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


# MASTER SYLLABUS

## COURSE NUMBER – COURSE NAME
## CONS 324 – STRUCTURAL STEEL DESIGN

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**Canino School of Engineering Technology**

**Department: Civil and Construction Technology**

**Semester/Year: Fall 2018**

**A.** **TITLE**: Structural Steel Design

**B.** **COURSE NUMBER:** CONS 324

**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:**

An introduction to the theory, analysis and design of the elements that comprise structural steel buildings. Instruction follows the specifications and selection techniques provided in the American Institute of Steel Construction (AISC) Manual of Steel Construction. Subject areas include determination of controlling load combinations, analysis and selection of tension members, analysis and selection of flexural members, analysis and selection of compression members, fastener strength and connection design and combined bending and axial stresses (beam-columns).

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

MECH/CONS220 (Engineering Materials Lab) and CONS 336 (Structural Analysis)

**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) Explain and implement both ASD and LRFD design philosophies. | | | 5-Ind, Prof, Disc, Know Skills<br>1-Comm Skills<br>ISLO | Subsets<br>Subsets<br>Subsets<br>Subsets |
| b) Analyze and select tension members (x-bracing, truss members, and threaded rods) IAW AISC. | | | 5-Ind, Prof, Disc, Know Skills<br>2-Crit Think<br>ISLO | Subsets<br>Subsets<br>Subsets<br>Subsets |
| c) Analyze and select compression members (columns) IAW AISC. | | | 5-Ind, Prof, Disc, Know Skills<br>2-Crit Think<br>ISLO | Subsets<br>Subsets<br>Subsets<br>Subsets |
| d) Analyze and select flexural members (beams) IAW AISC. | | | 5-Ind, Prof, Disc, Know Skills<br>2-Crit Think<br>ISLO | Subsets<br>Subsets<br>Subsets<br>Subsets |
| e) Select the number of bolts and "workable" combinations for connections IAW AISC. | | | 5-Ind, Prof, Disc, Know Skills<br>2-Crit Think<br>ISLO | Subsets<br>Subsets<br>Subsets<br>Subsets |

| **KEY** | **Institutional Student Learning Outcomes [ISLO 1 – 5]** |
|---|---|
| **ISLO #** | **ISLO & Subsets** |
| **1** | **Communication Skills**<br>Oral [O], Written [W] |
| **2** | **Critical Thinking**<br>*Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]* |
| **3** | **Foundational Skills**<br>*Information Management [IM], Quantitative Lit,/Reasoning [QTR]* |
| **4** | **Social Responsibility**<br>*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 | ☐ Civic Engagement |
| ☐ Internship | ☐ Creative Works/Senior Project |
| ☐ Clinical Placement | ☐ Research |
| ☐ Practicum | ☐ Entrepreneurship (program, class, project) |
| ☐ Service Learning | |
| ☐ Community Service | |

**K. TEXTS:**

Steel Design, 6th Ed., William T. Segui, (2017) Cengage Learning

**L. REFERENCES:**

AISC ASD/LRFD Manual of Steel Construction, current Edition

**M. EQUIPMENT: None ☒ Needed:**

**N. GRADING METHOD:** A-F

**O. SUGGESTED MEASUREMENT CRITERIA/METHODS:**

- **Exams**
- **Solved problems**
- **Project (optional)**

**P. DETAILED COURSE OUTLINE:**

**1. Introduction**
- **a. Steel Structures**
- **b. Handbooks and Specifications**
- **c. Steel Properties**
- **d. Design Considerations**
- **e. Load Paths**
- **f. LRFD theory**
- **g. ASD theory**

**2. Determining factored loads for LRFD**

**3. Tension Members**
- **a. Review of tensile stress**
- **b. Rupture limit state**
- **c. Fracture limit state**
- **d. Tension Member Analysis**
  - **i. Net area**
  - **ii. Effective Net Area**

**iii. Length Effects**
**e. Block Shear**
**f. Design of Tension Members**
**g. Threaded Rods in Tension**

**4. Axially Loaded Column**
**a. Introduction**
**b. Ideal Columns**
**c. Effective Lengths from the LRFD**
**d. AISC Resistance factors for Compression Members**
**e. Analysis of Columns (AISC)**
**i. By formula**
**ii. Using the column tables (LRFD)**
**f. Design of Axially Loaded Columns**
**g. Column Base Plates (Axial Load) (Optional)**

**5. Beams**
**a. Review of the Mechanics of Bending (Moment diagrams)**
**b. Plastic Hinge and Plastic Modulus (Z)**
**c. Analysis of Beams based on Moment Strength**
**d. Use of Beam Curves**
**e. Inadequate Lateral Support**
**f. Design of Beams based on Moment Strength**
**g. Shear in Beams**
**h. Deflection**

**6. Eccentrically Loaded Columns**
**a. Introduction**
**b. Analysis of Beam-Columns (AISC)**
**c. Design of Beam-Columns (AISC)**

**7. Bolted Connections (Optional)**
**a. Introduction**
**b. Types of Bolted Connections**
**c. High-Strength Bolts**
**d. Strength and Behavior of High Strength Bolted Connections**
**e. Framed Beam Connections**
**f. Unstiffened Seated Beam Connections**

**Q. LABORATORY OUTLINE: None ☒ Yes ☐**

**NA – The 2 hour recitation session will not be operated as a traditional lab. Rather the additional time will allow the instructor to engage the student in lengthy problem solutions associated with current lecture topics.**