



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Durability and Condition Assessment of Reinforced Concrete Structures

CIVILEN 5510

Credit Hours:

3.00 - 3.00

Course Levels:

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

In-depth review of the most common processes affecting durability of portland cement concrete durability, and presents methods of assessing the quality of in-place concrete construction for vertical construction, roads and bridges, and geotechnical elements. Laboratory durability testing, on-site non-destructive evaluation techniques, and procedures for repair and rehabilitation will be discussed.

Prerequisites and Co-requisites:

Prereq: 3510, or Grad standing in Civil Engineering.

Course Goals / Objectives:

- 1. Describe the mechanisms of deterioration of RC structures; 2. Link aspects of design and materials usage to damage progression 3. Select appropriate non-destructive testing methods for condition assessment;
 - 4. Assess the limitations of inspection procedures; 5. Describe the limitations of repair procedures; 6. Critically review technical articles and synthesize information from various sources.
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Course Topics:

- Intro General review of cement chemistry and hydration Concrete microstructure and transport properties
 - Basics of Forensic Analysis Visual inspections Field diagnosis/prognosis
 - Non-destructive testing methods for concrete: GPR, UPV, Schmidt Hammer
 - Alkali Aggregate Reactions: Alkali carbonate reaction and Alkali-silica reaction: Causes and case studies
 - Alkali-silica reaction: Prevention and attempts to slow progression
 - ASR test method jigsaw Corrosion: Chloride transport Corrosion detection and monitoring
 - Corrosion: Corrosion prevention strategies
 - Corrosion test method jigsaw Freeze-thaw durability: General freeze-thaw Salt scaling Calcium oxychloride formation and damage Prevention strategies
 - Freeze-thaw (cont'd) External sulfate attack/salt crystallization damages Internal sulfate attack Prevention strategies
 - Sulfate attack (cont'd) Carbonation Prevention Strategies Service life predictions Repair of concrete structures: Site preparation Placement and Curing Repair of concrete structures: Strategy Material considerations and Incompatibility issue
 - Repair of concrete structures: Structural repairs
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Designation:

Elective