

About the university

Established in 1968, Virginia Commonwealth University is the third-largest public research university in Virginia, with more than 28,000 students. The MCV Campus houses the schools of Allied Health Professions, Dentistry, Medicine (including the School of Public Health), Nursing and Pharmacy. The Monroe Park Campus, in the historic Fan District, hosts the College of Humanities and Sciences (including the L. Douglas Wilder School of Government and Public Affairs and the schools of Mass Communications and World Studies), the schools of the Arts, Business, Education, Engineering, and Social Work, as well as the Graduate School. Of the more than 181 certificate, undergraduate, graduate and professional programs offered, 40 are unique in Virginia, and many are nationally ranked.

Richmond, a major economic and government center, is one of the South's most livable and cosmopolitan cities. It offers many cultural and recreational opportunities including parks, museums, theaters, galleries, symphonies and more. A vibrant university, VCU combines a strong emphasis on research with comprehensive education programs in the arts, humanities and sciences.

School of Engineering

The Virginia Commonwealth University School of Engineering enrolled its first freshman class in 1996, was approved to start its M.S. and Ph.D. programs in 2000, and received ABET accreditation in 2001. Integrated, multidisciplinary curricula are offered in computer science as well as biomedical, chemical and life science, computer, electrical, and mechanical engineering. The computer science program has existed as an accredited program at VCU since 1983, and joined the School of Engineering in 2001. The school supports undergraduate student success in a relatively small learning community (about 1,000 students), and takes advantage of the strengths of the VCU Medical Center and cutting-edge developments emerging from the Virginia BioTechnology Research Park. Encouraged to pursue interaction with practicing professionals, students are continually aware of the real-world applications of their research and studies. Dual degrees and minors are encouraged. The school is dedicated to the preparation of computer scientists and engineers who are ready to assume leadership roles in a dynamic future.

More information

View specifics about the curriculum and courses
at <http://www.vcu.edu/bulletins> or <http://www.egr.vcu.edu>.
Contact us by calling (804) 828-9117
or e-mail us at askengineering@vcu.edu or mechanicalengr@vcu.edu.
We look forward to hearing from you.

Virginia Commonwealth University

VCU Engineering

Biomedical • Chemical and Life Science • Computer • Computer Science • Electrical • Mechanical

Mechanical Engineering

It is said that scientists ask "Why?" and engineers ask "Why not?" In a slight variation of those words, science is concerned with what is, engineering is concerned with what can be. In reality, science and engineering are strongly linked. This observation is particularly true for mechanical engineering, one of the oldest and broadest fields of engineering endeavors. It is the art and science of making things that move.

In nature, molecules, atoms and their even-smaller constituents are nanoscale machines. The universe, galaxies and their constituents are gargantuan machines. Man-made machines fall somewhere in between these two extreme scales. Fabricated machines include all kinds of air, land and sea vehicles such as airplanes, trains, automobiles and ships; energy conversion systems such as nuclear and fossil-fuel power plants, internal combustion engines, jet engines, wind turbines and fuel cells; all kinds of environment-control systems such as heating, ventilation and air-conditioning equipment; machines used in the construction, mining, chemical, textile, electronics and all other kinds of industries; and finally machines used to make other machines. Another important application of mechanical engineering exists in the medical field, where artificial organs, surgical tools and drug delivery systems are vital to the health of humans.

Engineers use mathematics and computers to analyze and synthesize complex systems. Building on their strong foundation in mathematics and physics, mechanical engineering students add engineering courses in design, control and measurements that will enable them to design, fabricate, control, operate, test and maintain present as well as yet-to-be-invented machines. Mechanical engineers solve complex problems and constantly strive to improve the quality of life and living standards of all people. They can play a vital role in improving the environment as well. Factories, vehicles and power plants inevitably generate undesired pollution. Mechanical engineers work creatively to provide the world with its energy and transportation needs with the minimum possible release of pollutants.

Study in mechanical engineering at Virginia Commonwealth University will prepare you for a wide variety of challenging careers in the field. We also suggest that you link your interest to careers in law, business, management and medicine. Mechanical engineering at VCU is recognized not only as a technical discipline, but also as an integrated creative design/research endeavor through our close collaboration with the nationally renowned VCU School of the Arts (ranked No. 6 in graduate programs in the nation by U.S. News & World Report, 2004).

While interdisciplinary teamwork fosters the effective verbal and written communication skills that businesses consider basic necessities, collaboration also enhances the interpersonal skills necessary in a business environment. The number of students in a typical class is small, but the spirit and enthusiasm are high. Our team of talented and dedicated faculty will work diligently to provide our students with the best education for the 21st century.

dream it. think it. do it.



Mechanical Engineering

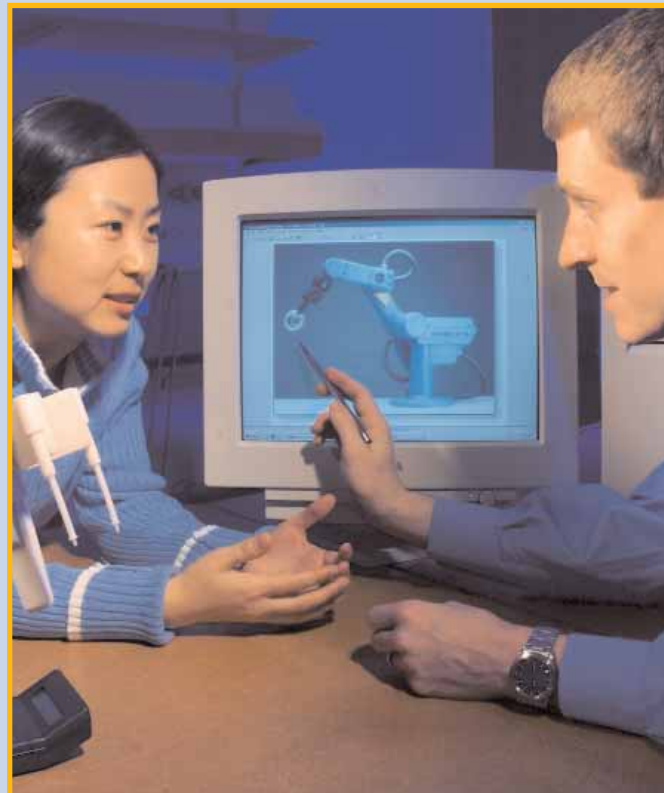
Our laboratories have sophisticated, research-grade equipment to which all undergraduates have access. Our faculty members are broadly experienced in industry, education and research, and all are involved in modern research programs of major significance to society. Also, we have several courses that are jointly taught with chemical and electrical engineering faculty, bringing to our students a healthy mix of fundamentals and engineering applications. In fact, few other examples of such courses exist in the United States. With our outstanding faculty and well-rounded curriculum, we offer a great program for future mechanical engineers.

Degrees awarded

- B.S. in Mechanical Engineering
- M.S. and Ph.D. in Engineering

Concentrations and specializations

- Manufacturing
- Mechanical design
- Photovoltaics
- Robotics
- Biomedical engineering
- Flow control
- Smart materials
- Synthesis of art and engineering
- Microelectromechanical systems
- Computational biofluid dynamics
- Nanomaterials



Student skills and capabilities

Students will leave the program with a sound technical foundation, the ability to communicate effectively, an understanding of business operations and an enhanced creative approach to problem solving.

By virtue of our small program size, we are able to foster outstanding opportunities for professor-student mentoring with an interdisciplinary lifelong-learning approach.

Bachelor of Science degree course sequence

Year 1

Chemistry I with laboratory
Calculus with Analytical Geometry I and II
Writing and Rhetoric Workshop I
Introduction to Engineering
University Physics I
Economics of Product Development and Markets
Engineering Visualization and Computation
General education electives

Year 2

Differential Equations
University Physics II
Dynamics and Kinematics
Mechanics of Deformables
Multivariate Calculus
Engineering Statics
Organizational Behavior
Electric Circuits
Thermodynamics
Writing and Rhetoric Workshop II
General education elective

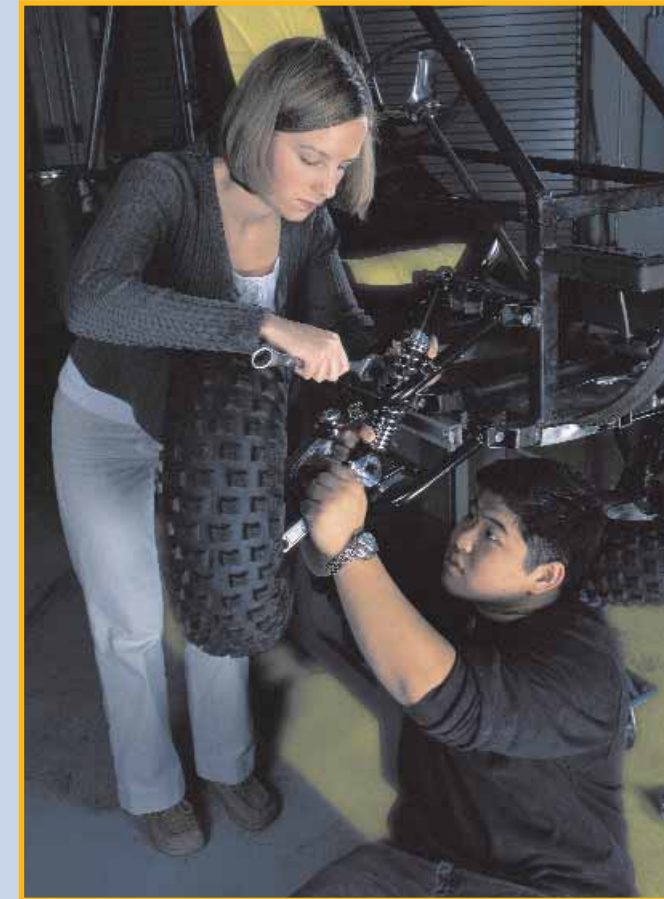
Year 3

Material Science for Engineers
Sensors and Measurements
Fluid Mechanics
Mechanical Systems Design
CAE Design
Heat Transfer
Process and System Dynamics
Thermal System Design
CAE Analysis
General education electives
Solid Mechanics Laboratory
Thermal Sciences Laboratory

Year 4

Senior Design Studio I and II and laboratories
Engineering Synthesis Laboratory
Review and Internship
Technical electives
Applied Statistics
General education electives

Total minimum requirement — 130 semester hours



Laboratories

- Solid mechanics
- Fluids and heat transfer
- Design optimization analysis
- Virginia Microelectronics Center (Class 1000 clean room)
- Manufacturing
- Mechanical systems
- Energy conversion systems
- Robotics
- Smart materials
- Computational biofluid dynamics
- Sensors

Internships

Our students are required to complete an industrial internship prior to their senior year of study. The internship offers valuable experience in a real-world situation, and gives our students a decided edge when it is time to seek employment. The following is a partial list of companies for which our students have worked during their internship experiences:

- ALCOA
- Alfa Laval
- Dominion Virginia Power
- DuPont
- Ethyl
- Honeywell
- Infineon Technologies
- NASA Marshall
- Philip Morris USA
- Pratt & Whitney

Our mechanical engineering program also offers numerous opportunities for participation in research projects with faculty and industry, either for credit or for pay, as a research assistant. Students are members of teams doing cutting-edge research in mechanical engineering. We have collaborations with the VCU Medical Center, the Virginia BioTechnology Research Park, many companies in the greater Richmond area and numerous companies across the United States and around the world. Also, you might have the opportunity to work for a company launched by our faculty members. The following are examples of recent undergraduate student projects:

- Off-road vehicle design
- Water sculpture
- Kinetic sculpture
- Manufacturing process improvement
- Wind tunnel design
- Non-destructive monitoring of manufacturing processes
- Engine design
- 3-D rapid prototype design

Full-time employment and graduate school placement

Mechanical engineers are always in demand because of their broad problem-solving skills and ability to work at the intersections of various disciplines. In general, about 75 percent of our graduates go on to full-time employment and 25 percent are in graduate school. Our alumni work with industrial leaders, with starting salaries above the national average. Students who have elected to go on to graduate study also are enrolled in a number of highly regarded programs. In 2003, our graduates averaged start salaries in the \$49,000 to \$58,000 range, which was above the national average. Corporations continue to visit campus to meet and interview our students, and we receive excellent feedback on our students' variety of skills and capabilities.

Admission criteria

Admission to the mechanical engineering program is competitive. Results on standardized examinations (SAT/ACT), rank in class (for high school students) and GPA are closely examined in the application review process. AP and IB test results and college-level course work can be considered for credit. In general, students applying for admission should have a strong college preparatory program in high school, including:

- four units of English, three units of history, social science or government
- three units of college-prep mathematics (a year of pre-calculus/calculus is desirable but not required)
- three units of science (which must include biology, chemistry and physics)