CEE 3111 - CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

2020

2020 ACADEMIC YEAR SEMESTER 1

Lecturers:	Office Hours:	Emails:
1. Eng. G. M LIMUNGA – Parts I and II	Wednesdays: 11:00 – 13:00 Hrs	gideon.limunga@unza.zm
2. Dr. B. Mwiya – Part III	Fridays: 09:00 – 17:00 Hrs	balimu.mwiya@unza.zm

Lectures: 2 Hours PerWeek

Tutorials: 2 Hours PerWeek

Labs: 3 Hours PerWeek

TOPIC 1

General Introduction to Civil Engineering Materials and Concepts

General Introduction

Material Engineers

- Responsible for the selection, specification, and quality control of materials to be used in civil engineering projects

Critical material selection criteria

- The materials must meet certain classes of criteria and/or properties that include:
  1. economic factors
  2. mechanical properties
  3. nonmechanical properties
  4. production/construction considerations
  5. aesthetic properties
  6. sustainable development

General Introduction

Selection of materials

- When engineers select the material for a specific application, they must consider the various criteria and make compromises
- Both the client and the purpose of the facility or structure dictate, to a certain extent, the emphasis that will be placed on the different criteria.

Commonly used materials in construction

- **Traditional civil engineering materials** such as steel, aggregate, concrete, masonry, asphalt, wood
- Others traditional materials include aluminum, glass, plastics, fiber-reinforced composites
- **High performance synthetic materials** (better quality, more economical, and safer materials) such as polymers, adhesives, composites, geotextiles, coatings, cold-formed metals, and various synthetic products

General Introduction

Breakthroughs of high performance materials

- Superplasticizers are used in the concrete industry, allowing the production of much stronger concrete
- Joints made of elastomeric materials have improved the safety of high-rise structures in earthquake-active areas
- Lightweight synthetic aggregates have decreased the weight of concrete structures, allowing small cross-sectional areas of components.
- Polymers have been mixed with asphalt, allowing pavements to last longer under the effect of vehicle loads and environmental conditions.