



**PLTW Engineering**

**12/Career Exploration – Mining and  
Geological Engineers**

**May 22, 2020**



12/EDD

Lesson: 5/22/2020

**Objective/Learning Target: Students will be able to explain the career path of a mining or geological engineer.**



## What do mining/geological engineers do?

Mining and geological engineers design mines to safely and efficiently remove minerals such as coal and metals for use in manufacturing and utilities.

Geological engineers search for mineral deposits and evaluate possible sites. Once a site is identified, they plan how the metals or minerals will be extracted in efficient and environmentally sound ways.



## What do mining/geological engineers do?

Mining engineers often specialize in one particular mineral or metal, such as coal or gold. They typically design and develop mines and determine the best way to extract metal or minerals to get the most out of deposits.

Some mining engineers work with geoscientists and metallurgical engineers to find and evaluate ore deposits. Other mining engineers develop new equipment or direct mineral-processing operations to separate minerals from dirt, rock, and other materials.



## What do mining/geological engineers do?

Mining safety engineers use best practices and their knowledge of mine design to ensure workers' safety and to maintain compliance with state and federal safety regulations.

They inspect the walls and roofs of mines, monitor the air quality, and examine mining equipment for possible hazards.

Engineers who hold a master's or a doctoral degree may teach engineering at colleges and universities.



# Typical duties for mining/geological engineers

- Design open-pit and underground mines
- Supervise the construction of mine shafts and tunnels
- Devise methods for transporting minerals to processing plants
- Prepare technical reports for miners, engineers, and managers
- Monitor mine production to assess the effectiveness of operations
- Provide solutions to problems related to land reclamation, water and air pollution, and sustainability
- Ensure that mines are operated in safe and environmentally sound ways



## Work environment for mining/geological engineers

Most mining and geological engineers work full time and some work more than 40 hours a week. The remoteness of some mining locations gives rise to variable schedules and weeks during which they work more hours than usual.

Many work where mining operations are located, such as mineral mines or sand-and-gravel quarries, in remote areas or near cities and towns. Others work in offices or onsite for oil and gas extraction firms or engineering services firms.



## How to become a mining/geological engineer

A bachelor's degree from an accredited engineering program is required to become a mining or geological engineer, including a mining safety engineer. Requirements for licensure vary by state but most states require applicants to pass two exams.

High school students interested in entering mining or geological engineering programs in college should take courses in mathematics and science.





## How to become a mining/geological engineer

Relatively few schools offer mining engineering or geological engineering programs.

Typical bachelor's degree programs in mining engineering include courses in geology, physics, thermodynamics, mine design and safety, and mathematics.

Bachelor's degree programs in geological engineering typically include courses in geology, chemistry, fluid mechanics, physics, and mathematics.



## How to become a mining/geological engineer

Both types of programs also include laboratory and field work, as well as traditional classroom study.

A related degree, such as civil or environmental engineering or geoscience, may be acceptable for some positions as a mining or geological engineer.



## Important qualities for a mining/geological engineer

***Analytical skills.*** Mining and geological engineers must take many factors into account when evaluating new mine locations and designing facilities. They must also plan for the restoration of the surrounding environment after operations end.

***Decision making skills.*** These engineers make decisions that influence many critical outcomes—from worker safety to mine production. The ability to anticipate problems and deal with them immediately is crucial.



## Important qualities for a mining/geological engineer

***Logical-thinking skills.*** In planning mines' operations, mineral processing, and environmental reclamation, these engineers have to put work plans into a coherent, logical sequence.

***Math skills.*** Mining and geological engineers use the principles of calculus, trigonometry, and other advanced topics in math for analysis, design, and troubleshooting in their work.

***Problem-solving skills.*** Mining and geological engineers must explore for potential mines, plan their operations and mineral processing, and design environmental reclamation projects.



## How much do mining/geological engineers get paid?

The median annual wage for mining and geological engineers was \$91,160 in May 2019.

The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less.

The lowest 10 percent earned less than \$52,160, and the highest 10 percent earned more than \$151,230.



## Work schedules for mining/geological engineers

Most mining and geological engineers work full time and some work more than 40 hours a week.

The remoteness of some mining locations gives rise to variable schedules and weeks during which they work more than usual.



## Quiz yourself

1. Name 1 thing mining engineers do.
2. Name 1 thing geological engineers do.
3. What degree would you need to teach mining engineering at colleges and universities?
4. List 3 typical duties for a mining/geological engineer.
5. List 2 important qualities for a mining/geological engineer.



## Helpful links

[Mining and geological engineering career video](#)

[A day in the life of a mining engineer video](#)