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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS375 - STRUCTURAL ENGINEERING DESIGN

Created by: Robert R. Blickwedehl
Revised: March 2014 J. F. Reilly

Updated by: JFR

Canino School of Engineering Technology

Department: DEPARTMENT OF CIVIL AND CONSTRUCTION TECHNOLOGY

Semester/Year: SPRING/2018

A. **TITLE**: STRUCTURAL ENGINEERING DESIGN

B. **COURSE NUMBER:** CONS375

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:**

This course is an introduction to the design of civil engineering structures comprised of structural steel, reinforced concrete and wood/timber. This course is taught on the basis of statically determinate structures. Students are introduced to the Load and Resistance Factor (LRFD) and Allowable Stress Design (ASD). Analysis and selection of tension members, columns and beams is incorporated.

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

Pre-requisites: CONS 272 (Strength of Materials) and CONS 280 (Civil Engineering Materials)

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***	
Determine the controlling load combination from provided load data	1,2,		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Confirm the adequacy of a proposed steel member/section in tension, compression and flexure	1.2.4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Select a steel member/section for tension, compression and flexure in accordance with AISC	1,2,4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Design a reinforced concrete beam in accordance with ACI procedures	1,2,4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Select/size compression and flexural components of a timber framed structure IAW the NDS	1,2,4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Determine the adequacy of the fasteners in a steel or timber connection	1,2		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets

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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:

No text is required for this course. A text may be required by the instructor.

L. REFERENCES:

Fanella, D.A. and Ghosh, S.K. (1993) Simplified Design of Reinforced Concrete Buildings of Moderate Size and Height. Skokie, IL: Portland Cement Association.

International Code Council and New York State Department of State, Division of Code Enforcement and Administration

The Existing Building Code of New York State.

National Design Specification and Supplement. National Forest Products Association.

Manual of Steel Construction, American Institute of Steel Construction

Building Code Requirements for Structural Concrete and Commentary. American Concrete Institute

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A - F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Exams
HW
Design Project

P. DETAILED COURSE OUTLINE:

I. Review
A. Structural analysis
B. Building Loads
C. Load Combinations

a) In LRFD
b) In ASD
D. Design Philosophies
a) LRFD
b) ASD
E. Material Properties/Strengths of materials
a) Tensile Test of steel
b) Yield Strength, Ultimate Strength, Modulus of Elasticity
c) Compression Test of Concrete

II. Design of structural steel
A. Material properties
B. Applicable codes and standards – AISC Specification
C. Analysis of Tension members
a) Yield
b) Rupture
c) Block Shear
d) Connection Design
e) Bolt Strength
D. Design of Tension Members
E. Analysis of Compression members
a) Euler Formula
b) Slenderness ratio
c) Effective Length
d) Computation of Design Strength
F. Columns in frames
G. Design/Selection of Columns
H. Analysis of Flexural members
a) Plastic Design Theory
b) Maximum Moment
c) Shear stress
d) Deflection
I. Selection of Shapes
III. Design of reinforced concrete
A. Material properties
B. Applicable codes and standards
C. Mechanics of bending in reinforced concrete
D. Design of reinforcement steel for flexure
E. RC beam analysis
F. RC beam design
IV. Timber design
A. Material properties
B. Applicable codes and standards
C. Design for compression
a) Analysis of column strength for sections in compression
D. Wood joist selection
E. Wood girder selection

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