

**Department: Civil & Environmental Engineering**  
**Level and Major: Graduate - Structure Engineering**

**Division: Civil engineering**

**Course Title:** Inelastic Analysis of structures

**Number of Credits:** 3

**Prerequisite (Corequisite):** Structural analysis (I), Concrete Technology **Lecturer:** -

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### Course Topics

- Stress-strain relations, Formability based on strain, Non-elastic deformation of the bars
- Anchor relations -Curvature for the beam and Column , Calculate anchor relations Curvature for a variety of sections and materials (steel and Concrete), Shape factor ,Curvature formability,The effect of axial force and The effect of shear force in bending Strength and Curvature formability capacity, the relation between curvature capacity and strain Capacity, the effect of thermal stresses and hysteresis
- Anchor relations- Rotation for the beam and column of non-elastic area in beams, plastic joint, The equivalent length of plastic hinge, Plastic rotation capacity, the effect of axial force and shear on the anchor relation -rotation, the relation between rotation Capacity and curvature capacity, the effect of thermal stresses and hysteresis.
- plastic analysis of beams and frames: The burden of collapse, The Theorems of lower bound, upper bound and uniqueness, Equilibrium method , Mechanism method, Restrictions on plastic analysis, the effect of axial force, the effect of shearing, Calculate the rotation of the joints, Calculate deformations, P-Delta Effects
- Non-elastic beam Column element, Non-elastic deformation with wide length, Non-linear geometric effects, Tangential stiffness matrix, A variety of Simplified elements
- Nonlinear analysis of frames, stiff plastic frames or joints , Frames with non-elastic behavior, Frames with Semi-rigid connections, p-Delta Effects, floor escape Capacity, Static methods of force control and displacement control
- Computer models of nonlinear analysis, Extensive models of non-elastic areas Fiber components, strap joints and non-elastic and non-linear springs, Numerical methods of solving non-linear problems, Dynamic analysis of non-elastic frames, familiarity with basics and usages of national regulations (national building regulations and 2800)and international in non-elastic analysis of structures

Course Description:

Reading Sources:

Course Goals and objectives:

Evaluation:

Course topics:

The course aims to: