



## CE 313 – Reinforced Concrete Design

**Code and Name:** CE 313 – Reinforced Concrete Design

**Credit Hours:** 3 (Lecture: 3, Tutorial: 1)

**Textbook:**

Reinforced Concrete – Mechanics and Design by J.K. Wight and J.G. MacGregor, 6th Ed., Pearson, 2012.

**Other References:**

*Building Code Requirements for Structural Concrete (ACI 318M-11)*

*Design of reinforced concrete structures by M. Ghoneim*

**Course Description:**

Study of the strength, behaviour, and design of reinforced concrete members (beams, short columns, one-way slab, footings etc.) and structural systems subjected to moments, shear, and axial forces; knowledge of code provisions for ultimate strength design, detailing and serviceability requirements; introduction to the use of design aids and computer design packages.

**Pre-requisites:** CE 311 (Structural Engineering), GE 301 (Numerical Methods in Engineering)

**Co-requisites:** CE 310 (Concrete Properties)

**Course Learning Outcomes:**

With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)

1. Differentiate among different failure modes of Reinforced concrete (RC) structural elements, in order to avoid brittle collapse of RC buildings and save human lives (4)
2. Formulate the shear and flexural behavior of RC elements. (1)
3. Analyze the Capacity of RC structural elements (beams, columns, slabs and footings) (1)
4. Design reinforced concrete beams. (2)
5. Design reinforced concrete short columns. (2)
6. Design reinforced concrete slabs and spread footings (2)
7. Apply the design standards rationally (2)
8. Develop the computational tool to facilitate the design process. (2)

**Topics to be covered:**

- Introduction to reinforced concrete structures, common structural elements in buildings.
- Introduction to design codes and specifications, load combinations in design codes.
- Stresses in beam at different loading stages.
- Flexural behavior of beams at ultimate limit state and Serviceability limit states.
- Concept of tension and compression controlled section, design of singly reinforced section.
- Balanced reinforcement ratio, Analysis and design of doubly reinforced beam.
- Design of T& L sections, Design of continuous beam, design of beams for shear.
- Bar development and anchorage and Reinforcement detailing
- One way slabs and joist floors
- Design of axially loaded column
- Design of spread footing

**Grading Policy:**

The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, and projects for the remaining 20% that is modified by the course instructor.

