SCHOOL OF STEM SYLLABUS

TERM:

INSTRUCTOR:

COURSE CODE: CNM-202

OFFICE HOURS:

COURSE TITLE: Construction Procedures and Material Testing

OFFICE LOCATION:

DAY(S) AND TIME(S):

EMAIL:

LOCATION:

PHONE:

COURSE PREREQUISITE: None

CREDITS: 4

COURSE DESCRIPTION:
This is a core course for students who intend to pursue a career in Construction Management or in the field of Civil Engineering. This course develops an understanding of managing a construction project and students learn the application of techniques that are utilized to manage a construction project. The course provides an opportunity to the students to learn most effective tools available in the construction industry for efficient way of utilizing available resources.

STUDENT LEARNING OUTCOMES:
Upon completion of this course, students should be able to:

- Interpret engineering, construction drawings and details.
- Analyze construction and design requirements for projects.
- Categorize various construction activities and their sequence.
- Identify types of equipment used in a construction project.
- Select appropriate architectural and engineering materials used for construction projects.
- Test materials for their strength, quality, and safety Create

TEXTBOOK AND SUPPLEMENTAL MATERIALS:

Proposed student text

Construction Project Management Handbook (Chapters 5 & 6), Federal Transit Administration Report No. 0015 by Kam Shadan, 2010 (free download)

Supplementary readings for students.

Construction Materials, fourth edition, Edited by Peter Demone and John Allston,
Handouts

Audiovisual materials and computer software.

Videos of material testing
Excel Worksheet.

GRADING POLICY:

Attendance and Participation	**10%**
Assignments	**40%**
Project Presentation	**10%**
Midterm Exam	**20%**
Final Exam	**20%**

SAMPLE COURSE SCHEDULE:

Orientation, syllabus review, overview of construction working drawings, plans / legends, construction equipment.

Overview of construction working drawings for reinforced concrete, steel, wood frame, and masonry construction, as well as some mechanical and electrical construction, including floor plans, elevations, sections, details, symbols, schedules, specifications, and abbreviations for architectural & engineering drawings.

Lab 1 – General lab Rules, Safety Protocol, tools involved in sampling. Review various type of engineering materials and their construction applications.

Examples of working drawings, review of shop drawing, purpose of As-Built plans

Week 1. **Aspects of Construction:** General consideration common to all projects. An overview of different types of engineering projects.
Bridges, Roads and Pavements: An overview of roadway construction projects, bridges and pavements. Subgrade and Sub-base material, aggregate, construction methods for pavement construction, Bituminous pavement material, prime coat, tack coat.

Week 2. **Excavation:** Excavation in different types of soils. General properties of soil. Soil classification. Equipment deployed in earthwork. Excavation, properties of excavated material, embankments, embankment construction methods, compaction, and testing methods for compaction.

Lab 2 – Determination of cement fineness modulus

Week 3. **Buildings and Special Structures:** An overview of buildings and special structures. Types of building and their construction methods

Types of Soils: Type of soils and type of building foundations. Types of foundations, methods of construction.
Lab 3 – Concrete mix preparation and curing.

Week 4. **Properties of Concrete:** Workability, water contents, compressive and tensile strength. Compressive strength, tensile strength, elasticity, creep, cracking, thermal conductivity, tension and shrinkage cracking, durability

Week 5. **Placement of Concrete:** Methods of placement and curing of concrete in foundations, slabs, beams and other structures. Concrete placement accessories buckets, hoppers, manual or motor-propelled buggies, chutes and drop pipes, conveyor belts, pumps, tremies, and paving equipment.

Week 6. **Flooring and Roofing Systems:** Constructional methodologies, slab on grade, plain cement concrete floors, floor finishing, roofing systems (planar and non-planar), finishing and water proofing. Methods of floor and roofing construction methods.

Week 7. **Non-Structural Elements:** Non-structural elements, especially masonry and brickwork with sufficient details related to constructional aspects, doors, and windows alignment, plumb and fixation, construction aspects related to services. 4 types of nonstructural constructions, electrical, mechanical, and plumbing and other engineering systems

Lab 4 – Testing properties of concrete (slump test).

Week 8. **Classification and General Aspects of Construction Materials:** An overview of materials used in construction, general aspects related to weight, density**,** specific gravity, strength, hardness, durability, workability, and cost of materials.

Classification and General Aspects of Construction Materials (cont'd): Classification of materials, ceramics, metals, and organics. Glass, fabric, brick, stone, clay

Lab 5 – Testing properties of concrete (air content).

Properties of common construction materials such as wood, concrete, iron, and steel. Review of working drawings, construction activities, construction materials. Video display for understanding common construction material and their properties.

Week 9. **Midterm Exam**

Week 10. **Spring Break – No Class**

Week 11. **Concrete Materials:** Introduction to concrete manufacturing, types and properties of cement, and properties of fine and coarse aggregates, types and properties **Concrete Materials (cont'd)** Quality of water in concrete, mixing, transportation & placing of concrete. Lightweight concrete, hot and cold weather concrete, precast concrete with special reference to cement concrete block.

Lab 6 – Testing properties of concrete (compressive strength and unit weight of concrete).

Week 12. **Steel:** Introduction to steel, its dimensions, and properties.
Steel (cont'd): Beams and girders, columns, common structural shapes, I, L, Z, T beams, **Steel** Connection angles / plates, bolted connections, welding connections, symbols for welding, types of welds,

Lab 7 – Testing properties of concrete (J – Ring test)

Week 13. **Metals and Alloys:** Composition, manufacturing, properties and uses of ferrous metals and their alloys, pig iron, cast iron, wrought iron and steel. Types of steel, effects of heat treatment of steel, steel sections and bars, corrosion, and method of its prevention. Common types of metals and alloys used in construction, architectural metals.
Natural Stones: General characteristics, varieties and uses of building stones, **Bricks and Tiles:** Manufacture, varieties, properties and uses of bricks and tiles

Lab 8 – Testing properties of material (NDT)

Week 14. **Timber:** Varieties, properties, and uses of timber, glued laminated timber, plywood, hardboard, chipboard, particle board and fiber board., timber construction and its benefits, mass timber in construction, **Rubber, Plastics and Bituminous Materials:** Composition, varieties, properties and uses of bitumen asphalt glass, rubber laminates, adhesives, asbestos, fiberglass, paints and varnishes

Lab 9 – X-Ray fluorescence Testing

Week 15. **Insulating Materials:** Waterproofing and heat insulating materials, acoustical materials. Fiber glass, cellulose, natural fibers, mineral wools, cementitious foam, poly urethane,

Lab 10 – Tensile & Hardness Testing of the Material

FINAL Exam

HCCC POLICIES, STATEMENTS, AND SERVICES:
https://www.hccc.edu/administration/academic-affairs/syllabus-addendum.html