



Environmental Engineering Overview

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The Field

Using the principles of biology and chemistry, environmental engineers develop solutions to environmental problems. They are involved in water and air pollution control, recycling, waste disposal, and public health issues. Environmental engineers conduct hazardous-waste management studies in which they evaluate the significance of the hazard, offer analysis on treatment and containment, and develop regulations to prevent mishaps.



They design municipal water supply and industrial wastewater treatment systems. They conduct research on proposed environmental projects, analyze scientific data, and perform quality control checks. They provide legal and financial consulting on matters related to the environment.

Environmental engineers are concerned with local and worldwide environmental issues. They study and attempt to minimize the effects of acid rain, global warming, automobile emissions, and ozone depletion. They also are involved in the protection of wildlife.

Many environmental engineers work as consultants, helping their clients to comply with regulations and to clean up hazardous sites.

Preparation

Environmental engineers should be creative, inquisitive, analytical, and detail oriented. They must have a strong grasp of mathematics, including algebra, geometry, trigonometry, and calculus; sciences, such as biology, chemistry, and physics; and computer systems. Abilities to work as part of a team and to communicate well also will be important as environmental engineers' jobs become more diversified and require interaction with specialists outside engineering. To hone these skills, recommended coursework includes English, writing, social studies, and humanities.

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Note: Some resources in this section are provided by the US Department of Labor, Bureau of Labor Statistics.

Environmental Engineering Programs

A bachelor's degree in engineering is required for almost all entry-level engineering jobs. Accredited environmental engineering programs usually provide broad studies in the physical, chemical, and biological sciences in addition to course work in civil, mechanical, and/or chemical engineering. In some programs, students may participate in an environmental engineering option within civil engineering, chemical engineering, or other degree programs. It is important to select a program that is accredited in Environmental Engineering. Some graduate level programs are also available in Environmental Engineering.



Admission Requirements

Admissions requirements for undergraduate engineering schools include a solid background in mathematics (algebra, geometry, trigonometry, and calculus) and science (biology, chemistry, and physics), and courses in English, social studies, humanities, and computer and information technology. Bachelor's degree programs in engineering typically are designed to last 4 years, but many students find that it takes between 4 and 5 years to complete their studies. In a typical 4-year college curriculum, the first 2 years are spent studying mathematics, basic sciences, introductory engineering, humanities, and social sciences. In the last 2 years, most courses are in engineering, usually with a concentration in one branch. For example, the last two years of an environmental program might include courses in solid waste management, treatment plant design, hydraulic design, and hazardous waste management.

Co-ops

Internships and Coops provide students with a great opportunity to gain real-world experience while still in school. Many universities offer co-op and internship programs for students studying Environmental Engineering.

Courses of Study

Environmental Engineering is most closely related to civil and chemical engineering. It requires knowledge in many fields of science, including physics, chemistry, hydrology, geology, and biology. Undergraduate students working toward a degree in Environmental Engineering will take courses that cover these fields including microbiology, organic chemistry, microbiology, hydrology, engineering geology and others.



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Accredited Programs

Those interested in a career in Environmental Engineering should consider reviewing engineering programs that are accredited by the Accreditation Board for Engineering and Technology, Inc. (ABET). ABET accreditation is based on an evaluation of an engineering program's student achievement, program improvement, faculty, curricular content, facilities, and institutional commitment.

The following is a current list of all universities offering accredited degree programs in Environmental Engineering. Please note that those with a (MS) after the school name are master's degree programs available in this field; all others are bachelor's degrees.

<ul style="list-style-type: none">• Air Force Institute of Technology (MS)• University of Arkansas (MS)• California Polytechnic State University, San Luis Obispo• University of California, Irvine• University of California, Riverside• University of Central Florida• University of Cincinnati (MS)• University of Colorado at Boulder• Colorado State University• Columbia University• University of Delaware• Drexel University• University of Florida• Gannon University• Georgia Institute of Technology (MS)• Humboldt State University• The Johns Hopkins University• Louisiana State University and A&M College• Manhattan College• University of Massachusetts Amherst (MS)• Massachusetts Institute of Technology• University of Miami• Michigan Technological University• Missouri University of Science and Technology• Montana Tech of the University of Montana• University of Nevada-Reno• University of New Hampshire• New Mexico Institute of Mining and Technology• State University of New York at Buffalo	<ul style="list-style-type: none">• North Carolina State University at Raleigh• Northern Arizona University• Northwestern University• The Ohio State University• The University of Oklahoma• Old Dominion University• Oregon State University• Pennsylvania State University• Pennsylvania State University, Harrisburg, The Capital College• Polytechnic University of Puerto Rico• Rensselaer Polytechnic Institute• San Diego State University• South Dakota School of Mines and Technology• University of Southern California• Southern Methodist University• Stanford University• Stevens Institute of Technology• Syracuse University• University of Texas at Austin (MS)• Texas Tech University (MS)• Tufts University• Tulane University• United States Air Force Academy• United States Military Academy• Utah State University• University of Vermont• Virginia Polytechnic Institute and State University (MS)• Wentworth Institute of Technology• Wilkes University• University of Wisconsin-Platteville
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Day in the Life

Environmental engineers develop ways to solve problems related to the environment. They are involved in both local and global environmental protection efforts such as air and water pollution control, recycling, and waste disposal.

Job Duties

Environmental engineers' job duties include collecting soil or groundwater samples and testing them for contamination; designing municipal sewage and industrial wastewater systems; analyzing scientific data; researching controversial projects; and performing quality control checks. They may be involved in legal or financial consulting regarding environmental processes or issues. They may study and attempt to minimize the effects of large-scale problems such as acid rain, global warming, and ozone depletion.

Many environmental engineers work as consultants, helping their clients comply with regulations and the cleanup of hazardous waste sites. One emphasis in environmental engineering consulting is on brownfields -- land areas that are abandoned because of contamination by hazardous substances. Environmental engineers help clients clean up the brownfields for reuse in place of premium land, minimizing the liabilities and the costs of infrastructure or building projects.

The Workplace

The type of job environmental engineers have often determines whether they work inside or outside. However, most work inside a majority of the time. Environmental engineers whose tasks require site visits -- for purposes such as collecting samples, checking quality control, and investigating sites for possible contamination -- spend at least part of their time away from the office. Site visits are more likely to take environmental engineers to unpleasant surroundings than to pristine ones, but they also give engineers a chance to turn theory into reality. And, working outside the office allows some environmental engineers to interact with people their work affects.



Teams and Coworkers

Almost all jobs in engineering require some sort of interaction with coworkers. Whether they are working in a team situation, or just asking for advice, most engineers have to have the ability to communicate and work with other people. Engineers should be creative, inquisitive, analytical, and detail-oriented. They should be able to work as part of a team and to communicate well, both orally and in writing. Communication abilities are important because engineers often interact with specialists in a wide range of fields outside engineering.

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Earnings

According to the U.S. Bureau of Labor Statistics, the median annual earnings of environmental engineers are about \$69,940.

According to a 2007 survey by the National Association of Colleges and Employers, bachelor's degree candidates in environmental engineering received starting offers averaging \$47,960 a year.



Employment

Environmental engineers hold about 54,000 jobs in the U.S. This represents 3.6% of the 1.5 million jobs held by engineers in the U.S. Almost half worked in professional, scientific, and technical services and about 15,000 were employed in U.S. federal, state, and local government agencies. They are also frequently employed at universities and research firms, government agencies, testing facilities, and also at major corporations.



Environmental Engineers work in a wide variety of industries, including chemical, pharmaceutical, water/wastewater treatment, mining, and manufacturing, and can be involved in hazardous waste remediation, air pollution control, facilities planning, and environmental consulting.

As the trend of regulation changes from pollution cleanup to prevention, environmental engineers will have to shift their focus to public health, an area of growing concern. But trends in environmental protection and regulation constantly change, so environmental engineers must keep abreast of a range of environmental issues to ensure steady employment.



Political factors also have an impact on the job outlook for environmental engineering employment opportunities; looser environmental regulations would reduce job opportunities, stricter regulations would enhance them.

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The following is a partial list of employers of Environmental Engineers:

Pharmaceutical, Chemical and Manufacturing Companies	U.S. Federal Government and State and Local Affiliates	Other Employers
<ul style="list-style-type: none"> • 3M Worldwide • Abbott Laboratories • Amgen Inc. • BASF • Bristol-Myers Squibb Company • Chevron Company • Dow Chemical Company • DuPont • Genentech • General Electric • GlaxoSmithKline • Hoffmann-La Roche Inc. • ICI Group • IBM • Johnson & Johnson • Merck & Company • Procter & Gamble Company • Smithkline Beechman Pharmaceuticals • Wyeth Pharmaceuticals 	<ul style="list-style-type: none"> • Army Corps of Engineers • Bureau of Reclamation • Department of Agriculture • Department of Energy • Department of the Interior • Department of Defense • Environmental Protection Agency • Federal Bureau of Investigation • Federal Emergency Management Agency • Federal Highway Administration • NASA • National Institute of Standards and Technology • National Oceanic and Atmospheric Administration • Natural Resources Conservation Service • Nuclear Regulatory Commission • Pacific Northwest National Laboratory • USDA Forest Service • US Navy • Veterans Health Administration 	<ul style="list-style-type: none"> • Environmental Consulting Firms • Professional Associations • Utility companies • Colleges and Universities

Career Path Forecast

According to the US Department of Labor, Bureau of Labor Statistics, environmental engineers should have employment growth of 25 percent from 2006-2016, much faster than the average for all occupations. More environmental engineers will be needed to comply with environmental regulations and to develop methods of cleaning up existing hazards.



A shift in emphasis toward preventing problems rather than controlling those that already exist, as well as increasing public health concerns resulting from population growth, also are expected to spur demand for environmental engineers. Because of this employment growth, job opportunities should be good even as more students earn degrees. Even though employment of environmental engineers should be less affected by economic conditions than most other types of engineers, a significant economic downturn could reduce the emphasis on environmental protection, reducing job opportunities.

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Professional Organizations

Professional organizations and associations provide a wide range of resources for planning and navigating a career in Environmental Engineering. These groups can play a key role in your development and keep you abreast of what is happening in your industry. Associations promote the interests of their members and provide a network of contacts that can help you find jobs and move your career forward. They can offer a variety of services including job referral services, continuing education courses, insurance, travel benefits, periodicals, and meeting and conference opportunities. A broader list of professional associations is also available at www.careercornerstone.org.

- **American Academy of Environmental Engineers (www.aaee.net)**

The American Academy of Environmental Engineers (AAEE) is dedicated to excellence in the practice of environmental engineering to ensure the public health, safety, and welfare to enable humankind to co-exist in harmony with nature. The Academy is the lead society for environmental engineering education program accreditation. Through this process, the Academy ensures that educational standards are responsive to the needs of the professional and that tomorrow's engineers will meet the needs of the profession.
- **American Institute of Chemical Engineer Environmental Division (www.envdiv.aiche.org)**

The American Institute of Chemical Engineers, AIChE, was founded in 1908. AIChE is a professional association of more than 40,000 members that provides leadership in advancing the chemical engineering profession. The AIChE Environmental Division is a division within AIChE that focuses on environmental issues.
- **ASCE Environmental & Water Resources Institute (www.ewrinstitute.org)**

EWRI is a specialty organization - already 22,000 members strong - within the American Society of Civil Engineers (ASCE). The diverse members who are coming under the EWRI umbrella include these engineering team professionals: environmental and water resources engineers and scientists, hydrologists, chemists and biologists, planners and economists, equipment suppliers, academicians, researchers, attorneys, and others involved in "wet and environmental" projects and research.
- **ASME Environmental Engineering Division (<http://divisions.asme.org/eed/>)**

The ASME Environmental Engineering Division (EED) promotes the art, science and practice of engineering in all issues pertaining to the environment. Originally, the Division's main business was pollution controls for emissions from electric power generation plants. Today, the Division fosters developments and applications in air, ground, and water pollution technologies and is breaking ground into many multi-disciplinary areas of the environment.
- **Water Environment Federation (www.wef.org)**

Founded in 1928, the Water Environment Federation (WEF) is a not-for-profit technical and educational organization with members from varied disciplines who work toward the WEF vision of preservation and enhancement of the global water environment. The WEF network includes water quality professionals from 76 Member Associations in 30 countries

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