



## Architectural Engineering Overview

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### The Field

Architectural engineers apply engineering principles to the construction, planning, and design of buildings and other structures. They often work with other engineers and with architects, who focus on function layout or aesthetics of building projects. Architectural Engineering often encompasses elements of other engineering disciplines, including mechanical, electrical, fire protection, and others. The architectural engineers are responsible for the different systems within a building, structure, or complex. Architectural engineers focus several areas, including:



- ▶ the structural integrity of buildings
- ▶ the design and analysis of heating, ventilating and air conditioning systems,
- ▶ efficiency and design of plumbing, fire protection and electrical systems,
- ▶ acoustic and lighting planning, and
- ▶ energy conservation issues.

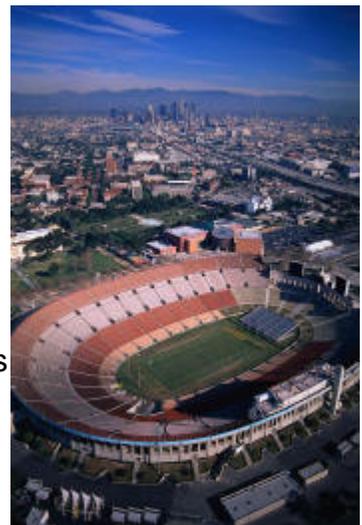
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### Preparation

Architectural Engineering graduates will enter a field that has a great deal in common with both civil and mechanical engineering -- but architectural engineers have chosen to concentrate on building projects. They will work on building system design, structural and computer-aided design, and address challenges such as earthquake and hurricane preparedness.

#### Architectural Engineering Programs

A bachelor's degree in engineering is required for almost all entry-level engineering jobs. Accredited architectural engineering programs usually provide broad studies in mathematics and physics in addition to course work in civil engineering. It is important to select a program that is accredited in Architectural Engineering.



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## 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. Having calculus in high school can provide a substantial advantage when working toward an architectural engineering degree. 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. Some Architectural Engineering programs are five years, instead of four. 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 architectural engineering program might include courses in architectural design, engineering economics, fluid mechanics, structural design and analysis, and thermodynamics.

## 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 Architectural Engineering. Click here for more information.

## Courses of Study

Students specializing in Architectural Engineering will explore engineering design, structures, mechanical and electrical systems, and construction management. They need to be proficient in mathematics (differential equations, probability and statistics) along with calculus-based physics and general chemistry. Students will study the strength of materials, thermodynamics, fluid mechanics, electric circuits, and engineering economics. Students will also learn about the history of architectural design. Teamwork is also a key part of the study of architectural engineering as architectural engineers will interact with the other design professionals in the execution of building projects.

## Accredited Programs

Those interested in a career in Architectural 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 universities offering accredited degree programs in Architectural Engineering.

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| <ul style="list-style-type: none"><li>• <a href="#"><u>California Polytechnic State University, San Luis Obispo</u></a></li><li>• <a href="#"><u>University of Colorado at Boulder</u></a></li><li>• <a href="#"><u>Drexel University</u></a></li><li>• <a href="#"><u>Illinois Institute of Technology</u></a></li><li>• <a href="#"><u>Kansas State University</u></a></li><li>• <a href="#"><u>The University of Kansas</u></a></li><li>• <a href="#"><u>University of Miami</u></a></li><li>• <a href="#"><u>Milwaukee School of Engineering</u></a></li></ul> | <ul style="list-style-type: none"><li>• <a href="#"><u>Missouri University of Science and Technology</u></a></li><li>• <a href="#"><u>University of Nebraska-Lincoln</u></a></li><li>• <a href="#"><u>North Carolina Agricultural and Technical State University</u></a></li><li>• <a href="#"><u>Oklahoma State University</u></a></li><li>• <a href="#"><u>Pennsylvania State University</u></a></li><li>• <a href="#"><u>The University of Oklahoma</u></a></li><li>• <a href="#"><u>Tennessee State University</u></a></li><li>• <a href="#"><u>University of Texas at Austin</u></a></li><li>• <a href="#"><u>University of Wyoming</u></a></li></ul> |
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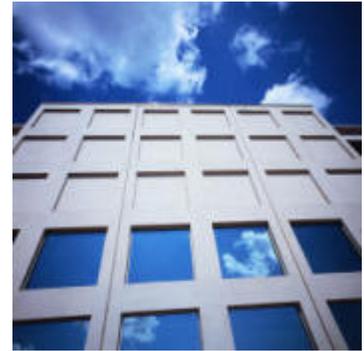
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## Day In The Life

Architectural Engineers work in teams with other engineers and architects to design, construct, and maintain buildings and building complexes. They might focus on designing structural systems, evaluating and planning heating and air conditioning, lighting, electrical, plumbing, and/or fire protection systems for buildings. Architectural Engineers may work on new building projects, or renovations of existing structures.



### What is the Differences Between Architecture and Architectural Engineering?

Usually, architects design the look or aesthetics of a building and design a building that meets the needs of a client. Architectural engineers are responsible for taking the design and developing the details of the building systems, including structural, heating/air conditioning, plumbing, fire protection, and electrical. They use their expertise in engineering, mathematics, and physics to make sure the structure is sound and functional.

### Job Duties

Architectural engineers often work in teams. Some Architectural engineers focus on specific issues, such as a structure's ability to withstand the stress of hurricanes, heavy snow, or earthquakes. Others might focus on air quality, energy efficiency, or the impact new construction has on the environment. They may participate in legal or financial consulting regarding construction planning, processes, equipment, or issues. Most Architectural Engineers work in the construction industry or related areas. Others may choose to work at non-profit organizations or firms.

### The Workplace

Architectural Engineers usually work in a comfortable environment. Most of their time is spent in offices consulting with clients and working with other engineers and architects. However, they often visit construction sites to review the progress of projects. Although most architects work approximately 40 hours per week, they often have to work nights and weekends to meet deadlines. Architectural engineers may find themselves working in different geographic locations based on the site of a construction project.



### 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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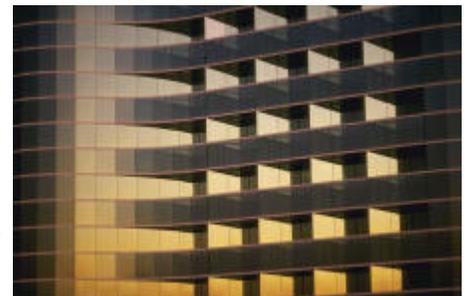
## Earnings

According to the Engineering Workforce Commission of the American Association of Engineering Societies' "Engineers' Salaries: Special Industry Report," the following chart shows median annual salaries for architectural engineers based on years of experience.

Years experience	Median annual salary - Architectural Engineers
35 +	\$96,000
31 to 35	\$104,000
26 to 30	\$106,080
21 to 25	\$90,000
17 to 20	\$92,000
13 to 16	\$81,000
11 to 12	\$72,500
9 to 10	\$74,000

## Employment

Most Architectural Engineers work in the construction industry or related areas. Others may choose to work at non-profit organizations or firms. Some Architectural Engineers are self employed. After developing an experience base, some Architectural Engineering graduates become principals in their own consulting firms. The following is a partial list of employers of Architectural Engineers:



Architectural/Construction Firms		U.S. Federal Government and State and Local Affiliates
<ul style="list-style-type: none"> <li>Alpha Corporation</li> <li>Bechtel Group Inc.</li> <li>Camp Dresser &amp; McKee</li> <li>Clark Nexson</li> <li>CH2M HILL</li> <li>DeSimone Consulting Engineers P.L.L.C.</li> <li>Dick Corporation</li> <li>EwingCole</li> <li>Freese &amp; Nichols</li> <li>Girard Engineering</li> <li>Granite Construction</li> </ul>	<ul style="list-style-type: none"> <li>Halliburton</li> <li>Meta Engineers P.C.</li> <li>Parsons Brinckerhoff</li> <li>Parsons Corp.</li> <li>SmithGroup, Inc.</li> <li>TAMS Consultants Inc.</li> <li>Tetra Tech, Inc.</li> <li>The Thornton-Tomasetti Group</li> <li>The Trump Organization</li> <li>Turner Construction</li> <li>URS</li> <li>Wiss, Janney, Elstner Associates, Inc.</li> </ul>	<ul style="list-style-type: none"> <li>Federal Emergency Management Agency</li> <li>NASA</li> <li>US Army Corps of Engineers</li> </ul> <p>Other Employers</p> <ul style="list-style-type: none"> <li>Colleges and Universities</li> <li>Engineers Without Borders</li> <li>Peace Corps</li> <li>Professional Associations</li> <li>Self Employment</li> </ul>

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## Career Path Forecast

According to the US Department of Labor, Bureau of Labor Statistics, employment of architectural engineers (and the architects who work with them) is strongly tied to the activity of the construction industry. Strong growth is expected to come from nonresidential construction as demand for commercial space increases. Residential construction, buoyed by low interest rates, is also expected to grow as more and more people become homeowners. If interest rates rise significantly, this sector may see a falloff in home building.



Current demographic trends also support an increase in demand for architectural engineers. As the population of U.S. sunbelt states continues to grow, the people living there will need new places to live and work. As the population continues to live longer and baby-boomers begin to retire there will be a need for more healthcare facilities, nursing homes, and retirement communities. In education, buildings at all levels are getting older and class sizes are getting larger. This will require many school districts and universities to build new facilities and renovate existing ones.

Some types of construction are sensitive to cyclical changes in the economy. Architectural engineers seeking design projects for office and retail construction will face especially strong competition for jobs or clients during recessions, and layoffs may ensue in less successful firms. Those involved in the design of institutional buildings, such as schools, hospitals, nursing homes, and correctional facilities, will be less affected by fluctuations in the economy. Residential construction makes up a small portion of work for architectural engineers, so major changes in the housing market would not be as significant as fluctuations in the nonresidential market.

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## Professional Organizations

Professional organizations and associations provide a wide range of resources for planning and navigating a career in Architectural 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](http://www.careercornerstone.org).

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- **American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ([www.ashrae.org](http://www.ashrae.org))**  
 Membership in ASHRAE is open to any person associated with heating, ventilation, air conditioning or refrigeration through such disciplines as indoor air quality and energy conservation, for example. ASHRAE has more than 160 chapters organized into thirteen regions.
- **Architectural Engineering Institute of the American Society of Civil Engineers ([www.aeinsteinute.org](http://www.aeinsteinute.org))**  
 AEI provides a multi-disciplinary national forum for members of but not limited to the architectural engineering, structural, mechanical, electrical, and architectural communities. AEI was established in 1998 and works to facilitate the crucial communication among members of the building team, both on a technical basis and in the professional arena.
- **Society of Fire Protection Engineers ([www.sfpe.org](http://www.sfpe.org))**  
 The Society of Fire Protection Engineers was established in 1950 and is the professional society representing those practicing the field of fire protection engineering. The Society has approximately 4500 members in the United States and abroad, and 57 regional chapters. The purpose of the Society is to advance the science and practice of fire protection engineering and its allied fields, to maintain a high ethical standard among its members and to foster fire protection engineering education.
- **The Illuminating Engineering Society of North America ([www.iesna.org](http://www.iesna.org))**  
 The IESNA is the recognized technical authority on illumination. For over ninety years its objective has been to communicate information on all aspects of good lighting practice to its members, to the lighting community, and to consumers through a variety of programs, publications, and services. The strength of the IESNA is its diversified membership: engineers, architects, designers, educators, students, contractors, distributors, utility personnel, manufacturers, and scientists.
- **Structural Engineering Institute ([www.seinsteinute.org](http://www.seinsteinute.org))**  
 SEI is a 20,000 plus community of structural engineers within the American Society of Civil Engineers. SEI started in 1996 in order to serve the unique needs of the structural engineering community more effectively while also being their voice on broader issues that shape the entire civil engineering community.

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