Mat 423 / 523 Cement Chemistry and Technology

FALL 2021

Topics and lectures

* Week #1 Introduction: Mali 27 09
  + Organization
  + History of cements
* Week #2 Types of Cements and Hydration of OPC Mali 04 10
  + Types of cements (hydraulic)
  + Phases of OPC and their functions
* Week #3 Hydration of OPC: Zeynep11 10
  + Hydration of phases of OPC
  + Properties of C-S-H
  + Hydrated Microstructure
* Week #4 Other types of Cements Mali or Zeynep? 18 10
  + White Portland Cement
  + Calcium aluminate cements
  + Phosphate cements
  + Calcium Sulfoaluminate Cements
  + Carboaluminate cements
* Week #5 Cement Manufacture Caglar? 25 10
  + Raw Materials and Mining, extraction,
  + Raw mix
  + Comminution Raw Meal, Homogenization
  + Cement Grinding Plants – Ball Mills – Classifiers
* Week #6 Cement Manufacture clinker production: Irfan 01 11
  + Clinker Reactions and high temperature Chemistry
  + Firing Systems - Fuels Preheaters, Calciner & Bypass Systems, Clinker Coolers
  + Kiln Heat and Mass Balance
  + Clinker Microstructure :Mali
* Week #7 Midterm I
* Week #8 Production of Concrete: Ismail 08 11
  + Cement to concrete
  + Concrete Design
  + Transport and Placement Concrete
* Week #9 Cement Additives and Admixtures Mali Zeynep and Ozge 15 11
  + Alternative raw materials
  + Composite cements
  + Supplementary cementitious materials
  + Admixtures
    - Retarders
    - Accelarators
    - Air entraining agents etc
* Week #10 Properties of fresh concrete Zeynep 22 11
  + Concrete Rheology and pumping
  + Strength
  + SCC, HPC UHPC, DUCTAL,ECC,
* Week #11 Midterm II 29 11
* Week #12 Fresh and Hardened Performance of concrete Zeynep 06 12
  + Durability of Cementitious Materials & Environment
    - Main Cement Problems Related to Durability(Sulfata Attack, Efflorescence, ASR, Freeze-Thaw.. Etc.)
* Week #13 Fiber Reinforced cement-based composites Zeynep 13 12
  + High Strength precast
  + RMC Precast Applicaitons
  + Dry-Mix Applications (Mortars, Renders&Plasters, Tile Adhesives, Floor Screed)
  + Dry-Mix Applications (Grout, Self Levelling Underlayments, External Insulation & Repair Systems)
* Week #14 New topics in concrete Zeynep 20 12
  + New alternative for Construction
  + Magnetorheology
  + 3-D manufacturing
  + Self Healing Concrete
* Week #15 Factory Visit AkcanSA B Cekmece