

Construction & Building Engineering Courses (CB)

Geotechnical Engineering Courses Group

CB 361 – Engineering Geology

COURSE INFORMATION

Course Title: Engineering Geology

Code: CB 361

Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit –3.

Prerequisite: None

GRADING

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION

Earth composition. Major types of rocks and deposits. Clay minerals. Weathering conditions. Principles of structural geology. Subsurface exploration: techniques and tests. Influence of geological origin on composition and structure of soils. Index properties. Soil description and engineering classification. Permeability and capillarity.

TEXT BOOK

Geotechnical Engineering: Principles And Practices by CODUTO, DONALD.
 Publisher: Pearson Education, Inc., Pearson Prentice Hall, Upper Saddle River, NJ
 USA, 2011.

Soil Mechanics Lab Manual, sixth edition by BRAJA DAS. Publisher: Oxford
 University Press

REFERENCE BOOKS

Geology Applied to Engineering by WEST, Terry R. Publisher: Prentice Hall, New
 York, 1994.

Engineering Geology by BELL, Fred G. Publisher: Blackwell, 1993

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Geology for Civil Engineers by McLEAN, A. C. and GRIBBLE, C. D. Publisher: George Allen & Irwin, London, 1986.

Engineering Geology: An Environmental Approach by RAHN, Perry H. Publisher: Prentice Hall, 1996.

Fundamentals of Geotechnical Engineering by DAS, Braja M. Publisher: Brooks-Cole, 1999.

Geotechnical Engineering: Soil Mechanics by CERNICA, John N. Publisher: Wiley, New York, 1995.

COURSE AIM

The course aims at introducing the student to the basics of engineering geology, and the physical characteristics of soil pertinent to engineering applications.

SPECIFIC OUTCOMES OF INSTRUCTION

The student should be able to Identify various types of soil formations, the effect of geological history on the physical and engineering properties of soil, the methods of site exploration and the basic soil engineering properties.

COURSE OUTLINE

- Week Number 1:* Soil in engineering:
- General perspective of geotechnical engineering and engineering geology, general approach to solving geotechnical problems
- Week Number 2:* Earth surface:
- Changes in the earth, types and origins of rocks, dimensions and surface relief of the earth and ocean floors, temperature gradient and density inside the earth
- Week Number 3:* Earth structure and age:
- Composition of the earth, earthquakes, changes in earth before occurrence, belts, scales of magnitude, waves and their propagation mechanism, continental drift, oceanic ridges, plate tectonics, earth age
- Week Number 4:* Rocks and soil deposits:
- The geological cycle; igneous, sedimentary and metamorphic rocks, sedimentary deposits
- Week Number 5:* Surface processes:
- Rock weathering, clay minerals, flocculation and dispersion, absorbed water; compressibility, shrinkage and expansion

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- Week Number 6:* Soil transport:
- Water-transported soils, wind-transported soils, glaciers, residual soils
- Week Number 7:* Geological structures:
- dip and strike, unconformity, folds, faults, brittle fracture, normal and reverse faults, fault groups, joints, geological maps
- Week Number 8:* Subsurface exploration:
- Scope of exploration program, depth of exploration, spacing of borings, site reconnaissance, subsurface exploration, behavior of adjoining structures
- Week Number 9:* Subsurface exploration:
- Geophysical testing, borings, disturbed samples, undisturbed samples, core boring, test pits, field tests, observation wells, boring logs
- Week Number 10:* Physical properties of soils:
- Void ratio, porosity, water content, degree of saturation, specific gravity, volumetric-gravimetric relationships, relative density of granular soils
- Week Number 11:* Index properties of soils:
- Consistency of clays, Atterberg limits: liquid limit, plastic limit, shrinkage limit; activity and sensitivity
- Week Number 12:* Soil classification:
- Classification based on grain size, coefficients of uniformity and curvature, AASHTO classification system, Unified Soil Classification system
- Week Number 13:* Permeability of soils:
- Flow through circular capillary tubes, Darcy's law, constant-head permeability test, falling-head permeability test
- Week Number 14:* Permeability coefficient:
- Field permeability tests, authenticity of k values from laboratory tests, influence of constituents, stratification, horizontal and vertical flow on permeability
- Week Number 15:* Soil capillarity:
- Surface tension; pressure; capillary rise in tubes of variable radius, capillary phenomenon in soils, capillary forces; shrinkage and swelling
- Week Number 16:* Final Exam.

COURSE COORDINATOR AND DEMAND

Course Coordinator: Dr.sameh Abu El Soud.

Course Demand: *Required*