

**Course Name:**  
Prestressed Concrete Structures

**Course Number:**  
20137

**Credit:**  
3

**Course Content (outline):**

- **Primary concepts** (the effect of prestressing on section stresses, equivalent loads, prestressing methods, comparison of prestressed concrete with conventional reinforced concrete, changes in prestressing force, partial prestressing)
- **Properties of materials** (high strength steel, types of tendons, drooping, types of concrete)
- **Flexural analysis** (non-cracked beams, behavior in elastic range, allowable bending stresses, cracking load, flexural strength, analysis methods)
- **Flexural design** (design principles, allowable stress design, variation of eccentricity through span, cross-sectional selection, standard sections, design based on load balancing, crack control, transmission length)
- **Shear and torsion analysis and design** (diagonal shear and tension, shear design criteria, design details, torsion)
- **Loss of part of the prestressing force** (total loss estimation, separate loss estimation, short and long-term loss)
- **Analysis and design of composite beams and methods of construction** (types of construction, load steps, cross-sectional properties, flexural momental strength, horizontal shear transmission, diagonal shear and tension)
- **Analysis and design of continuous beams (static indeterminate) and frames** (tendon profiles and stress arrangement, elastic analysis and equivalent load, linear transmission, coaxial tendons, flexural strength, moment redistribution and indeterminate frames)
- **Loss in prestressed members** (general principles of calculations, approximate method, cross-sectional moment of inertia, exact method of loss calculation using staggered intervals)
- **Ductility in prestressed members** (assumptions, moment-curvature analysis, parameters affecting ductility)