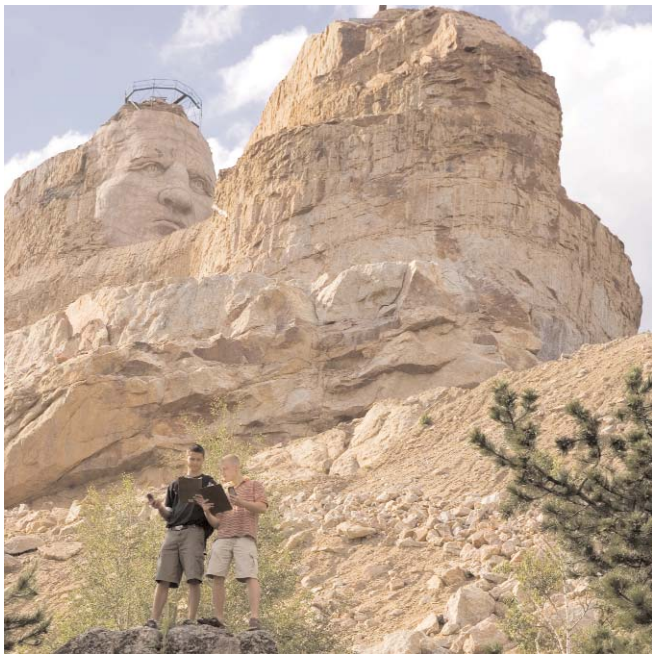
Geological Engineering



Career Profile

Geological engineering is the development and conservation of natural resources in ways that are useful to mankind. It encompasses diverse fields such as ground-water resources, subsurface contamination, slope stability, environmental site investigations, petroleum exploration and production, and minerals. The instruction in geological engineering provides training at both the undergraduate, master's, and doctoral levels.

A geological engineering degree prepares students to pursue graduate study in materials science, patent or environmental law, or even business administration, in addition to classical geological engineering.

Accreditation

The South Dakota School of Mines and Technology is accredited by the Higher Learning Commission of the North Central Association of Colleges and Secondary Schools, the recognized accrediting agency for the north central states. In 2006, the HLC voted to continue accreditation of the School of Mines. The School of Mines has been accredited since 1925.

The geological engineering program is accredited by the Engineering Accreditation Commission of ABET, Inc.

Faculty

Chair: Dr. Maribeth Price
Professors: Mickelson Professor Dr. Arden Davis and Dr. William Roggenthen
Associate Professor: Dr. Larry Stetler
Professor Emeritus: Dr. Perry Rahn

Labs and Facilities

The geological engineering facilities include a digital and analytical modeling laboratory, a Geographic Information Systems (GIS) laboratory, a ground-water laboratory, a wind engineering laboratory, a geotechnics laboratory, a drilling fluids laboratory, and an operational well field with data loggers and transducers. Instrumentation includes ground-probing radar, a hydrologic analysis system, a portable wind tunnel, a mobile drilling rig, and petroleum engineering equipment. The computer laboratory is continually updated and contains high-speed computers with GIS and other analytical capabilities.

Programs are available for digital modeling of ground-water flow and contaminant migration, petroleum engineering, slope stability, geophysical applications, geochemical modeling, and spreadsheet applications.

Features and Strengths

South Dakota School of Mines and Technology is located on the edge of the beautiful Black Hills, where magnificent exposures of rock and structures are one of the major assets of the geological engineering curriculum. The Badlands and the Black Hills are natural laboratories for hands-on studies of geologic processes and are used extensively for field trips.

The demand for geological engineers is great and is predicted to remain strong as our nation's ground-water usage and energy consumption continue to grow.

Program Overview

The undergraduate education in geological engineering is based on the fundamentals of engineering and geological science, and provides training and practice in the areas of ground water, environmental work, geomechanics, and petroleum or minerals. In the senior year, students select from two of these four areas in which to specialize: ground water, environmental site planning, geomechanics and engineering geology, or energy and mineral resources.

An appreciation and understanding of earth processes and landscapes is helpful to a geological engineer. Knowledge of computers also is helpful, especially for predicting how much water or oil can be pumped from the ground or for predicting what will happen to pollutants under the land surface in ground water. Mathematics, chemistry, physics, and English are also important to geological engineers.

Outcomes

- School of Mines geological engineering graduates received salary offers that average more than $57,000.
- 100 percent of 2005-06 School of Mines geological engineering graduates were placed in their field or entered a graduate program within a year of graduation.
- 80 percent of graduates gain real-life experience through internships and co-ops.
- Companies hiring geological engineering graduates include Pathfinder Energy Services, U.S. Geological Survey, Barr Engineering Company, and Phelps Dodge.

Student Organizations

Students at the School of Mines also have a variety of opportunities for extra-curricular activities that range from music, intramurals, and drama to ski and snowboarding clubs, and more than 75 other clubs and professional student organizations. These are important activities for our students and we encourage them to take full advantage of out-of-classroom events. Students in geological engineering are encouraged to become student members of The National Ground Water Association, the Society for Mining, Metallurgy, and Exploration, the Society of Petroleum Engineers, and the Association of Engineering Geologists.

The Center for Advanced Manufacturing and Production (CAMP) is designed to teach students engineering, science and design skills, as well as the ability to work in teams. Team members design, build, market and raise the money for their projects. All students are welcome to work on CAMP projects.

Research

Students have the opportunity to be involved in research with professors conducting work on ground water, environmental management, geomechanics, energy resources, and minerals.

Curriculum Listing
http://catalog.sdsmt.edu

For More Information contact:
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Geological Engineering Curriculum/Checklist

Freshman Year

First Semester

CHEM 112	General Chemistry I	3
MATH 123	Calculus I	4
ENGL 101	Composition I	3
GE 130	Intro to Engineering	2
Gen Ed Goal 3 or Goal 4		6
TOTAL		**18**

Second Semester

CHEM 112L	General Chem I Lab	1
CHEM 114	General Chemistry II	3
MATH 125	Calculus II	4
PHYS 211	University Physics I	3
GEOE 221	Geology for Engineers	3
CEE 117	Computer Aided Design and Interpretation in Civil Engr.	2
TOTAL		**16**

Sophomore Year

First Semester

EM 214	Statics	3
MATH 225	Calculus III	4
MEM 201	Surveying for Mineral Engineers	2
PE	Physical Education	1
PHYS 213	University Physics II	3
Gen Ed Goal 3 or Goal 4		6
TOTAL		**16**

Second Semester

ENGL 279	Technical Communications I	3
EM 321	Mechanics of Materials	3
GEOL 212	Mineralogy/Crystallography	3
MATH 321	Differential Equations	4
PE	Physical Education	1
Gen Ed Goal 3 or Goal 4		6
TOTAL		**17**

Junior Year

First Semester

ENGL 289	Technical Communications II	3
GEOL 331	Stratigraphy & Sedimentation	3
GEOL 341	Elementary Petrology	3
CEE 346	Geotechnical Engineering	3
MET 320	Met Thermodynamics	4
TOTAL		**16**

Second Semester

GEOE 322	Structural Geology	3
GEOE 324	Engineering Geophysics I	3
EM 328	Applied Fluid Mechanics	3
Approved Elective[1]		3
MEM 302	Mineral Economics and Finance	3
Humanities or Social Sciences Elective(s)		1
TOTAL		**16**

Summer

GEOE 410	Engineering Field Geology	6
TOTAL		**6**

Senior Year

First Semester

GEOE 466	Engr and Envr Geology	3
GEOE 475	Ground Water	3
GEOE 461	Petroleum Production[2]	3
GEOE 464	Geol Engr Design Project I	3
GEOL 416	GIS I: Intro to GIS	3
TOTAL		**15**

Second Semester

MEM 304	Rock Mechanics I	4
Professional Electives[3]		6
GEOE 465	Geol Engr Design Project II	3
Humanities or Social Sciences Elective(s)		3
TOTAL		**16**

136 credits required for graduation

Curriculum Notes

[1] Approved Elective. Must be a course approved by the Department of Geology and Geological Engineering.

[2] Students interested in mineral exploration may substitute GEOE 451 for GEOE 461.

[3] Professional Electives. Students may choose two of the following courses:

GEOE 451	Economic Geology
GEOE 425	Engineering Geophysics II
GEOE 462	Drilling Engineering
GEOE 482	Applied Geomorphology
ENVE 326	Environmental Engineering Process Fundamentals
ENVE 421	Environmental Systems Analysis
CEE 337	Engineering Hydrology
CEE 347	Geotechnical Engineering II
CEE 437	Watershed and Floodplain Modeling
CEE 447	Foundation Engineering
CEE 474	Engineering Project Management
ME 351	Mechatronics and Measurement Systems (cross-listed with EE 351)
MEM 433	Computer Applications in Geoscience Modeling
MEM 405	Mine Permitting and Reclamation
MEM 450	Rock Slope Engineering
MEM 305	Introduction to Explosives Engineering

Additional course work in mathematics and statistics is encouraged. MATH 381 and MATH 382 are recommended statistics courses; MATH 432 is recommended for students interested in numerical modeling of partial differential equations.