

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
Textbook	M. Mamlouk and J. Zaniewski, <i>Materials for Civil and Construction Engineers</i> , Pearson – Prentice Hall, Current Edition.
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. Students will also learn new construction methodology involving advanced construction materials.

Course Outcomes

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

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

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Date

1 July 2018