STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CMGT 314 – Soils In Construction

Created by: Adrienne Rygel

Updated by:

Canino School of Engineering Technology

Department: Civil and Construction Technology

Semester/Year: Fall 2020

A. **TITLE**: Soils In Construction

B. **COURSE NUMBER:** CMGT 314

C. **CREDIT HOURS: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)**

 # Credit Hours: 3
 # Lecture Hours: 3 **per week**
 # Lab Hours: **per week**
Other: **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☒ **Yes:** GER
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☐ **Spring** ☒ **Fall & Spring** ☐

G. **COURSE DESCRIPTION:**

Students learn about soil types, soil properties, soil classification, basic soil property tests, how to conduct site and subsurface investigations. Introductory concepts of hydrogeology are introduced, students learn to measure and calculate hydraulic conducitivity, and site dewatering techniques are discussed. Other site work related topics include: the compaction control process, slope stability and erosion control, excavation safety and support systems, and roadway subgrade materials and testing; types of shallow foundations, deep foundations, and retaining structures and aspects of their construction as related to soil work.

H. **PRE-REQUISITES: None** ☐ **Yes** ☒ **If yes, list below:**

MATH123 Pre-Calculus or higher; or permission of instructor

CO-REQUISITES: None ☐ **Yes** ☒ **If yes, list below:**

CMGT 315 Soils In Construction Laboratory

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
a. Analyze data to determine the following soil index properties: grain size distribution, coefficient of uniformity, coefficient of curvature, moisture content, liquid limit, plastic limit, and specific gravity.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
b. Calculate the following soil properties based on mass-volume relationships: void ratio, porosity, degree of saturation, water content, wet unit weight and dry unit weight, wet unit mass and dry unit mass, and specific gravity.	SO 3 and 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
c. Classify a soil sample using the Unified Soil Classification System and the AASHTO Classification System.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
d. Discuss and analyze results from field and lab tests used in subsurface investigations as they relate to/impact a construction project.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
e. Discuss dewatering techniques for earthwork projects	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
f. Explain the compaction control process.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
g. Discuss techniques for slope stability and erosion control.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
h. Explain how soil is classified for excavation construction purposes.	SO 5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
i. Compose an Engineering Research Report regarding a soil design or construction topic using appropriate syntax and grammar.	SO 1		1-Comm Skills ISLO ISLO	W Subsets Subsets Subsets
j. Prepare and present an oral presentation regarding a soil design or construction topic with appropriate visual aids.	SO 1		1-Comm Skills ISLO ISLO	O Subsets Subsets Subsets

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

*Include program objectives if applicable. Please consult with Program Coordinator

J. **APPLIED LEARNING COMPONENT:** Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service

- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship
  (program, class, project)

K. TEXTS:

Liu, Cheng and Evett, Jack B. (2014). Soils and Foundations, 8th Edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.

L. REFERENCES:

Bardet, Jean-Pierre (1997). Experimental Soil Mechanics. Upper Saddle River, New Jersey: Pearson Prentice Hall.
Coduto, Conald P. (2000). Foundation Design, Principles and Practices, 2nd edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
Coduto, Conald P. (1999). Geotechnical Engineering: Principles and Practice, 1st edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
McCarthy, David F. (2007). Essentials of Soil Mechanics and Foundations: Basic Geotechnics, 7th edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
Slgado, Rodrigo (2008). The Engineering of Foundations. New York, New York: McGraw Hill.
Schroeder, W.L., Dickenson, Stephen, and Warrington, Don. C. (2004). Soils in Construction, 5th edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Assignments, Exams, In-Class Exercises and Quizzes, Written Report(s), and Oral Presentation(s)

P. DETAILED COURSE OUTLINE:

I. Part 1: Soil Properties and Classification
A. Introduction

B. Origin of Soil Deposits
- **1. The soil formation cycle**
  - **a) Weathering**
  - **b) Erosion**
  - **c) Transport and Deposition**
- **2. Transport and deposition mechanisms**
  - **a) Alluvial (Water)**
  - **b) Aeolian (Wind)**
  - **c) Glaciers**
  - **d) Gravity**

C. Soil Properties
- **1. Grain Size Distribution**
  - **a) Coarse Grain**
  - **b) Fine Grain**
- **2. Coarse Grained Soil Index Parameters**

a) Sieve Analysis
b) Grading
c) Coefficient of Curvature and Coefficient of Uniformity
d) Effective grain size and median grain size

3. Fine Grained Soil Index Parameters
a) Hydrometer Analysis
b) Liquid Limit
c) Plastic Limit
d) Shrinkage Limit

D. Soil Classification
1. AASHTO Classification System
2. Unified Soil Classification System
3. Agricultural Classification System
4. Geologists' Classification System

E. Soil Particle Shape and Soil Structure

F. Soil Mass/Volume Relationships

II. Part 2: Subsurface Investigations
A. Site Investigations
1. Components
2. Resources

B. Subsurface Investigation Methods
1. Auger and Core Boring
2. Test Pits
3. Standard Penetration Test
4. Cone Penetrometer Test
5. Vane Test
6. Geophysical Tests

C. Basic Hydrogeology Concepts
1. Aquifers
2. Confining Layers
3. Coefficient of Permeability

III. Part 3: Site Work and Construction
A. Methods for dewatering soil
1. Vaccuum trucks
2. Trenches and Sump Pits
3. Wells
4. Caissons
5. Cofferdam
6. Seepage Barriers
7. Electroosmosis

B. Soil Compaction
1. Density and Soil Moisture
2. Compaction Control Process
3. Compaction Methods

4. Testing

C. Slope Stability and Erosion Control

1. Embankment Control Issues
2. Methods of Slope Stability
3. Methods of Erosion Control
4. Pertinent Regulations

D. Excavations

1. Excavation Safety and Regulations
2. OSHA Soil Classification for Excavation Work
3. Excavation Support Systems

E. Roadway Subgrades

1. Materials
2. Testing
3. Subgrade Construction

F. Soil Work Associated with Foundations and Retaining Structures

1. Types of Shallow Foundations
2. Types and Construction of Deep Foundations
3. Types and Construction of Retaining Structures

Q. <u>LABORATORY OUTLINE</u>: None ☒ Yes ☐