Geological Engineering

Geological engineering is the application of geological principles in order to solve problems in the geoenvironment and geotechnics. Geological engineers focus on problems related to the Earth's natural resources, geological environment, energy and mineral wealth.

Geological engineers formulate alternative solutions to the environmental or geological problems they face and select and develop the most effective solution the problem within the framework of the economic, environmental and political situation in which they operate.

Geological engineers deal with geoenvironmental problems, such as groundwater contamination, remediation of pollution in the subsurface, and design and monitoring of waste storage facilities, such as landfills and waste repositories. Geological engineers also work to protect the public from hazards such as landslides, earthquake damage, flooding, and volcanic eruptions by creating solutions for environmental and hazardous waste issues. Many geological engineers work with renewable engery, such a solor power and wind turbines.

As the population expands and requires more of the Earth's resources the geological engineering community will play an increasingly critical role in protection of the water, mineral and agricultural resources, and in designing engineering systems to minimize the impact of human activity and the potential hazards from environmental and geological processes.

As a geological engineer, you will probably divide your time between field, laboratory, and office work. In the field, you might examine and map the extent and structural features of rocks and soils. You may collect samples for testing of their physical and chemical properties, or you may conduct programs for on-site testing. In the laboratory, you might perform direct testing of strength or permeability, or organize research programs. Office work will include the evaluation of data, computer modeling of geological conditions, writing of scientific reports, and participation in the planning, designing, and construction of engineering projects.

Missouri S&T's ABET-accredited program combines basic science and engineering principles with a strong emphasis in design and a solid technical knowledge.

Student Organizations and Undergraduate Research

Undergraduate research opportunities are available through the Opportunities for Undergraduate Research Experience program as well as many faculty-sponsored projects. Geological engineering faculty work with faculty members from several other disciplines on many interdisciplinary engineering research projects. There is a student chapter of the Association of Engineering Geologists (AEG) that meets regularly and the national geology honor society, Sigma Gamma Epsilon.

Career Placement

Geological engineering graduates are in high demand by industry and government; over the past few years 100% of graduates have been placed in industry or have chosen to attend graduate school and demand is expected to remain high for the foreseeable future.

Entry Level Job Titles

- Environmental Engineer
- Geological/Geotechnical Engineer
- Geologist – *geologic mapping, geochemical sampling, logging, drill core or cuttings and/or assisting in geophysical surveys*
- Petroleum Engineer
- Quarry Engineer

Scholarship Information

Freshman scholarships are awarded based on high school transcripts and ACT/SAT scores; some may require a separate application. Scholarships ranging from $1,000 to $2,000 for sophomores, juniors and seniors are available; these scholarships typically require an application and are based on academic record, service activities and extracurricular activities.

Co-op and Internship Availability

Co-op and summer intern programs are available to students. These programs provide students with the opportunity to integrate their classroom studies with learning through productive work experiences in a field related to a student's academic or career goals. Work for a semester or during the summer and build your resume.

Departmental Contact Information:

Department Chair:	Dr. Ralph Flori
Program Head:	Dr. Norbert Maerz
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Faculty

Professors:
- Mohamed Abdelsalam, Ph.D., Texas-Dallas
- Neil Anderson[1, 2], Ph.D., Calgary
- Jeffrey Cawlfield[1, 2], Ph.D., California-Berkeley
- Curt Elmore[1], Ph.D., Arizona
- Stephen Gao, Ph.D., UCLA
- Leonard Koederitz[1] (Curators'), Ph.D., Missouri S&T
- Kelly Lui, Ph.D., UCLA
- Francisca Oboh-Ikuenobe, Ph.D., Cambridge (Program Head)

Associate Professors:
- Baujun Bai, Ph.D., China Univ of Geosciences
- Shari Dunn-Norman, Ph.D., Heriot-Watt (Program Head)
- Ralph Flori, Ph.D., Missouri S&T (Chair)
- Leslie Gertsch, Ph.D., Colorado School of Mines
- John P. Hogan, Ph.D., Virginia Tech
- Norbert Maerz[1], Ph.D., Waterloo (Program Head)
- J. David Rogers[1, 2], Ph.D., California-Berkeley
- David Wronkiewicz, Ph.D., New Mexico Tech
- Wan Yang, Ph.D., Texas

Assistant Professors:
- Ahadab Anwar, Ph.D., Florida International
- Runar Nygaard, Ph.D., Oslo
- Andreas Eckert, Ph.D., Karlsrube

[1] Registered Professional Engineer
[2] Registered Geologist

Available Emphasis Areas

Geological engineering students may choose a specialty as part of their degree program in the following areas:

- Environmental Protection and Hazardous Waste Management
- Groundwater Hydrology and Contaminant Transport
- Engineering Geology and Geotechnics
- Petroleum, Energy and Natural Resources
- Quarry Engineering

Related Programs and Minors

In addition to a Bachelor of Science in Geological Engineering, Missouri S&T offers the following related degree programs. Requirements are outlined in Missouri S&T's course catalog, available online at **registrar.mst.edu**.

- Bachelor of Science, Petroleum Engineering
- Bachelor of Science, Geology and Geophysics
- Bachelor of Science, Environmental Engineering
- Minor, Geological Engineering
- Minor, Geology and Geophysics
- Minor, Petroleum Engineering
- Minor, Environmental Engineering

Notes

Detailed information on course equivalencies, acceptable credits for elective coursework, grade requirements and prerequisites is available from S&T's Registrar's Office at **registrar.mst.edu**.

All Geological Engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade is not required; however, this is the first step to becoming a registered professional engineer.

Bachelor of Science

Geological Engineering ..... 128 credit hours

Entering freshmen desiring to study geological engineering are admitted to the Freshman Engineering Program. They may, however, state a Geological Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the Freshmen Engineering program is on enhanced advising and career counseling, with the goal of providing to the student the information necessary to make an informed decision.

FIRST YEAR — Credit

FE 1100-Careers in Engineering	1
MechE 1720-Engineering Design	3
Chemistry 1310,1319,1100-General Chemistry w/ Lab	6
English 1120-Exposition	3
Math 1214-Calculus for Engineers I	4
Math 1215-Calculus for Engineers II	4
Physics 1135-Engineering Physics I	4
Elective/Humanities or Social Science	3
Elective/Chemistry or Geochemistry	3
Elective/Humanities or Social Science	3
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SECOND YEAR

GeoE 1150-Geology for Engineers	3
GeoE 2110-Principles of Geo Engr	1
Geo 2611-Physical Mineralogy & Petrology	3
GeoE 3148-Fund of Geographic Info Systems	3
GeoE 3175-Geomorphology & Terrain Analysis	3
CivE 2200-Engr Mech/Statics	3
Math 3304-Differential Equations	3
Math 2222-Calculus III w/ Analytic Geometry	4
Physics 2135-Engineering Physics II	4
Elective/Economics	3
Elective/Humanities or Social Science	3
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THIRD YEAR

MechE 2350-Engr Mech/Dynamics	2
CivE 2210-Mechanics of Materials	3
CivilE 3330-Fluid Mechanics	3
GeoE 4115- Geostatistical Methods in Engr & Geology	3
Geo 3310-Structural Geology	4
GeoE 5443-Subsurface Exploration	3
Elective/Technical Communication	3
Elective/Earth Energy	3
Elective/Humanities or Social Science	6
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FOURTH YEAR

GeoE 4010-Senior Seminar	1
GeoE 5331-Subsurface Hydrology	3
GeoE 5441-Eng Geology & Geotechnics	3
GeoE 5090-Geol Engr Senior Design	3
CivilE 3715-Elem Soil Mechanics -or- MinE 4823-Rock Mechanics	3
GeoE 5174-Engr Geologic Field Methods	3
GeoE Elective/Technical	3
GeoE Elective/Technical	3
GeoE Elective	3
Elective/Earth Mechanics	3
Elective/Engineering Economics	3
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