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An Overview on Specializations of Geological Engineering

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Opinion Article

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DESCRIPTION

Geological engineering is a branch of engineering that focuses on using geological science and engineering principles in a variety of industries, including forestry, mining, and civil engineering, among others. The work of geological engineers frequently guides or aids the work of other engineering disciplines, such as determining the suitability of locations for oil and gas projects, mining operations, civil engineering, and environmental engineering through the conduct of geological, geoenvironmental, geophysical, and geotechnical studies. They work on impact assessments for construction projects and other activities that have an impact on the surface and subsurface environments. On these projects, the geological engineers' recommendations and comments on the engineering design will frequently have a significant impact on the construction and operation.

Geotechnical, geological, geophysical, hydrogeological, and environmental data collecting are all planned, designed, and carried out by geological engineers. This includes manual ground-based techniques, deep drilling, geochemical sampling, cutting-edge geophysical technologies, and satellite surveys, among other things. In addition, ground characterisation programmes for particular engineering requirements, mapping at all sizes, and analysis of past and present ground behaviour are all of interest to geological engineers. Geological engineers use these investigations to develop reports and suggestions that could significantly alter the foundations of construction, mining, and civil engineering projects. Rock excavation, building foundation consolidation, pressure grouting, hydraulic channel erosion control, slope and fill stabilisation, risk assessment for landslides, groundwater monitoring, and assessment and contaminant cleanup are a few examples of projects. Additionally, geological engineers are a part of design groups that create solutions for resource management, surface and subsurface excavation projects, groundwater remediation, and surface hazards. Geological engineers, like mining engineers, carry out resource exploration campaigns, mine evaluations, and feasibility analyses in addition to assisting with the efficiency, sustainability, and safety of ongoing mining projects.

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Specializations

Numerous subdisciplines of geological engineering investigate various facts of earth sciences and use them in a range of engineering tasks. The following subfields are frequently taught at the undergraduate level, and they are all related to fields outside of geological engineering. However, a geological engineer who has spent their entire education specialising in one of these subdisciplines is still qualified to work in any of the other subdisciplines.

Geoenvironmental and hydrogeological engineering: The branch of geological engineering known as geoenvironmental engineering focuses on preventing or reducing the negative environmental consequences of anthropogenic contaminants in soil and water. It addresses these problems by creating systems and infrastructure for the provision of clean water, the removal of trash, and the regulation of all forms of pollution. Geoenvironmental engineer's work mostly entails looking into the movement, interaction, and effects of contaminants as well as cleaning up contaminated areas and safeguarding uncontaminated ones. A geoenvironmental engineer's typical tasks include:

- The creation, examination, and revision of reports on environmental investigations.
- The planning of initiatives that protect the environment, such as groundwater monitoring wells or water reclamation facilities.
- Carrying out economic evaluations and feasibility studies for environmental projects.
- Acquiring and updating plans, permits, and industry standards.
- Offering technical assistance for initiatives involving environmental cleanup that call for legal action.

Geotechnical and rock engineering: The subfield of geological engineering known as geotechnical engineering deals with managing ground natural and induced settlement of buildings, slope and fill stability, and potential effects of landslides and earthquakes on human infrastructure. It also manages safe excavation, stabilisation, and monitoring of the rock and soil surrounding underground excavations and surface construction. For ongoing issues in areas like rock mechanics, soil mechanics, and the mitigation and prevention of natural hazards, geotechnical engineers primarily focus on the geomechanical deformation properties of rocks and soils.