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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS 280 – Civil Engineering Materials

Created by: Joseph Reilly

Updated by: Adrienne C. Rygel

Canino School of Engineering Technology

Department: Civil and Construction Technology

Semester/Year: Fall 2018

A. **TITLE**: Civil Engineering Materials

B. **COURSE NUMBER:** CONS 280

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

 # Credit Hours: 3
 # Lecture Hours: 2 **per week**
 # Lab Hours: (1) three-hour lab **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:**

This course examines properties, common applications and methods for properly selecting the materials typically used in the constructed environment. The laboratory develops awareness with and expertise in conducting standardized field and laboratory tests on common civil engineering materials. The materials studied include aggregates, Portland cement concrete, masonry, and asphalt.

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

MATH 121 (Colege Algebra), MATH 123 Pre-Calculus, or MATH 135 Technical Math I.

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) Accurately record measurements from instruments commonly used in the civil engineering laboratory (e.g. calipers).	2488: 1b, 3a 517: 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
b) Discuss the significant properties, preparation and applications of aggregate, concrete, asphalt and masonry in the constructed world.	2488: 1a 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
c) Conduct and interpret results from a sieve analysis.	2488: 1, 2, 3 517: 5 162: 4		2-Crit Think ISLO ISLO	Subsets Subsets Subsets Subsets
d) Determine the specific gravity and absorption of fine aggregate.	2488: 3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
e) Prepare a mix design for concrete	2488: 3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
f) Perform slump, air content, temperature, and unit weight tests of freshly mixed concrete.	2488: 3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets

g) Prepare and store concrete cylinders and beams for testing	2488: 3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
h) Conduct tests to evaluate the important properties of hardened concrete specimens.	2488: 3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
i) Discuss types, application, and testing associated with masonry units and hot asphalt in highway engineering.	2488: 1,3 517: 5 162: 4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
j) effectively communicate through written (laboratory reports), oral (group lab presentation), and graphical communication (group lab poster, Excel graphs).	2488: 7a, 7b 517: 1 162: 1		1-Comm Skills ISLO ISLO	O W 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:

- Mamlouk, Michael S. and Zaniewski, John P. (2017). Materials for Civil and Construction Engineers, 4th edition, Pearson Publishing.
- ! Rygel, Adrienne. (2018). CONS 280 Civil Engineering Materials Laboratory Manual. SUNY Canton.

L. - REFERENCES:

Portlan Cement Association Material Handbook

M. - EQUIPMENT: None ☐ **Needed:** Concrete mixing equipment and materials, comrpessive strength testing machine, flexural strength testing machine, calipers, unit weight buckets, slump testing equipment, concrete air content testing equipment, thermometers

N. - GRADING METHOD: A-F

O. - SUGGESTED MEASUREMENT CRITERIA/METHODS:

- exams
- assignments,
- lab performance

P. DETAILED COURSE OUTLINE:

I. - Introduction
II. - Aggregates
A. Sources
B. Geologic classification
C. Uses
D. Properties
E. Handling

III. Portland Cement

A. Production
B. Chemistry
C. Voids and properties in hydrated cement
D. Types of cement

IV. Portland Cement Concrete

A. Water
B. Admixtures
C. Proportioning mixes
D. Mixing placing and handling
E. Curing
F. Properties of hardened concrete
G. Testing of hardened concrete
H. Modern alternatives and innovations

V. Masonry

A. CMUS
B. Clay bricks
C. Mortar
D. Grout
E. Plaster

VI. Asphalt Binders and Mixtures

A. Types and uses of Asphalt
B. Thermal and chemical considerations
C. Performance characterization
D. Classifications of asphalt
E. Asphalt concrete
F. Mix Design
G. Characterization
H. Production
I. Recycling
J. Additives

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

1. Sieve Analysis of Aggregates
2. Specific Gravity, Absorption, and Dry Unit Weight of Fine Aggregates
3. Concrete mix 1 -
a. Mix design
b. Water/cement ratio
c. Slump test
d. Unit weight test
e. Air content determination
f. Making and curing concrete cylinders
4. (a) Specific Gravity, Absorption, and Dry Unit Weight of Coarse Aggregates
(b) Capping concrete cylinders and Compressive Strength of Concrete
5. Field Trip – Jefferson Concrete – Precast Concrete Plant
6. Concrete mix 2 – admixtures (e.g. effect of air entrainment, superplasticizers, fly ash, silica fume) -

7. Flexural Strength of Concrete (beams)
8. Concrete mix 3 – design by ACI absolute volume method (hand calculations)
9. Field Trip – Barrett's Paving – Asphalt plant and testing lab
10. Concrete mix 3 – design by ACI absolute volume method (mixing)
11. Concrete mix 4 – student design project for high strength concrete (research and design)
12. Concrete mix 4 – student design project for high strength concrete (mixing)
13. Concrete mix 4 – student design project for high strength concrete (group presentations and final breaks)