Course Name:
Design of Concrete Structures II

Course Number:
20017

Credit:
2

Prerequisite:
Design of Concrete Structures I
Corequisite:
Structural Analysis 2

Course Description (Objectives):
Following the course "Design of Concrete Structures I (20231)", in this course students become familiar with basics of design and analysis of short columns, long columns, slabs, shear walls, and foundations based on the international code ACI318M-14. Students will learn to work with integrated analysis and design programs like ETABS and SAFE. If time allows, seismic provisions of reinforced concrete structures are also covered.

Course Content (outline):

- **Short Columns**
  Ultimate behavior of columns under axial loads with various eccentricities; interaction diagram; biaxial bending; Bresler's reciprocal load method; Bresler-Parme's method; splice details of longitudinal rebar reinforcement

- **Long Columns**
  Review of buckling theory; effective length factor in sway and non-sway frames; effective length factor of columns in concrete frames; secondary moments; first-order and second-order analyses; slenderness criteria; moment magnification method

- **Slabs**
  Types of floor systems, and their advantages and disadvantages; analysis and design of one-way slabs; definition of column and middle strips in two-way slabs; analysis of two-way slabs with direct method and equivalent frame method; limitations of classic analysis methods; punching shear; analysis and design of two-way slabs with finite element programs like SAFE

- **Shear Walls**
  Types of structural walls; behavior of short and tall shear walls; Types of shear walls; design requirement of shear walls with rectangular section

- **Footings**

Types of footings; soil bearing stress beneath single footings; design requirements of single footings; combined footings

- **Seismic Provisions**
  Type of lateral load resisting systems; seismic provisions of intermediate and special moment frames; seismic provisions of intermediate and special shear walls

References:
- Reinforced Concrete, Mechanics and Design, J. K. Wight and J. G. MacGregor, 6th Edition, Pearson Education Inc., 2012.
- Design of Reinforced Concrete, J. C. McCormac and J. K. Nelson, 9th Edition, John Wiley & Sons, 2014.
- Design of Concrete Structures, A. H. Nilson, D. Darwin, and C. W. Dolan, 14th Edition, McGraw Hill, 2008.