A Syllabus of 
Engineering and Environmental Geology 

Spring Semester, 2020 (Jan. 21- May 1, 2020) 
(up-dated 3/20/2020)

Course number: GSCI3710/CE3530/ENVE3530 
Lecture: Tuesday & Thursday, 9:30-10:45 am, in Beach Hall 317 
Instructor: Prof. Lanbo Liu (email: Lanbo.Liu@UConn.edu) 
Department 1: Geosciences, U-1045 
Department 2: Civil and Environmental Engineering, U-3037 
Instructor Office Hours: by appointment 
Teaching Assistant: Mr. Tao Zhang (email: Tao.Zhang@UConn.edu) 
TA Office Hours: Tuesday 2:00 – 4:00 PM, Castleman 123 (CAST 123) 

Textbook: Terry R. West and Abdul Shakoor: 
Geology Applied to Engineering, Waveland Press 
Credit: 3 units 
Homework: due 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:

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

Week 01: 
Tue. (1/21) Introduction: the role of geology in civil and environmental engineering. 
 Thu. (1/23) Reviews of fundamental math, Physics, units, and some useful constants. 
 Reading: Chapter 1. 

Week 02: 
Tue. (1/28) Rocks and tectonic cycle; Rock types, Mineralogy, Petrology. 
Thu. (1/30) Engineering properties of rocks. 
Reading: Chapter 2, 3, 5, 6.
Week 03:
Tue. (2/4)   Engineering classification; Rock strength
Thu. (2/6)  Rocks as engineering materials.
Reading:    Chapter 8, 7

Week 04:
Tue. (2/11)  Mohr circle and Coulomb criterion. Rock mechanics review & summary
Thu. (2/13)  Weathering: Mechanical and Chemical weathering
Reading:    Chapter 8, 4, 7

Week 05:
Tue. (2/18)  Rock mechanics recap
Thu. (2/20)  Soil Mechanics I
Reading:    Chapter 4, 7

Week 06:
Tue. (2/25)  Construction materials, Problem solving in Rock Mechanics
Thu. (2/27)  Visit Connecticut Advanced Pavement Lab (CAPLab).
Reading:    Chapter 7, 8, 9

Week 07:
Tue. (3/3)   Soil Mechanics II
Thu. (3/5)   Soil profiles and soil profile development
Reading:    Chapters 12, 13

Week 08:
Tue. (3/10)  Review of the contents taught before the spring break.
Thu. (3/12)  Take-home Midterm examination.

Week 09:  Spring Recess, Mar. 15 - 21, 2020 no class.
(All course contents will be delivered on-line after spring break)

Week 10:
Tue. (3/24)  Surface water, Groundwater hydrogeology: water table, hydraulic head, Darcy’s law, Groundwater distribution.
Thu. (3/26)  Permeability, pumping test.
Reading:    Chapters 12, 13

Week 11:
Tue. (3/31)  Coastal problems, Coastal erosion and Coastline protection; Coast hazards:
Thu. (4/2)   tsunami, salt water intrusion
Reading:    Chapter 12, 13, 16

Week 12:
Tue. (4/7)   Site characterization for Eng./Environ. projects: seismic refraction
Thu. (4/9)   Site characterization for environmental projects: electric resistivity tomography (ERT)
Reading:    Chapter 18, 19

Week 13:
Tue. (4/14) Site characterization for environmental projects: electromagnetic (EM) methods
Thu. (4/16) Site characterization for Eng./Environ. projects: ground penetrating radar (GPR)
Reading: Chapter 18, 19

Week 14:
Thu. (4/21) Structural Geology: Stress state, pore pressure, effective stress, and faults; fracking and environment
Thu. (4/23) Geohazards: Earthquake strong ground motion, Mass movement, landslides
Reading: Chapter 20, 11, 18, 15

Week 15:
Tue. (4/28) Engineering Geology: Slope stability, Tunneling, Subsidence
Thu. (4/30) Course summary, review
Reading: Chapter 15, 21

Final exam will be take-home exam.