Course CE 31500 – Civil Engineering Materials

Type of Course Required for Civil Engineering Program

Catalog Description Study the nature and performance of civil engineering materials and evaluation of their physical and mechanical properties. This course focuses on materials used in construction and maintenance of building and infrastructure such as ferrous and nonferrous metals, aggregates, Portland cement, concrete, masonry, asphalt and asphalt mixtures, wood and composites. Emphasis will be placed on selection criteria, design, applications and proper use of these materials.

Credits 3

Contact Hours 3

Prerequisite Courses None

Corequisite Courses CE 25200 – Strength of Materials

Prerequisites by Topics None


Course Objectives The objective of this course is to understand the nature, characteristics, performance, and behavior of civil engineering materials used in buildings and infrastructure and to evaluate their physical and mechanical properties. Students will learn how to select materials based on their properties and their proper use for a particular facility under prevailing environmental conditions.

Course Outcomes Students who successfully complete this course will be able to:
1. Understand basic materials properties including stress and strain, and elastic, plastic and time dependent deformations. [a]
2. Identify atomic structure of materials. [a]
3. Describe the strength and durability characteristics of steel, Portland cement concrete, polymers, fiber reinforced polymers, and hot-mix asphalt. [a]
4. Design Portland cement concrete mixes to be used in the construction of civil engineering structures. [a, c, e, g]
5. Identify the basic pavement performance parameters used in the SuperPave hot-mix asphalt design procedure. [e]
6. Design Asphalt Concrete mixes to be used in the construction of civil engineering structures. [a, c, e]
7. Apply the field quality control procedures in the manufacturing and placing of Portland cement concrete and hot-mix asphalt. [a]
8. Select appropriate material in the design phase and in the life-cycle cost of engineering facilities. [a, c, e, g]

Lecture Topics

1. Materials Engineering Concepts
2. Nature of Materials
3. Steel
4. Aluminum
5. Aggregates
6. Portland Cement
7. Portland Cement Concrete
8. Masonry
9. Asphalt Binders and Asphalt Mixtures
10. Wood
11. Composites

Computer Usage
Low

Laboratory Experience
Low

Design Experience
Low

Coordinator
Mohammad Alhassan, Ph.D.

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