are combined with engineering and management for the development and recovery of the world's mineral resources.

Areas of study include mineral exploration, evaluation, development, extraction, mineral processing, and environmental management.

The program provides a general background in all aspects of the mining industry. Graduates find employment in the mining of construction aggregates, coal, copper, gold, phosphate, mineral sands, and many other commodities.

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www.mining.vt.edu

OCEAN ENGINEERING

Ocean engineering deals with the design of ships of all types. The field is often called naval architecture. It involves fluid mechanics, propulsion, structures, vehicle dynamics, and marine engineering. The curriculum culminates in an international award-winning design sequence in which students design a complete ship.

The program is closely related to aerospace engineering, and the two programs share a major portion of their course requirements. A double aerospace and ocean engineering major is available to students desiring this combination.

MORE INFO
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ENGINEERING

College & Career Opportunities

FRESHMAN CURRICULUM

All freshmen are admitted into the general engineering program in the Department of Engineering Education, allowing them to get acquainted with the different degree programs before making final decisions about a major. After the first semester of the freshman year, students who qualify for the Dean's List (3.40 GPA or higher) have the option of applying to the department of their choice. All other students who successfully complete their general engineering requirements may apply to the department of their choice at the end of the spring semester of freshman year. If you have questions about the freshman general engineering program, please visit *www.enge.vt.edu* or contact the Department of Engineering Education (540/231-6555; e-mail: *enge@vt.edu*).

1ST SEMESTER	2ND SEMESTER
Calculus I	Calculus II
Elective	Exploration of the Digital Future or
Elementary Linear Algebra	Exploration of Engineering Design
Engineering Exploration	Freshman English
Freshman English	Physics + Lab
General Chemistry + Lab	Vector Geometry
	General Chemistry + Lab (CHE majors)
	C++ Programming (EE & CPE majors)
	Java (CS majors)
	Elective (all other majors)

The above schedule represents the first year as a student in the College of Engineering.

HONORS, CO-OP, & EDUCATION ABROAD

University Honors is available to students who have either a cumulative GPA of 3.70 (as reported on the high school transcript) and a minimum SAT score of 1350 (critical reading and mathematics) or a minimum ACT composite score of 30. Current college students who have a 3.5 or higher GPA are also eligible for University Honors.

Qualified students may wish to participate in the **Cooperative Education Program**. Co-op is a five-year program alternating academic semesters with related work semesters. This program allows students to help finance their education while gaining valuable experience in their chosen fields. Students can learn more about co-op opportunities at *www.career.vt.edu*.

Students can **study abroad** around the world for the summer, semester or year. See *www.oired.vt.edu* or *www.eng.vt.edu/international*.

STUDENT ORGANIZATIONS

In addition to the wide variety of clubs and special-interest groups available at Virginia Tech, the following curricular activities are open to engineering students:

- American Institute of Aeronautics & Astronautics
- American Institute of Chemical Engineers
- American Society of Agricultural and Biological Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- American Society of Safety Engineers
- American Water Resources Association
- Association for Women in Computing
- Autonomous Vehicle Team
- Burkhart Mining Society
- Construction Management Association of America
- Enterprise System Engineering Society
- Galileo (Residential Community)
- Grand Challenge Society
- Hybrid Electric Vehicle Team
- Hypatia (Residential community)
- Materials Engineering Professional Societies
- National Society of Black Engineers
- Society of American Military Engineers (SAME)
- Society of Environmentally Focused Students
- Society of Hispanic Professional Engineers
- Society of Women Engineers
- Soil & Water Conservation Society
- Student Engineers Council
- Women in Mining

Honor societies include:

- Alpha Epsilon (biological systems)
- Alpha Pi Mu (industrial)
- Chi Epsilon (civil)
- Eta Kappa Nu (electrical)
- Omega Chi Epsilon (chemical)
- Sigma Gamma Tau (aerospace)
- Tau Beta Pi (all fields)
- Upsilon Pi Epsilon (computer science)

Contact Us

For more information about the College of Engineering, please contact:

Office of Academic Affairs, College of Engineering
212 Hancock Hall
Blacksburg, VA 24061
Phone: 540/231-3244
Fax: 540/231-1831
E-mail: engris@vt.edu
Web: www.eng.vt.edu

If you have questions about admission to Virginia Tech, please contact:

Office of Undergraduate Admissions
201 Burruss Hall
Blacksburg, VA 24061
Phone: 540/231-6267
Fax: 540/231-3242
E-mail: vtadmiss@vt.edu
Web: www.vt.edu

VT/400/0909/21.5M/291731/334

INSIDE LOOK:

Career Opportunities

Each year, more than 1,200 industries and agencies visit Virginia Tech to recruit graduates of the College of Engineering. Fields open to our graduates include the development and manufacture of products for large and small industries, teaching and conducting research at universities, and conducting research in government or private laboratories. A sampling of career opportunities follows. More information is available from Career Services at *www.career.vt.edu*.

- Air quality engineer
- Cartographer
- Ceramic engineer
- Communication engineer
- Computer programmer
- Computer systems analyst
- Construction engineer
- Design engineer
- Environmental engineer
- Equipment applications specialist
- Flight test engineer
- Graphical interface designer
- Hardware engineer
- Highway engineer
- Industrial systems engineer
- Information systems analyst
- Logistics engineer
- Mobile and portable radio specialist
- Naval engineer
- Network access analyst
- Operations research analyst
- Patent examiner
- Radiological control engineer
- Reliability engineer
- Research engineer
- Robotics engineer
- Software engineer
- Stress analyst
- Structural design engineer
- Test engineer