Structural Design for Non Structural Engineers Training program

Introduction:

Architects and non-structural engineers often work together with structural engineers on design projects. An understanding of the basic concepts of structural engineering could make their jobs easier. If you are involved with the design and construction of concrete, steel, or wood structures, you will find this course particularly helpful. It is assumed that course candidates have no formal training in structural engineering. Basic concepts and design examples will be reviewed without in-depth mathematical derivations. This course is not designed to make you a structural engineer, but you will leave the course with an understanding of the structural design process and know when you need to call in an expert.

Who Should Attend?

Construction Engineers, Senior Construction Engineers, Construction Supervisors, Construction General Supervisors, Construction Project Managers, Engineering Technologists, Supervision Engineer, Inspection Engineers, Civil Inspectors, Foremen, Design Structural Engineers, Planners, Structural Engineers, Material Specialists, Quality Control and Quality Assurance Experts, Architects, Supervision Engineers, Team Leaders, Site Officers and Managers, Mechanical Engineers, Technical Professionals, Field Production Supervisor, Operation Engineers, Clients Representatives.

Course Objectives:

By the end of this course delegates will be able to:

- Learn basic principles of strength of materials and structural analysis
- Be introduced to the codes that govern structural design
- Be familiarized with the available design aids
- Understand the fundamentals of structural analysis
- Learn how to apply loads, select materials, and calculate footings, foundations, columns, beams, floor systems, shear walls and diaphragms
- Achieve an understanding of Shear and Moment diagrams and how these are used by designers in concrete, steel and wood
- Learn the behavior of structures and ways to save construction costs

Course Outline:

Structural Requirements

- Type and Direction of Loads
- National Building Code of Canada
- Limit States Design
- Strength and Stability
- Loads and Effects
- Load Combinations
- Importance Factors and Categories
- Factored Resistance
- Dead & Live Loads
- Load Variation with Tributary Area
- Climate Data
- Structural Evaluation and Upgrading of Existing Buildings
- Structure Characteristics
- Components of Structures
- Loading Properties
- Support Properties
- Material Properties
- Geometric Properties
- Member Design
- Stress, General Equations for Member Design
- Force Diagrams
- The Effects of Continuity
- Special Considerations for Frames
- Load Transfer Systems

Structural Member Properties

- Cross-sectional Area
- Moment of Inertia
- Section Modulus
- Radius of Gyration
- Composite Construction
-

Structural Behaviour

- Beams
- Columns
- Frames
- Trusses
- Arches
- Plates
- Space Trusses and Grids

Structural Steel Design

- General Information
- Steel Types
- Steel Products
- Residual Stresses
- Evaluation of Existing Structure
- Design of New Structures
- Tension Members
- Compressive Members
- Base Plates
- Beams
- Bolted Connections
- Welded Connections
- Beam Columns, Composite Design, Gerber Girders

Design of Reinforced Concrete Structures

- History of Concrete
- CSA Standards
- Fundamentals of Concrete
- Properties of Concrete
- High Performance Concrete
- Concrete Reinforcing
- Methods of Concrete Construction
- Concrete Design – Basic Structural Design Checks
- Design of Un-reinforced Elements
- Reinforced Concrete
- Design of Beams
- Bearing
- Design of One-Way Slabs
- Design of Columns
- Two-Way Slabs
- Specifying Concrete
- Concrete Reinforcing
- Testing
- Placing and Finishing Concrete
- Design of Various Concrete Structures
- Remediation Using FRP
- Concrete Specification

Structural Design Using Wood and Wood Products

- Canadian Forests
- Wood as a Material
- CSA Standards
- National Lumber Grades
- Standard Lumber Sizes
- Resources
- Properties

- Bending & Shear
- Notches
- Factors
- Compression Members
- Tension Members
- Combined Load
- Bearing
- Diaphragms & Shear Walls
- Manufactured Products
- Fastenings