COURSE OUTLINE

CONS 375– STRUCTURAL ENGINEERING DESIGN

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Revised: March 2014 J. F. Reilly

CANINO SCHOOL OF ENGINEERING TECHNOLOGY
DEPARTMENT OF CIVIL AND CONSTRUCTION TECHNOLOGY
MAY 2015
A. **TITLE:** Structural Engineering Design

B. **COURSE NUMBER:** CONS 375

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** no

E. **COURSE LENGTH:** 15 Weeks

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   Two 1-hour lecture and one 2-hour recitation per week

H. **CATALOG DESCRIPTION:**
   This course is an introduction to the design of structural steel, reinforced concrete and wood. 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.

I. **PRE-REQUISITES:**
   Pre-requisites: CONS 272 (Strength of Materials) and CONS 280 (Civil Engineering Materials)

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

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<tr>
<th>Course Objective</th>
<th>Institutional ISO</th>
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<tr>
<td>a) Determine the controlling load combination from provided load data</td>
<td>3. Professional Competence</td>
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<td>b) Confirm the adequacy of a proposed steel member/section in tension, compression and flexure</td>
<td>3. Professional Competence</td>
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<td>2. Critical Thinking</td>
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<td>c) Select a steel member/section for tension, compression and flexure in accordance with AISC</td>
<td>3. Professional Competence</td>
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<td>2. Critical Thinking</td>
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<td>d) Design a reinforced concrete beam in accordance with ACI procedures</td>
<td>3. Professional Competence</td>
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<td>2. Critical Thinking</td>
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<td>e) Select/size compression and flexural components of a timber framed structure</td>
<td>3. Professional Competence</td>
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<td>2. Critical Thinking</td>
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<td>f) Determine the adequacy of the fasteners in a steel or timber connection</td>
<td>3. Professional Competence</td>
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<td>2. Critical Thinking</td>
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K. **TEXTS:**
No text is required for this course. A text may be required by the instructor.

L. **REFERENCES:**


-- *Manual of Steel Construction, 14th Ed.* American Institute of Steel Construction

-- (2008) *318-08: Building Code Requirements for Structural Concrete and Commentary.* American Concrete Institute

M. **EQUIPMENT:** Technology enhanced classroom

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

O. **MEASUREMENT CRITERIA/METHODS:**
- Exams
- Quizzes
- Homework
- Research papers

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
   b) of sections for compression
D. Wood joist selection
E. Wood girder selection

Q. LABORATORY OUTLINE:

NA