SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: STRUCTURAL DESIGN

Code No.: ARC 109

Program: CIVIL ENGINEERING

Semester: THREE

Date: JUNE, 1983

Author: G. FRECH

New: _____ Revision: X

APPROVED: J.P. Arozietto
Chairperson

Date

STRUCTURAL DESIGN	ARC 109
Course Name	Course Number

PHILOSOPHY/GOALS:

The objective is to give the student a basic knowledge into the design, framing and use of structural tables. He/she will be able to design simple structures in steel and wood, and will have a working knowledge of skeleton frame construction.

METHOD OF ASSESSMENT (GRADING METHOD):

A - 86 - 100%
B - 70 - 85%
C - 55 - 69%
R - Repeat
X - Work to be upgraded or new work assigned

1) Marks will be accumulated and averaged, using tests and assignments

2) Final testing will be given to students not achieving 75% average with no failures or 80% with one failure 50 to 54% average

3) Attendance, lateness and attitude will be considered in assessment

TEXTBOOK(S):

C.I.S.C. Steel Handbook

C.I.S.C. Drafting Fundamentals

Applied Strength of Materials

STRUCTURAL DESIGN

ARC 109

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
1	12	Design - Beams
		Loading
		Design Loads
		Flexure Formula
		Beam Choice
		Wall Plates
		Shear & Crippling
		Deflection
2	8	Design - Columns
		Loading
		K Factor
		Column Formula - Steel/Wood
		Column Design
		Base Plates
3	4	Connections
		Tables
		Riveted (Bolted)
		Welded
4	8	Clearance & Interference
		Gauge Lines
		Pitch
		Centers
		Shop & Field Clearance
		Cuts, Copes
5	8	Drawings
		Grid System
		Details
		Notes
		Column Schedules
6	24	Trusses
		Stress Diagrams
		Stresses
		Member Design
		Smoleys Tables

STRUCTURAL DESIGN

ARC 109

The General Objective of the course is to give the student a working knowledge into the design, framing and use of tables for structural shapes. Working in conjunction with an architectural project he will design and place the framework properly. He must, upon completion, be able to:

LOADING & DESIGN

1. Identify loading on beams and girders.
2. Calculate building and design loads.
3. Review flexure formula and use this in design of beams under different loading conditions.
4. Design most economical sections.
5. By use of the steel handbook formula, design wall bearing plates.

COLUMN & BASE PLATES

1. Identify columns under axial load.
2. Identify K factor for column end restraint.
3. Identify least radius of gyration.
4. Calculate slenderness ratio Kl/r and relate it to short intermediate or long columns.
5. Know the procedure for column design (rules).
6. Design a column under single direct axial loadings.
7. Identify column base plates and design a simple base plate by use of the base plate design formula in either the C.I.S.C. or A.I.S.C. handbook.
8. Identify wood columns of rectangular shapes, their stress allowable from tables and the design of wood columns using an empirical formula from any timber handbook or the column chapter in Strength of Materials texts.

STANDARD CONNECTION TABLES

1. Use the tables for bolted (riveted) connections in either A.I.S.C. or C.I.S.C. handbook for the design of standard connections.
2. Use the tables for welded connections in either the A.I.S.C. or C.I.S.C. handbook for the deisgn of standard welded connections.
3. Solve problems using tables for standard connections: beam to column; beam to beam.

CLEARANCE & INTERFERENCE

1. Identify clearance and interference for field or shop assembly.
2. Identify gauge lines, pitch and centers for connections.
3. Identify cuts and copes.
4. Calculate copes for beam to beam or beam to column situations.
5. Identify the symbols for shop connections, field connections and open holes.

GRID SYSTEM INFORMATION

1. Identify the grid system as used on construction and architectural drawings.
2. Identify column schedules.
3. Identify and draw column base details as required on construction plans.
4. Identify anchor plans and show information properly concerning column bases.
5. Apply the information above to the student's drawing and design project, along with all design and data sheets.

TRUSS FORCES GRAPHICALLY AND ANALYTICALLY

1. Identify and use Bow's Notation with respect to loads and truss members.
2. Draw to scale force and stress diagrams for trusses using Bow's Notation.
3. Measure stresses accurately from the stress diagram and determine whether the member(s) is in tension or compression.
4. Identify forces in a truss analytically - method of joints.
5. Calculate mathematically, stresses at panel points of a truss using laws of equilibrium, and indicate tension or compression.

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