



CE 210 – Civil Engineering Materials

Code and Name: CE 210 – Civil engineering materials

Credit Hours: 2 (Lecture: 2, Tutorial: 1)

Textbook:

- Materials for Civil and Construction Engineers: Mamlouk, M.S., Zaniewski, J. P., 3rd Edition, Pearson, 2010.

Other References:

- Mays, L. W., *Water Resources Engineering*, John Wiley & Sons. 2005

- Kosmatka, S. H., Wilson, M. L., *Design and Control of Concrete Mixtures*, 15th Edition, Portland cement Association, 2011.

Course Description:

Introduction to materials engineering concepts and nature of materials, Structure and properties of civil engineering materials such as: steel, aluminum, aggregates, cement, masonry, wood, and composites. The properties range from elastic, plastic, fracture, porosity, thermal and environmental responses.

Pre-requisites: None

Co-requisites: STAT 215 Probability and Statistics in Engineering.

Course Learning Outcomes:

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

1. Outline the types, source and use of most common civil engineering materials (1)
2. Understand a variety of established material testing techniques and procedures in civil engineering (AASHTO, ASTM, PCI, ACI, AISC, etc.) (6)
3. Identify crucial problem areas during the production and/or manufacturing methods associated with these materials (1)
4. Evaluate the physical behavior and mechanical properties of construction materials (1)
5. Explain the importance of experimental verifications of material properties (6)
6. Realize economical, environmental and sustainability issues concerning civil engineering materials and explain the diverse ways by which these materials interact with the environment and hence deteriorate (4)
7. Apply optimization techniques while selecting building materials from multiple sources (1)

Topics to be covered:

- Introduction to engineering materials, role of materials in civil engineering projects. Mechanical properties of materials, sustainable design. Material variability, laboratory measuring devices
- Steel production, steel alloys, structural steel, cold-formed steel, fastening products. Reinforcing steel, mechanical testing of steel, welding, corrosion
- Aluminum production, testing and properties.
- Aggregates: Sources, classification and uses. Aggregate properties and testing.
- Portland cements: Production, chemical composition, properties and hydration. Types of Portland cements and uses, mixing water, supplementary cementitious materials.
- Masonry units, mortar, grout, plaster.
- Structure of wood, chemical composition, wood production. Physical and mechanical properties of wood.
- Composites and properties of composites

Grading Policy:

The grading for the course are 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 for the remaining 20%.

