



## Mining Engineering Overview

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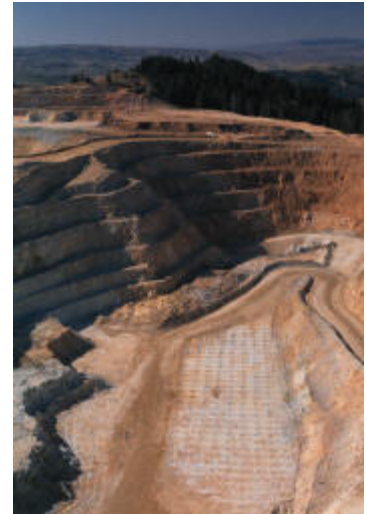
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### The Field

Mining and geological engineers, including mining safety engineers, find, extract, and prepare coal, metals, and minerals for use by manufacturing industries and utilities. They design open-pit and underground mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the safe, economical, and environmentally sound operation of mines.

Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment or direct mineral- processing operations that separate minerals from the dirt, rock, and other materials with which they are mixed.

Mining engineers frequently specialize in the mining of one mineral or metal, such as coal or gold. With increased emphasis on protecting the environment, many mining engineers work to solve problems related to land reclamation and water and air pollution. Mining safety engineers use their knowledge of mine design and practices to ensure the safety of workers and to comply with State and Federal safety regulations. They inspect walls and roof surfaces, monitor air quality, and examine mining equipment for compliance with safety practices.



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### Preparation

A bachelor's degree in engineering is required for almost all entry-level engineering jobs.

#### ► 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.

## ► 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 Mining Engineering. This provides students with first hand experience in the industry and the opportunity to contribute to a real-world program or project.

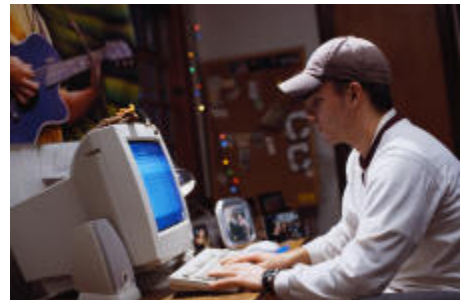
## ► Courses of Study

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. Mining engineering students may also take courses such as Introduction to Mining Safety, Structural Geology, and Geology for Engineers during these years. In the last 2 years, a mining engineering program might include courses in Material Handling in Mines, Physical Mineralogy and Petrology, Surface Mining Methods and Equipment, Principles of Explosives Engineering, Mine Management, and Environmental Aspects of Mining.



## ► Accredited Programs

Those interested in a career in Mining 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 Mining Engineering.



- **University of Alaska Fairbanks**
- **University of Arizona**
- **Colorado School of Mines**
- **University of Kentucky**
- **Missouri University of Science and Technology**
- **Montana Tech of the University of Montana**
- **University of Nevada-Reno**

- **New Mexico Institute of Mining and Technology**
- **Pennsylvania State University**
- **Southern Illinois University at Carbondale**
- **University of Utah**
- **Virginia Polytechnic Institute and State University**
- **West Virginia University**

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## Day in the Life

Mining and geological engineers solve problems relating to finding, extracting, and preparing natural resources for a multitude of uses in manufacturing and utilities. Mining engineers work on many different tasks, including designing either open-pit or underground mines. Their duties may include supervising construction or coming up with transportation plans for the minerals, coal, or metals they extract. Some mining and geological engineers focus on safety issues, while others develop new advances in mining equipment that can either increase safety or production or both. Some engineers will help improve separation processing systems

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for separating minerals from rocks, dirt or other materials in their raw state. Others will assist in valuating a mining operation, to determine the likely profits from the facility and work in teams to determine measures for increasing profits while maintaining quality and safe operations.

### ► The Workplace

The type of job a mining engineer has will often determine whether how much they work inside or outside. Many mining engineers work to solve problems related to land reclamation and water and air pollution, which will cause them to visit sites for evaluation. While some desk work is likely, most mining engineers spend a good deal of time on job sites. There are international travel opportunities for some mining engineers, as their expertise is needed on a global basis. Some mining engineers work on a consulting basis, and may spend most of their time in an office.



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### ► Teams and Coworkers

Almost all jobs in engineering require some sort of interaction with coworkers. For example, some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. 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

Earnings for engineers vary significantly by specialty, industry, and education. Even so, as a group, engineers earn some of the highest average starting salaries among those holding bachelor's degrees. Earnings for engineers vary significantly by specialty, industry, and education.

### ► Salary Data

According to the U.S. Department of Labor, Bureau of Labor Statistics, the median income for mining and geological engineers, including mining safety engineers is \$72,160. The lowest 10% earned \$42,040, and the highest 10% earned \$128,410. In terms of starting salaries, the average starting salary for mining engineers who have earned a Bachelor's degree is \$54,381.

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# Employment

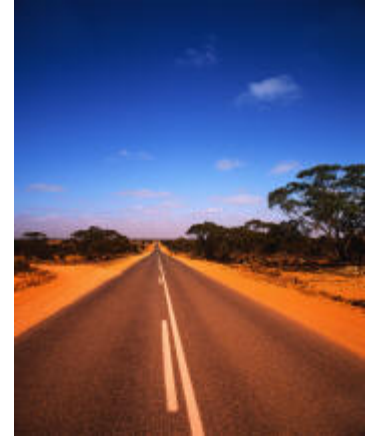
Mining and geological engineers, including mining safety engineers, held about 7,100 jobs in the United States. While about 4 out of 10 mining engineers worked in the mining industry, over one-third worked in professional, scientific, and technical services firms, mostly providing consulting and other services to the mining industry. Most of the rest worked in State or Federal government. Mining engineers often are employed at the location of natural deposits, often near small communities, and sometimes outside the United States. Those in research and development, management, consulting, or sales, however, often are located in metropolitan areas. The website MiningJobs ([www.miningjobs.org](http://www.miningjobs.org)) offers details on employment in the field. The following is a partial list of employers of mining and geological engineers:

<b>Mining, Industrial, Manufacturing Companies and Financial Firms</b> <ul style="list-style-type: none"><li>• <b>Alamos Gold Inc.</b></li><li>• <b>Aurizon Mines Ltd.</b></li><li>• <b>BCI Engineers &amp; Scientists, Inc.</b></li><li>• <b>Carter Stone &amp; Company</b></li><li>• <b>Coeur Rochester, Inc.</b></li><li>• <b>Crystallex International Corporation</b></li><li>• <b>Eldorado Gold Corporation</b></li><li>• <b>Etruscan Resources Inc.</b></li><li>• <b>First Nickel Inc.</b></li><li>• <b>FNX Mining Company Inc.</b></li><li>• <b>Freeport McMoran Copper &amp; Gold Inc.</b></li><li>• <b>Golden Star Resources Ltd.</b></li><li>• <b>Hanson Aggregates</b></li><li>• <b>Iluka Resources</b></li><li>• <b>Jaguar Mining Inc.</b></li><li>• <b>Jim Walter Resources</b></li><li>• <b>John T Boyd Company</b></li><li>• <b>Kennecott Utah Copper</b></li><li>• <b>Macmillan Gold Corp</b></li><li>• <b>Martin Marietta Materials</b></li><li>• <b>Meridian Gold Inc.</b></li><li>• <b>Mine Ventilation Services, Inc.</b></li><li>• <b>Nevada Pacific Gold Ltd.</b></li><li>• <b>Newmont Mining Corp</b></li><li>• <b>Northern Mining Explorations Ltd.</b></li><li>• <b>Northern Orion Resources Inc.</b></li><li>• <b>Pan American Silver Corp.</b></li><li>• <b>Phelps Dodge Corporation</b></li><li>• <b>Queenstake Resources Ltd.</b></li><li>• <b>Unimin Corporation</b></li></ul>	<b>U.S. Federal Government and State and Local Affiliates</b> <ul style="list-style-type: none"><li>• <b>NASA</b></li><li>• <b>Mining Safety Research at National Institute of Occupational Safety and Health</b></li><li>• <b>National Parks Service</b></li><li>• <b>Office of Surface Mining</b></li><li>• <b>U.S. Army Corps of Engineers</b></li><li>• <b>U.S. Department of Energy</b></li><li>• <b>U.S. Department of the Interior - Bureau of Land Management</b></li><li>• <b>U.S. Geological Survey</b></li><li>• </li></ul> <b>Other Employers</b> <ul style="list-style-type: none"><li>• <b>Mining Consulting Firms</b></li><li>• <b>Professional Associations</b></li><li>• <b>Utility companies</b></li><li>• <b>Colleges and Universities</b></li></ul>
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## Career Path Forecast

According to the U.S. Department of Labor, Bureau of Labor Statistics, mining and geological engineers, including mining safety engineers are expected to have 10 percent employment growth between 2006 and 2016. This is about as fast as the average for all occupations. Following a lengthy period of decline, strong growth in demand for minerals and increased use of mining engineers in the oil and gas extraction industry is expected to create some employment growth over the 2006-16 period. Moreover, many mining engineers currently employed are approaching retirement age, a factor that should create additional job openings. Furthermore, relatively few schools offer mining engineering programs, resulting in good job opportunities for graduates. The best opportunities may require frequent travel or even living overseas for extended periods of time as mining operations around the world recruit graduates of U.S. mining engineering programs.



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## Professional Organizations

Professional organizations and associations provide a wide range of resources for planning and navigating a career in mining 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).

- ▶ **American Institute of Mining, Metallurgical, and Petroleum Engineers ([www.aimehq.org](http://www.aimehq.org))**
- ▶ **Government, Education and Mining (GEM) Program ([www.smenet.org/education/gem](http://www.smenet.org/education/gem))**
- ▶ **National Mining Association ([www.nma.org](http://www.nma.org))**
- ▶ **Mining and Metallurgical Research Society of America ([www.mmsa.net](http://www.mmsa.net))**
- ▶ **The Minerals, Metals & Materials Society ([www.tms.org](http://www.tms.org))**
- ▶ **The Society for Mining, Metallurgy, and Exploration ([www.smenet.org](http://www.smenet.org))**