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

MASTER SYLLABUS

CIVL 316– Foundation Design

CIP Code: 14.0802

Created by: Adrienne C. Rygel
Updated by: Saeid Haji Ghasemali

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

A. TITLE: Foundation Design

B. COURSE NUMBER: CIVL 316

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

# Credit Hours per Week	**3**
# Lecture Hours per Week	**2**
# Lab Hours per Week	**2**
Other per Week	

D. WRITING INTENSIVE COURSE:

Yes	
No	x

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	x
Spring	
Fall and Spring	

G. COURSE DESCRIPTION:

Students apply theory and concepts of soil mechanics to foundation design. Soil-supported foundations for buildings and structures are discussed, which include different foundation types, design methods, design considerations and criteria, and installation techniques. Students learn to design shallow foundations, deep pile and drilled shaft foundations, and retaining structures. Theory and practice of slope stability are taught.

H. PRE-REQUISITES:

CIVL 314 Soils Mechanics and 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. Analyze data to determine the stress distribution in soil from an applied load and lateral earth pressured acting on a structure.	SO 2, SO1		ISLO 2 (PS) and ISLO 5
b. Design and analyze a spread footing foundation for settlement and bearing capacity.	SO 2, SO1		ISLO 2 (PS) and ISLO 5
c. Design and analyze deep foundation	SO 2, SO1		ISLO 2 (PS) and ISLO 5
d. Design and analyze a retaining wall, including drainage.	SO 2, SO1		ISLO 2 (PS) and ISLO 5
e. Conduct slope stability analysis.	SO 2, SO1		ISLO 2 (PS) and ISLO 5

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:

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

L. REFERENCES: None

M. EQUIPMENT: None

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

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

P. DETAILED COURSE OUTLINE:

Part 1: Review of Principles of Soil Mechanics Applied to Foundations

A. Introduction and Review of Soil Properties
   1. Importance of soil mechanics in foundation engineering
   2. Review of Soil Types and properties
   3. Role of soil properties in the design of foundations.

B. Review of Stress Distribution in Soil
   1. Calculation of Stress Distribution Under Concentrated Loads
   2. Calculation of Stress Distribution Under Uniform Loads

C. Review of Consolidation and Settlement
   1. Impact of Soil Type on Consolidation and Settlement
   2. Calculating the Amount and Rate of Consolidation and Settlement

D. Review of Shear Strength of Soils

E. Review of Lateral Earth Pressure

Part 2: Shallow Foundations

A. Types of Shallow Foundations
   1. Introduction to Shallow Foundations
   2. Types of Shallow Foundations

B. Design Considerations for Shallow Foundations
   1. Load Distribution
   2. Bearing Capacity Analysis
   3. Settlement Analysis for Shallow Foundations

C. Construction Techniques for Shallow Foundations
   1. Excavation and Preparation for Shallow Foundations
   2. Placement of Reinforcement and Concrete

Part 3: Deep Foundations

A. Types of Deep Foundations
   1. Introduction to Deep Foundations
   2. Types of Piles
   3. Types of Drilled Shafts and Construction

B. Design of Deep Foundations
   1. Pile Capacity and Load Transfer Mechanisms and Calculations
   2. Design of Pile Groups
   3. Settlement and Consolidation of Deep Foundations

C. Installation Techniques for Deep Foundations
   1. Pile Driving Methods
   2. Drilling and Placement of Drilled Shafts

Part 4: Retaining Structures

A. Types of Retaining Walls
   1. Gravity Retaining Walls
   2. Cantilever Retaining Walls
   3. Anchored Retaining Walls

B. Design of Retaining Structures
   1. Design Principles for Retaining Walls
   2. Factors of Safety for Retaining Wall Stability

C. Construction Techniques for Retaining Walls
   1. Excavation and Construction of Retaining Walls
   2. Drainage and Waterproofing for Retaining Structures

Part 5: Slope Stability

A. Introduction to Slope Stability
   1. Factors Affecting Slope Stability
   2. Types of Slope Failures

B. Methods for Evaluating Slope Stability
   1. Slope Stability Analysis - Limit Equilibrium Methods
   2. Slope Stability Charts and Software Applications

C. Slope Stabilization Techniques
   1. Methods for Stabilizing Slopes
   2. Design and Implementation of Slope Stabilization Methods

Q. LABORATORY OUTLINE:

1. Review problems and analysis for: Stress Distribution in Soil; Consolidation and Settlement; Shear Strength of Soil; Lateral Earth Pressure
2. Design and Analysis for Shallow Foundations
3. Design and Analysis of Deep Foundations s
4. Design and Analysis of Retaining Structures
5. Design and Implementation of Slope Stabilization Methods