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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS 316 – FOUNDATION DESIGN

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Canino School of Engineering Technology

Department: Civil and Construction Technology

Semester/Year: Fall 2018

A. **TITLE**: Foundation Design

B. **COURSE NUMBER:** CONS 316

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

 # Credit Hours: 3
 # Lecture Hours: 2 **per week**
 # Lab Hours: **per week**
Other: 2 hours recitation **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:**

Principles of soil mechanics are taught: stress distribution, consolidation and settlement, shear strength, and lateral earth pressure. Students apply 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 about shallow foundations, deep pile and drilled shaft foundations, retaining structures, and slope stability.

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

CONS 216 Soils in Construction, and CONS 272 Strength of Materials, and MATH 161 Calculus I, or permission of the instructor.

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

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 stress distribution in soil from an applied load.			2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	Subsets Subsets Subsets Subsets
b. Calculate the amount of consolidation settlement and the time associated with settlement in fine grained soils.			2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	Subsets Subsets Subsets Subsets
c. Analyze shear strength test data with Mohr's circles to determine the cohesion, internal friction, and shear strength of a soil sample.			2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	Subsets Subsets Subsets Subsets
d. Calculate lateral earth pressures acting on a structure.			2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	Subsets Subsets Subsets Subsets
e. Design and analyze a spread footing foundation for settlement and bearing capacity.			2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	Subsets 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:

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

L. REFERENCES:

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Examinations**
- **Homework assignments**
- **In-class exercises**
- **Quizzes**
- **Term Project: Paper and Presentation**

P. DETAILED COURSE OUTLINE:

Part 1: Principles of Soil Mechanics

A. Stress Distribution
1. **Principles of Stress Distribution In Soil From Applied Loads**
2. **Calculation of Stress Distribution Under Concentrated Loads**
3. **Calculation of Stress Distribution Under Uniform Loads**

B. Consolidation and Settlement
1. **Causes of Consolidation and Settlement**
2. **Impact of Soil Type on Consolidation and Settlement**
3. **Calculating the Amount and Rate of Consolidation and Settlement**

C. Shear Stress and Shear Strength
1. **Definition and Calculation of Shear Stress and Shear Strength**
2. **Field and Laboratory Tests**
3. **Shear Strength of Common Soil Types**

D. Lateral Earth Pressure
1. **Lateral Earth Pressure at Rest**

2. Active Lateral Pressure
3. Passive Lateral Pressure

II.Part 2: Shallow Foundation Design
A. Design Approach and Considerations
B. Bearing Capacity Design
C. Load and Resistance Factor Design
D. Contact Pressure
E. Sizing of Footings
F. Settlement Check

III.Part 3: Deep Foundation Design
A. Design Approach and Considerations
B. Bearing Capacity Design
C. Pile Grouping and Spacing
D. Settlement Check

IV.Part 4: Retaining Structure Design
A. Stability Analysis
B. Backfill and Drainage
C. Design and Construction of Different Types of Retaining Structures
1. Gravity walls
2. Cantilever walls
3. Reinforced earth walls
4. Slurry trench walls
5. Anchored bulk heads

V.Part 5: Slope Stability Design
A. Analysis of mass resting on an inclined layer of impermeable soil
B. Slopes in homogenous cohesionless soils
C. Slopes in homogenous soils possessing cohesion
D. Method of slices
E. Slope Stability Techniques

Q. LABORATORY OUTLINE: None ☒ Yes ☐