

GE 106
Introduction to Geological Engineering
2 Credits

Lecture M, W 9:00 - 9:50, Laxalt Mineral Engineering 415

Instructor: Dr. Scott McCoy; scottmccoy@unr.edu

Office Location: LME 411

Phone Number: 775 – 682 – 7205

Office Hours: Monday 11:00-11:50 or by appointment

Course Description: GE 106 INTRODUCTION TO GEOLOGICAL ENGINEERING

Lecture+Lab: Credit(s): 2

Reviews natural hazards and risk (e.g., seismic, landslides, debris flows, floods), tunneling, foundations, exploration and mining geology, remote sensing, geophysics and hazardous waste. Field trip optional.

Course Pre/Co-requisites: None

Required Texts/Course Materials: None

Course Outline:

The purpose of the class is to welcome you to the interesting and exciting field of geological engineering (GE) and related fields in applied geology, and the range of career options available to students on graduation. Also covered is an overview of the courses required for the B.S. degree in GE, My Nevada, and other strange stuff on the UNR web site. As an undergraduate it is your responsibility to stay informed about your major, the professors who teach you, the geological engineering courses and curriculum, which leads to a timely graduation date.

The geological engineering major involves aspects of civil engineering, mining engineering, environmental engineering, geotechnical engineering, petroleum industry, mineral resources, geology, and hydrogeology. It is a multifaceted discipline that requires communication and technical skills. Students gain conceptual (qualitative) strength and quantitative abilities (math and science) as they progress through the program. Geological Engineering is both a discipline and profession with significant socioeconomic impacts and safety/liability issues. As an engineer you will design engineered structures which can be made from (or in) rock, soil, water, and even snow, mitigate natural hazards, and help provide expertise to produce a safer, healthier, and bountiful earth.

To enable students to develop a “feel” for the major the class utilizes formal lectures and select laboratory exercises (conducted during normal lecture sessions), and one field trip. Laboratory exercises stress both the engineering and geologic aspects of the major and augment laboratory classes which have a GEOL prefix e.g., GEOL 101). All work is

submitted on Canvas/WebCampus according to specified due dates. One (1) point subtracted for each day late.

Topics likely to be covered, but we can adjust slightly based on student interest:

Navigating the UNR web, GE curriculum and advising
Overview of site investigation
Tools of the trade, sensors and sensor networks
Remote sensing (various passive satellite sensors, drones, LiDAR, InSAR, SAR)
Overview geologic hazards and mitigation
Hazard, risk, and liability
Rock mass strength/ rock mass classification
Landslides, rock and soil slope stability
Debris flows and floods
Earthquakes and engineering design
Foundations for buildings and bridges
Dam construction and monitoring
Underground excavations and tunneling for transportation, hydropower, mines, sewers etc.
Energy: gas, petroleum, and geothermal
Minerals engineering and economic geology
Need for environmental laws
Landfills, hazardous waste and nuclear energy industry
Topical geological engineering projects

Course material:

Copies of power point slides and Canvas/WebCampus access will augment class instruction. I will contact you via the email address that you have given UNR, so ensure it is current and you regularly monitor.

Course Requirements:

DGSE Code of Conduct: In this course we will follow the [DGSE Code of Conduct](#). There will be zero tolerance for harassment, microaggressions, or academic misconduct of any kind.

Formal examinations are replaced by submitting two written projects/papers (5-10 pages each) on aspects of the course. One project will detail a natural hazard case study, the other an infrastructure case study. In addition, an in-person presentation ~5 minutes long will be given by each student on one of the projects/papers. Presentations are a good way to gain confidence in speaking and presenting your findings and conclusions. I/the class will typically ask a question at the end of each presentation. Finally, short answer questions will be assigned for each topic to check understanding as we progress through the material.

The Geological Engineering Degree is a professional accredited engineering degree, accredited by the Accreditation Board for Engineering and Technology (ABET). Consequently, courses with a GE and other prefixes require assessment of how the course meets ABET student Learning Objectives (SLO's).

Course Objectives:

1. Introduce students to geological engineering.
2. Illustrate how the major interfaces with civil, mining and environmental engineering.
3. Show how geology affects geologic hazards as well as almost all designs for projects built in, on or of earth materials.
4. Show how the major is multifaceted.
5. Illustrate how the profession requires good communication skills.
6. Demonstrate that students draw upon conceptual (qualitative) strength as well as quantitative abilities (math and science).
7. Show that the profession has significant socioeconomic impacts and liability issues.
8. Graduates are in high demand in energy, economic and environmental geology, geotechnical and geohazards.
9. Show teamwork is critical when you work for a company.
10. The major is fun and enjoyable.

Relationship of Course Goals to ABET Student Learning Outcomes

ABET Student Learning Outcomes	Corresponding Course Objectives
1) <i>Fundamental Background and Problem Solving</i> - an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	1,2,3,4,6,7
2) <i>System and Process Design</i> - an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	3
3) <i>Communication</i> - an ability to communicate effectively with a range of audiences	5
4) <i>Ethics, Broad Education, and Social Awareness</i> - an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	1,3,7,8
5) <i>Teamwork</i> - an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	9
6) <i>Experimental Design / Data Analysis</i> - an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	3
7) <i>New Knowledge</i> - an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	1,2,3
8) <i>Field Competency</i> - the application of geologic field proficiency to engineering practice	6

Student Learning Outcomes

Upon completion of this course:

1. Students will be able to develop a recognition of the importance of functioning in interdisciplinary engineering disciplines.
2. Students will be able to recognize the need to communicate effectively.
3. Students will be able to recognize the need for an ability to engage in lifelong learning.

Required Work and Grading

Your overall course grade will be calculated from the two project reports (60%), your presentation (10%), short answer responses (20%) and class participation (10%). No formal examinations will be scheduled.

No plus/minus grading will be used below a B-.

100%-93% = A; 92.9%-90% = A-; 89.9%-87% = B+; 86.9%-84% = B; 83.9%-80% = B-; 79.9%-70% = C; 69.9%-55% = D; 54.9% or below = F

University Policies

Statement on Academic Dishonesty

The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: [UAM 6.502](#).

Generative AI use is permitted

In this course you are welcome to use generative artificial intelligence/large language model tools (such as ChatGPT, DALL-E, Gemini, Perplexity, etc.). Using these tools aligns with the course learning outcomes/student goals. Please be aware that many AI companies collect and store personal information. Please do not enter your confidential information as part of a prompt. Also, please note that some of these large language models may “make up” or “hallucinate” information. These tools may reflect misconceptions and biases of specific data. Students are responsible for checking facts, finding reliable sources for, and making a critical examination of any work that is submitted.

All use of AI tools or content must be acknowledged or cited. If you do not acknowledge or cite your use of an AI tool, what you submit will be considered a form of cheating, as outlined in [UNR Academic Integrity Policy \(UAM 6,502\)](#).

Please make sure to use the appropriate guidelines for acknowledging/citing generative AI in your assignments.

- [UNR MLA Citation Guide](#)
 - [UNR APA Citation Guide](#)
- Additional Considerations
- [Generative AI for Research](#)

Statement on Student Compliance with University Policies

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. “Disruptive behavior” is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

Statement of Disability Services

Use either the traditional or online statement, in addition to the last sentence regarding third party materials.

For Traditional and Seated Classrooms:

Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the [Disability Resource Center](#) (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.

Statement on Audio and Video Recording

Student-created Recordings

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped, or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Instructor-created Recordings

Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the "chat" feature, which allows you to type questions and comments live.

Statement on Maintaining a Safe Learning and Work Environment

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the [Equal Opportunity and Title IX](#) page.

Statement on Campus Closures or Delays

In the event of class cancellations or delays caused by inclement weather conditions, fire/smoke conditions, or other unforeseen emergencies, the safety and well-being of students are the University's top priority. Official notifications will be disseminated through the University website and other official channels with details related to any campus delays or closures.

In the event of a campus closure, you will be informed as to whether the class will be offered remotely or if it will be canceled. If the class is cancelled, you will receive information on how to address any missed course content.

Students facing significant impacts due to these events are encouraged to communicate with their instructor for potential accommodations.

Additional Information

- If you are sick, please do not come to class. If you must miss class due to illness, please contact me to make arrangements for any missed work or lecture materials.
- Your student fees cover usage of the [University Math Center](#) (<https://www.unr.edu/university-math-center>), (775) 784-4433; [University Tutoring Center](#) (<https://www.unr.edu/tutoring-center>), (775) 784-6801; and [University Writing & Speaking Center](#) (<https://www.unr.edu/writing-speaking-center>), (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.