

ENVE XXXX Construction Materials for Environmental Engineering

Syllabus

Week	Topics
1	Introduction, Properties of Materials, Classification of Materials, Standard Specifications, Materials Testing
2	Mechanical behavior: Stress and Strain, Behaviour under Tensile Stress, Elasticity, Plasticity and Flow, Ductility and Brittleness, Stress-Strain Curves, Proportional Limit, Elastic Limit, Yield Point, Strain Hardening, Ultimate Strength,
3	Hardness, Toughness and Resilience, Viscosity, Creep, Fatigue,
4	Metals, ceramics, polymers and composites as construction materials.
5	Physical Properties of Materials: Density, Specific Gravity, Compactness, Porosity, Water Absorption, Capillarity, Permeability, Insulation
6	Concrete as a construction material. Cements, types, properties. Aggregates, types, properties. Water and admixtures.
7	Proportioning concrete mixes. Properties of fresh concrete. Mixing, transporting, placing, compacting and finishing. Curing and hardening.
8	Strength and other properties of hardened concrete. Reinforced concrete. Durability and degradation of concrete.
9	Bituminous materials and asphaltic concrete
10	Midterm exam
11	Durability: Oxidation (flammability and photo-degradation), corrosion (acids, alkalis, water and organic solvents)
12	Mechanism of corrosion, fighting corrosion, degradation
13	Materials, processes and the environment (Material consumption and its growth, the material life cycle and criteria for assessment, definitions and measurement: embodied energy, process energy and recycling energy, charts for embodied energy, design: selecting materials for eco-design, materials and sustainability)
14	Materials Selection for Environmental Engineering Applications-I
15	Materials Selection for Environmental Engineering Applications-II

References

1. M. S. Mamlouk, J. P. Zaniewski, 2011, Materials of Civil and Construction Engineers.
2. Erdogan, T.Y., Materials of Construction, 2002, METU Press.
3. Van Vlack, "Elements of Materials Science and Engineering", 1980.
4. Türk Standartları Enstitüsü (TSE), Konu ile İlgili Standartlar / Turkish Standards Institution, Related Standards
5. Materials: engineering, science, processing and design, 2010, North American Edition, Michael F. Ashby, Hugh Shercliff, David Cebon