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

MASTER SYLLABUS

CIVL 314– Soil Mechanics

CIP Code: 14.0802

Created by: Adrienne C. Rygel

School: Canino School of Engineering Technology
Department: Civil and Construction Technology
Implementation Semester/Year: Fall 2026

A. TITLE: Soil Mechanics

B. COURSE NUMBER: CIVL 314

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

# Credit Hours per Week	**4**
# Lecture Hours per Week	**3**
# Lab Hours per Week	**3**
Other per Week	

D. WRITING INTENSIVE COURSE:

Yes	x
No	

E. GER CATEGORY:

Does course satisfy a GER category(ies)? If so, please select all that apply.

[1-2] Communication	
[3] Diversity: Equity, Inclusion & Social Justice	
[4] Mathematics & Quantitative Reasoning	
[5] Natural Science & Scientific Reasoning	
[6] Humanities	
[7] Social Sciences	
[8] Arts	
[9] US History & Civic Engagement	
[10] World History & Global Awareness	
[11] World Languages	

F. SEMESTER(S) OFFERED:

Fall	
Spring	x
Fall and Spring	

G. COURSE DESCRIPTION:

Students initially learn about soil types, soil properties, and basic soil property tests. This knowledge and testing results are used to classify soils. The remainder of the course covers advanced topics in soil mechanics. The methods of compaction, consolidation, and settlement of soil are discussed. Students learn about soil and slope stabilization techniques and design. Soil-supported foundations for buildings and structures are discussed, which include different foundation types, design methods and considerations, and installation criteria and methods. Students learn about lateral earth pressures and design of retaining structures. Methods and safety precautions for excavations are also covered. The laboratory component of the course explores soil testing methods and analytical design problems related to lecture topics. This is a writing intensive course.

H. PRE-REQUISITES:

ENGS 203 Strength of Materials, or permission of the instructor.

CO-REQUISITES: None

I. STUDENT LEARNING OUTCOMES:

Course Student Learning Outcome [SLO]	Program Student Learning Outcome [PSLO]	GER	ISLO & Subsets
a. Test a soil sample and analyze the data to estimate the following soil index properties: coefficient of uniformity, coefficient of curvature, moisture content, liquid limit, plastic limit, specific gravity, coefficient of permeability, maximum dry unit weight, in place unit weight	SO6, SO1		ISLO 5
b. Classify a soil sample using the Unified Soil Classification System and the AASHTO Classification System.	SO7		ISLO 5
c. Analyze data to determine the stress distribution in soil from an applied load.	SO1, SO2		ISLO 2 (PS) and ISLO 5
d. Calculate the amount of consolidation settlement and the time associated with settlement in fine grained soils.	SO1, SO2		ISLO 2 (PS) and ISLO 5
e. Analyze shear strength test data with Mohr's circles to determine the cohesion, internal friction, and shear strength of a soil sample.	SO1, SO2		ISLO 2 (PS) and ISLO 5
f. Calculate lateral earth pressures acting on a structure.	SO1, SO2		ISLO 2 (PS) and ISLO 5
g. Compose an Engineering Research Report regarding a soil design or related soil mechanics topic using appropriate syntax and grammar. Present this review in an oral presentation to the class.	SO3		ISLO 1 (O,W)

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**

J. APPLIED LEARNING COMPONENT:

Yes	x
No	

If yes, select [X] one or more of the following categories:

Classroom / Lab	x	Community Service	
Internship		Civic Engagement	
Clinical Practicum		Creative Works/Senior Project	
Practicum		Research	
Service Learning		Entrepreneurship [program, class, project]	

K. TEXTS:

Liu, Cheng and Evett, Jack B., Soils and Foundations, 8th Edition, Prentice Hall, 2013. ISBN: 0-13- 978-0135113905.

L. REFERENCES:

Braja Das, Principles of Foundation Engineering, 8th ed., Cengage Learning, 2016, ISBN 978-1- 305-08155-0.

M. EQUIPMENT:

calculator, ruler, compass, protractor, computer flash drive

N. GRADING METHOD:

A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Exam
Homework assignments
In-class exercises
Laboratory exercises and projects
Term Project: Paper and Presentation

P. DETAILED COURSE OUTLINE:

A. Part 1: Soil Properties and Characteristics
   a. Origin of Soil Deposits
   b. Soil formation cycle
      i. Weathering
      ii. Erosion
      iii. Transport and Deposition
   c. Soil Properties
      i. Grain Size Distribution
      ii. Coarse Grained Soil Index Parameters
      iii. Fine Grained Soil Index Parameters
   d. Soil Classification
      i. AASHTO Classification System
      ii. Unified Soil Classification System
      iii. Agricultural Classification System
      iv. Geologists' Classification System

B. Part 2: Site Work
   a. Dewatering soil
      i. Methods
      ii. Dewatering plans
   b. Site and Subsurface Investigations
      i. Auger and Core Boring and test pits
      ii. Standard Penetration Test
      iii. Cone Penetrometer Test and Vane Test
      iv. Geophysical Tests
   c. Soil Compaction
      i. Density and Soil Moisture
      ii. Compaction Methods
      iii. Compaction Control Process

C. Part 3: Principles of Soil Mechanics
   a. Introduction to Foundation Design and Soil Mechanics
      i. Overview of Soil Mechanics in Foundation Design
      ii. Importance of soil mechanics in foundation engineering.
      iii. Role of soil properties in the design of foundations.
      iv. Review of types of foundations
   b. Stress Distribution in Soil
      i. Principles of Stress Distribution in Soil from Applied Loads
      ii. Calculation of Stress Distribution Under Concentrated Loads
      iii. Calculation of Stress Distribution Under Uniform Loads
   c. Consolidation and Settlement
      i. Causes of and factors affecting consolidation and settlement
      ii. Impact of Soil Type on Consolidation and Settlement
      iii. Calculating the Amount and Rate of Consolidation and Settlement
   d. Shear Strength of Soils
      i. Shear Strength and its Role in Foundation Design
      ii. Field and Laboratory Methods for Measuring Shear Strength
      iii. Shear Strength of Common Soil Types
   e. Review of Foundation Types and Functions
      i. Function of foundations in transferring loads from structures to soil.
      ii. Types of foundations (shallow and deep).
      iii. Load and design approach for different foundations.

f. Lateral Earth Pressure
    i. Lateral Earth Pressure Concepts: active, passive, and at-rest earth pressure.
    ii. Calculation Methods for Lateral Earth Pressure

Q. LABORATORY OUTLINE:

1. Sieve Analysis
2. Hydrometer Analysis
3. Water Content and Specific Gravity Tests
4. Liquid Limit and Plastic Limit Tests
5. CLSM and Soil Classification
6. Compaction by Standard Proctor Method
7. In Place Unit Weight by Sand Cone Method
8. Soil Erosion Control Plan
9. CLSM breaks and poster presentations
10. Consolidation and Settlement Analysis Questions
11. Shear Strength Tests Analysis and Shallow Foundation Design Calculations
12. Deep Foundation Design Calculations
13. Lateral Earth Pressures and Slope Stability Analysis
14. Term Project Presentations