

## Design of Cold Framed Steel Structures

Code	Credit Hours	Category
CE-818	3	Elective

### Course Description:

Cold Formed Steel (CFS) structures are innovative construction systems whose application has been steadily increasing over the years thanks to the huge benefits in terms of structural and environmental efficiency. In Pakistan, they were introduced back in 2005 after Kashmir Earthquake. Much of these constructions were used in the Northern Parts of the country to overcome the housing crisis for displaced communities. One big reason for the adoption of these systems is their prefabricated technologies and reduced construction time. Recently, a 250-bed corona isolation ward was established in Islamabad made of entirely cold formed steel construction. These structures are also commonly employed as extension structures to already existing reinforced concrete or masonry buildings. In Pakistan, the design of these structures is carried out according to AISI S100-16 against the gravity loads and AISI S400 against the seismic loads. Unfortunately, the design of 'Cold formed steel structures' is not taught in both the UG and PG curriculum of Pakistani Universities. Hence the 'Design of Cold formed steel structures' is introduced in the Structures curriculum.

### Text Book:

- Cold-formed steel design by Wei-Wen Yu, Roger A. LaBoube.

### Reference Books:

- AISI Manual cold-formed steel design
- Structural Design of Low-Rise Buildings in Cold-Formed Steel, Reinforced Masonry, and Structural Timber by J. R. Ubejd Mujagic
- Design of Cold formed Steel Structures, by Dubina D., Ungureanu V., Landolfo R., Ernst & Sohn, Berlin ,2012.
- Design of metallic cold-formed thin-walled members, by Ghersi, A. Landolfo, R. and Mazzolani F.M., E&FN Spon, London, 2001.

### Prerequisites:

- BE (Civil, Architecture, Construction Engineering & Management)

## Assessment System

Component	Percentage Range
Quizzes	10-15%
Assignments	10-15%
Mid Terms	20-30%
ESE	40-50%
Project (optional)	10-15%

## Teaching Plan:

Week No	Topic
1	Introduction/Overview
2	Materials: Types and shapes, Cold forming techniques, Effect of cold forming
3	Materials: Cross-sectional properties, Types of cold formed steel structures
4	Instability phenomenon
5	Design of CFS members: Tension members, Flexure Members (shear, bending, lateral-torsional buckling, combined bending and shear, web crippling, stiffeners)
6	Compression members (torsional and flexural-torsional buckling, combined axial loading and bending)
7	Connections and joints: Welded connections
8	Connections and joints: Bolted and screwed connections
9	<b>Mid Term Exam/ OHT, (As per NUST Exam Policy)</b>
10	Seismic design of cold formed steel structure: All steel design approach,
11	Sheathing braced design approach
12	Seismic design of cold formed steel structure: Intro to AISI S400
13-14	Seismic design of cold formed steel structure: Cold formed steel lateral force resisting systems.
15	Structural assemblies and systems: Built-Up Sections, Floor, Roof, or Wall Steel Diaphragm Construction
16	Software tools for Design
17	Presentations for Term-project
18	<b>ESE</b>

## Software Tools

OpenSees, MATLAB, FRAMECAD