

A Syllabus of Engineering and Environmental Geology

Spring Semester, 2021 (Jan. 19- April 29, 2021)

Course number: GSCI3710/ENVE3530
Lecture: Tuesday & Thursday, 9:30-10:45 AM, virtual classroom
Instructor: Prof. Lanbo Liu (email: Lanbo.Liu@UConn.edu)
Department 1: Geosciences, U-1045
Department 2: Civil and Environmental Engineering, U-3037

Teaching Assistant: Ms. Naomi Adler (email: naomi.adler@UConn.edu)
TA Office Hours: TBA

Textbook: Terry R. West and Abdul Shakoor:
Geology Applied to Engineering, 2nd ed. Waveland Press
Credit: 3 units
Homework: electronically due to TA in one week from the date of assignment
Grading: Homework: 40%; Midterm: 30%; Final: 30%

Educational Outcomes:

Engineering & Environmental Geology is a division of geologic science/technology that involves both geologic principles and engineering fundamentals. The course objectives are preparing the students for the recognition of the importance of geologic factors affecting the location, design, construction, and maintenance of engineering and environmental projects, and incorporation of the knowledge acquired from this course to the engineering and environmental projects they will be involved with. Upon completion of this course, students should be proficient in the ability to:

- apply knowledge of math and physics to quantitative problems in soil mechanics, rock mechanics, slope stability, and groundwater hydrology, etc.;
- identify the conditions and constraints of the geology-related problems and formulate them to develop engineering solutions;
- prepare professionally-styled engineering calculations to answer homework problem assignments.

Week 01:

Tue. (1/19) Introduction: the role of geology in civil and environmental engineering.
Thu. (1/21) Reviews of fundamental math, Physics, units, and some useful constants.
Reading: Chapter 1.

Week 02:

Tue. (1/26) Rocks and tectonic cycle; Rock types, Mineralogy, Petrology.
Thu. (1/28) Engineering properties of rocks.
Reading: Chapter 2, 3, 5, 6.

Week 03:

Tue. (2/2) Engineering classification; Rock strength
 Thu. (2/4) Rocks as engineering materials. (no class due to winter storm, no student come to the virtual classroom, 2021)
 Reading: Chapter 8, 7

Week 04:
 Tue. (2/9) Mohr circle and Coulomb criterion. Rock mechanics review & summary
 Thu. (2/11) Weathering: Mechanical and Chemical weathering
 Reading: Chapter 8, 4, 7

Week 05:
 Tue. (2/16) Rock mechanics recap
 Thu. (2/18) Soil Mechanics I
 Reading: Chapter 4, 7

Week 06:
 Tue. (2/23) Construction materials, Problem solving in Rock Mechanic
 Thu. (2/25) Visit Connecticut Advanced Pavement Lab (CAPLab).
 Reading: Chapter 7, 8, 9

Week 07:
 Tue. (3/2) Soil Mechanics II
 Thu. (3/4) Soil profiles and soil profile development
 Reading: Chapter 4, 17, 20

Week 08:
 Tue. (3/9) Review of the contents taught before the spring break.
 Thu. (3/11) Take-home Midterm examination.

Week 9:
 Tue. (3/16) comments on midterm exam; hydrology introduction, Surface water.
 Thu. (3/18) Groundwater hydrogeology: water table, hydraulic head, Darcy's law, Groundwater distribution. Permeability, pumping test.
 Reading: Chapters 12, 13

Week 10:
 Tue. (3/23) Coastal problems, Coastal erosion and Coastline protection; Coast hazards:
 Thu. (3/25) tsunami, salt water intrusion
 Reading: Chapter 12, 13, 16

Week 11:
 Tue. (3/30) Site characterization for Eng./Environ. projects: seismic refraction
 Thu. (4/1) Site characterization for environmental projects: electric resistivity tomography (ERT)
 Reading: Chapter 18, 19

Week 12:
 Tue. (4/6) Site characterization for environmental projects: electromagnetic (EM) methods
 Thu. (4/8) Site characterization for Eng./Environ. projects: ground penetrating radar (GPR)
 Reading: Chapter 18, 19

Week 13: Spring Recess, Apr. 11 - 17, 2021 no class.

Week 14:

Thu. (4/20) Structural Geology: Stress state, pore pressure, effective stress, and faults;
fracking and environment

Thu. (4/22) Geohazards: Earthquake strong ground motion, Mass movement, landslides

Reading: Chapter 11, 15, 18

Week 15:

Tue. (4/27) Course summary, review

Thu. (4/29) No class, as instructed by the University

Reading: Chapter 15, 21

Final exam will be take-home exam.