

Meetings: TR, 9:30-10:45am (lecture/discussion), Science (S) 165

R, 1:00-2:50pm (lab), S165/S166/S170

Text: Compilation of readings from published sources, available for purchase at
<https://students.universityreaders.com/store/>

Instructor: Bill Niemann, Ph.D., P.G., E.I.T.

Office: 171 Science Building

Office Hours for Students:

- M/W/F: 9:30-9:50am
- M/W/F: 11:00-11:30am
- M/W: 2:00-4:00pm
- By appointment
- Not a good time: before class

Phone: 696-6721 (W)

E-mail: niemann@marshall.edu

Web: <http://www.science.marshall.edu/niemann/>

Blackboard through MUOnLine

Course Description

Engineering geology is the oldest branch of geology. It can be defined as the application of geologic information to the design of engineered structures. This course will provide basic technical background knowledge for typical engineering geology applications in addition to practice in the art of communication of geologic information for engineering purposes.

Foundational knowledge

Foundational knowledge provides a starting vocabulary and base-level understanding of concepts and phenomena in the study of engineering geology. Foundational knowledge students should already have before beginning this course (prerequisites):

1. Basic understanding of minerals, rocks, and surface processes. (Successful completion of an introductory geology survey course--GLY 110 or 200 or equivalent--should suffice). If you need to review, consult the instructor for appropriate resources.
2. Basic understanding of topographic maps and ability to recognize properties of and identify basic rocks and minerals. (Successful completion or current enrollment in, an introductory earth materials lab--GLY 210L or equivalent--should suffice). If you need to review, consult the instructor for appropriate resources.
3. Math skills commensurate with completion of course(s) in college algebra and trigonometry.
4. Writing skills appropriate for college sophomores. For special help, go to <http://www.marshall.edu/cos/studentresources.asp> and click on *Writing Center*.

Course Learning Outcomes

1. Articulate the typical role and duties of an engineering geologist. Demonstrate an appreciation for the type of interaction required with engineers who use geologic information in the design of engineered structures.
2. Become familiar with geologic characteristics of rock and soil that influence engineering properties. Describe and identify relevant characteristics from grain-size to field scale.
3. Describe how weathering processes influence the engineering behavior of rock and soil including development and/or weakening of discontinuities. Use this knowledge to predict the types of engineering issues that might exist in areas characterized by given geologic materials or history.
4. Demonstrate a familiarity with basic mechanics as they apply to intact rock, rock masses and soils. Be able to solve quantitative problems involving stress and strain of rock and soil and make qualified judgments in the application of this information.
5. Demonstrate a familiarity with evaluation of slope stability in both natural and engineered slopes underlain by soil and rock.
6. Describe how subsurface water influences the engineering behavior of rock and soil.
7. Demonstrate how geologic materials are placed in engineered structures as fill, support, ballast, etc.
8. *Application* of all of the above to specific problems, sites, or scenarios through assignments given in this course.

Assessment of Learning

➤ **Grading scale**

A = 90-100% of total points

B = 80-89% “ “ “

C = 70-79% “ “ “

D = 60-69% “ “ “

F < 60% “ “ “

➤ **Grade components**

Lab exercises (~14) = 40%

Exams (2) = 35% (15% + 20%)

Quizzes (~4) = 10%

Homework (~8) = 15%

Total = 100%

Extra Credit

Attendance = -2% to +2%

(29 lectures, 14 labs)

No. of Unexcused Absences*	Extra Credit (%)
0	+2
1	+1.5
2-3	0
4	-1
4+	-2
Unexcused from lecture counts as 1 absence Unexcused from lab counts as 2 absences *See attendance policy below	

Assessment of Learning (cont.)

- **Grading of Labs and Homework.** Selected labs and homework may be scored by use of a $\sqrt{+}$, $\sqrt{}$, or $\sqrt{-}$, indicating above satisfactory (125%), satisfactory (100%) and less than satisfactory (75%), respectively. Significantly incomplete or sloppy work will receive a grade of $\sqrt{--}$ (50%). A detailed matrix describing this grading method is shown below.

Grade →	$\sqrt{--}$ (50%)	$\sqrt{-}$ (75%)	$\sqrt{}$ (100%)	$\sqrt{+}$ (125%)
Criterion ↓				
Timeliness	Submitted 48 hours or more after due date/time	Submitted late but within 24 hours of due date/time	Submitted by due date/time	Submitted by due date/time
Completeness	Repeated missing answers/elements (includes not showing supporting calculations for numerical answers)	Missing answers/elements (includes not showing supporting calculations for numerical answers)	Complete answers/elements	Work product beyond assignment
Neatness	Illegible and/or sloppy	Difficult to read	Easy to Read	Easy to Read
Care	Obvious lack of care	Lack of care	Obvious care	Extraordinary care
Achievement	Multiple missing / incorrect answers	Incorrect answers	Reasonable answers	Correct and thorough answers
Evidence of Learning	No evidence	Lack of evidence	All objectives met	Exceeds objectives

- **Late Lab Assignments.** Lab exercises are due at the beginning of the subsequent week's lab period unless otherwise stated by the instructor. For lab assignments receiving a numerical grade, late submittals will be penalized an automatic 15%, and an additional 5% per subsequent calendar day (weekdays), with a maximum late penalty of 50%. Failure to submit a lab assignment within 7 days of the original due date means a grade of zero for that assignment. If submittal of a lab assignment is delayed for reasons relating to an excused absence, the adjusted due date then becomes the beginning of the next class or lab period.
- **Late Homework.** Late submittal of homework or other take-home assignments (including Blackboard assignments) will be penalized an automatic 15%, and an additional 5% per subsequent calendar day (weekdays), with a maximum late penalty of 50%. Failure to submit an assignment within 1 week of the original due date will result in a grade of zero for that assignment. If submittal of an assignment is delayed for reasons relating to an excused absence, the adjusted due date then becomes the beginning of the next class or lab period.
- **A zero grade will be assigned for in-class quizzes if an absence is unexcused.** In the case of an excused absence, a "no grade" (i.e., no credit or penalty) will be assigned or the quiz may be made up by a date mutually agreed upon by the student and instructor.

***Attendance Policy**

A daily record of attendance will be kept by circulating a sign-in list at the beginning of each class. ***It is the responsibility of each student to sign the list, and if late to sign the list or notify the instructor at the end of the lecture.*** Failure to do so may result in an unexcused absence for that lecture. Arriving late or leaving lecture early may reduce or void credit for attendance for that day.

The only absences considered excused for this class or those approved by the Dean of Student Affairs. These include “University Excused Absences” such as serious medical or legal reasons, military obligation, or university activities excused by the academic deans. See Marshall’s policy on “excused Absences” at www.marshall.edu/academic-affairs/policies/. **Note that a student who is briefly ill or injured for three or less consecutive hours of class is not excused from attending this class. Notice of an excused absence must be received by the instructor directly from the office of the Dean of Student Affairs.** Student Affairs is located on the second floor of the Memorial Student Center (2W38), 304-696-6423. Requests for excused absences can be submitted remotely using the form available at <http://www.marshall.edu/student-affairs/excused-absence-form/>

In the case of an excused absence, any material missed can be completed, without penalty, by a later date assigned by the instructor. Failure by the student to complete the material by the assigned date will result in a zero for the assignment in question. The instructor may instead opt to assign a “no-grade,” without penalty to the student, for missed material as a result of the absence.

There will be no makeup exams without an official excused absence from the Dean of Student Affairs.

Note that extreme weather could result in closure of the university and cancellation of class or a delay in the start of class. Marshall’s “clock” starts at 8 am. A two-hour delay means that TR classes starting at 9:30 would instead begin at 10:00 am and continue to 10:45am. (If the weather looks bad, check your e-mail and listen for announcements on local radio and TV. See Marshall’s policy on “Inclement Weather” at www.marshall.edu/academic-affairs/policies/.)

University-wide policies

- Additional university policies relating to academic dishonesty, etc. also apply to this class and can be viewed at <http://www.marshall.edu/academic-affairs/policies/>

WEEK	DAY	DATE	FORMAT	TOPIC	READING
1	T	23-Aug	Lecture	Introduction	
	R	25-Aug	Lecture	Introduction	CP: 1-23
	R	25-Aug	Field Trip	Lab 1: Introductory Field Trip	
2	M	29-Aug		11:59pm: Homework 1 due	
	T	30-Aug	Lecture	Stress - Intro	
	R	1-Sep	Lecture	Stress - Intro	CP: 55-69
	R	1-Sep		1:00pm: Lab 1 due	
	R	1-Sep	Field Trip	Lab 2: Compression Tests	
3	T	6-Sep	Lecture	Stress - Mohr's Circles	
	T	6-Sep		11:59pm: Homework 2 due	
	R	8-Sep	Lecture	Stress - Mohr's Circles	CP: 69-85
	R	8-Sep		1:00pm: Lab 2 due	
	R	8-Sep	Lab	Quiz 1	
4	M	12-Sep		11:59pm: Homework 3 due	
	T	13-Sep	Lecture	Engineering Properties of Rocks	
	R	15-Sep	Lecture	Engineering Properties of Rocks	CP: 107-154
	R	15-Sep	Lab	Lab 3: Engineering Properties of Rocks	
5	M	19-Sep		11:59pm: Homework 4 due	
	T	20-Sep	Lecture	Catch-up / review	
	R	22-Sep	Lecture	Exam 1	
	R	22-Sep		1:00pm: Lab 3 due	
	R	22-Sep	Lab	No meeting	
6	T	27-Sep	Lecture	Rock Masses: Intro	TBA
	R	29-Sep	Lecture	No meeting	
	R - SA	29 Sep - 1 Oct	Weekend Field Trip	Rock Slope stability, dams, sinkholes, etc.	
7	T	4-Oct	Lecture	Rock Masses: Rock Quality	
	R	6-Oct	Lecture	Rock Masses: Rock Mass Rating	TBA
	R	6-Oct	Lab	Lab 4: Rock Masses I: Discontinuities	
8	M	10-Oct		11:59pm: Homework 5 due	
	T	11-Oct	Lecture	Weathering	
	R	13-Oct	Lecture	Soil - Bedrock Contacts	
	R	13-Oct		1:00pm: Lab 4 due	
	R	13-Oct	Lab	Lab 5: Rock Masses II: Rock Quality Designation (RQD)	

9	M	17-Oct		Homework TBA	
	T	18-Oct	Lecture	Rock Scour	
	R	20-Oct	Lecture	Rock Scour	
	R	20-Oct		1:00pm: Lab 5 due	
	R	20-Oct	Lab	Lab 6: Slake Durability Test	
	M	24-Oct		Homework TBA	
10	T	25-Oct	Lecture	Quiz 2 / Soil: Volume & weight	
	R	27-Oct	Lecture	Soil: description & classification	
	R	7-Jan		1:00pm: Lab 6 due	
	R	27-Oct	Field Trip	Lab 7: Rock Scour	
11	M	31-Oct		Homework TBA	
	T	1-Nov	Lecture	Catch-up / review	
	R	3-Nov	Lecture	Exam 2	
	R	3-Nov		1:00pm: Lab 7 due	
	R	3-Nov	Lab	Lab 8: Soils: Particle-size analysis	
12	M	7-Nov		Homework TBA	
	T	8-Nov	Lecture	Soil: description & classification	
	R	10-Nov	Lecture	Soils: Mechanics	
	R	7-Jan		1:00pm: Lab 8 due	
	R	10-Nov	Lab	Lab 9: Soils: Atterberg Limits	
13	M	14-Nov		Homework TBA	
	T	15-Nov	Lecture	Soils: Mechanics	
	R	17-Nov	Lecture	Quiz 3 / Subsurface water: Significance	
	R	17-Nov		1:00pm: Lab 9 due	
	R	17-Nov	Lab	Lab 10: Soils: Compaction Test	
THANKSGIVING BREAK				Monday - Friday 22-27 November	
14	M	14-Nov		Homework TBA	
	T	29-Nov	Lecture	Subsurface water: Principles	
	R	1-Dec	Lecture	Subsurface water: Pressure & Flow	
	R	1-Dec		1:00pm: Lab 10 due	
	R	1-Dec	Lab	Lab 11: Subsurface water: Permeameter Test	
15	M	14-Nov		Homework TBA	
	T	6-Dec	Lecture	Subsurface water: Control	
	R	8-Dec	Lecture	Catch-up / review / cheap concert	
	R	8-Dec		1:00pm: Lab 11 due	
	R	8-Dec	No Lab	Dead Week	
FINAL EXAMS	Exam 3: Tuesday, 13 December, 8-10 am				