CE 310 – Concrete Properties

Code and Name: CE 310 – Concrete Properties
Credit Hours: 2 (Lecture: 1, Lab: 2)

Textbook:
- Design and control of concrete mixtures: S. Kosmatka, B. Kerkhoff and W. Panarese, 15th Edition, Portland Cement Association, 2011

Other References:
- *Neville on Concrete: An Examination of Issues in Concrete Practice: Adam Neville, 2nd Editio, 2006*
- *Course handouts: distributed on a regular basis to provide more information on the topic.*

Course Description:
Concrete constituent materials, concrete mix design, concrete production, transportation and placing operations, fresh and hardened concrete properties and testing, hot weather concreting, durability, admixtures and special types of concrete. Fresh and hardened concrete testing. The non-destructive testing methods.
The laboratory is an essential part where fresh and hardened concrete testing will be conducted including the non-destructive testing methods to evaluate mechanical properties of concrete.

Pre-requisites: CE 213 Civil Engineering Materials Lab
Co-requisites: CE313 Reinforced Concrete Design

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

1. Grasp the knowledge of Portland cement concrete ingredients along with their fresh and hardened properties and their effect on mixing, transportation, placing and curing of concrete in view of environmental context (4)
2. Identify admixtures to achieve desired properties of Portland cement concrete. (1)
3. Design a Portland cement concrete mixture using volumetric calculations (2)
4. Comprehend the effects of hot weather, cold weather and early-age volumes changes on concrete and also understand its durability issues (1)
5. Perform the tests on fresh concrete along with destructive and non-destructive tests to evaluate the properties of concrete (6)
6. Demonstrate the ability to write technical lab report (3)

Topics to be covered:
- Basic Ingredients of Concrete
- Concrete mix design to achieve certain specified strength and workability properties.
- Best practices for mixing, transportation, placing and curing of concrete.
- Admixtures to control strength, setting and durability of concrete.
- Standard test for quality control of fresh and hardened concrete.

Grading Policy:
The grading for the course is: 70% Theory and 30% Lab. The theory part consists of one Midterm Exam (20%), two quizzes (10%) and final exam (40%) while the lab consists of Lab quizzes (10%), Lab reports (8%) and Lab final Exam (12%).