ARC 112
CONSTRUCTION MATERIALS AND METHODS

COURSE DESCRIPTIONS:

Prerequisites: None
Corequisites: None

This course introduces construction materials and their methodologies. Topics include construction terminology, materials and their properties, manufacturing processes, construction techniques, and other related topics. Upon completion, students should be able to detail construction assemblies and identify construction materials and properties. Course Hours per Week: Class, 3. Lab, 2. Semester Hours Credit, 4

LEARNING OUTCOMES:

A student who successfully completes this course should be:

a. Able to identify construction methods.
b. Able to identify traditional and sustainable construction materials and their properties.
c. Able to describe basic construction sequences for residential and commercial applications.
d. Able to demonstrate an understanding of contruction related terminology.

OUTLINE OF INSTRUCTION:

I. Course Introduction
    A. Course Outline and Policies
    B. General Planning Constraints
        1) Building Codes
            (a) Model Codes
            (b) State Codes
            (c) Occupancy Types
                (1) Construction Types
            (d) Fire protection issues
        2) Zoning
            (a) Setbacks
            (b) Parking Requirements
            (c) Fire zone
        3) Owner's Programs
        4) Budget
        5) Site
            (a) Landform
            (b) Access
            (c) Climate
            (d) Circulation
            (e) View

C. Project manual organization
    1) CSI Master format
    2) Uniformat
    3) EJDOC

II. Site work and site preparation
A. Soil types
    1) Particle size
    2)

2) Grade
3) Support
4) Lap
5) Hooks
6) Mesh categories

E. Formwork
F. Placement
G. Finishing
H. Testing
1) Compression
2) Slump

IV. Site Cast Concrete
A. Slabs
1) On grade
2) Void
B. Joists
1) Distribution ribs
C. Drop panels
D. Columns
E. Special systems
1) Lift slab
2) Tilt up
3) Shotcrete
4) Slip forming

V. Precast Concrete
A. Types and sizes
B. Joints
C. Span capabilities
D. Economic and production considerations.

VI. Masonry
A. Types of masonry
B. Brick
1) Sizes
2) Bond patterns
(a) Orientation of bricks
(1) Header
(2) Stretcher
(3) Rowlock
(4) Sailor
(5) Soldier
(6) Shiner
3) Manufacturing techniques

C. Elastic behavior
    1) Yield stress
    2) Ultimate stress
D. Standard rolled shapes
E. Steel Joists
F. Decking
G. Welded joints
    1) Detailing symbols
    2) Joint types
H. Bolted joints
    1) Bolt types
    2) Friction V.s. Shear connections
    3) Moment V.s. Shear connections
    4) Eccentric V.s. Concentric connections
    5) Gage
I. Joint types
    1) Beam to column connections
    2) Beam to girder connections
    3) Coping flanges and webs
J. Avoiding galvanic corrosion by insulating dissimilar metals from one another.

VIII. Wood and Plastics
A. Wood properties
    1) Softwood V.s. Hardwood
    2) Non isotropic behavior
    3) Hygroscopicity
    4) Seasoning defects
        (a) Warps
        (b) Knots
        (c) Insect damage
        (d) Rot
B. Lumber sizes
    1) Nominal V.s. Actual sizes
C. Framing member terminology
D. Connections
    1) Nailed joints
    2) Stapled joints
    3) Bolted joints
    4) Specialty connectors
E. Sheet and panel products
    1) Plywood
    2) Engineered wood products
    3) Engineered woodboard products
    4) Grade stamps and performance

IX. Thermal and Moisture Protection
A. Waterproofing
B. Dampproofing

C. Insulation
    1) Board
    2) Batt
    3) Blown
D. Roofing
    1) Roof styles
    2) Shingles
    3) Built up roofing
    4) Single ply membranes
    5) Sprayed applied

X. Doors and Windows
A. Door types
    1) Swing doors
        (a) Hand
    2) Fire doors and egress
B. Window types
C. Glazing types
    1) Annealed
    2) Heat strengthen
    3) Tempered
    4) Laminated
D. Glazing coatings
E. Glazing systems
F. Storefront

XI. Finishes and Finish Carpentry
A. Plaster
B. Drywall
C. Partitions and demountable partitions
D. Ceilings
E. Interstitial ceilings

XII. Curtain wall Systems
A. Stick built
B. Column and Spandrel
C. Units
D. Column and Cover
E. Panel Systems

XIII. Storefront Systems and Glazing

XIV. Paints and Coatings
- A. Pigments
- B. Driers
- C. Extenders
- D. Surface preparation
- E. Sprayed applied

XV. Roofing Systems and Types
- A. Roofing
  - 1) Roof styles
  - 2) Shingles
  - 3) Built up roofing
  - 4) Single ply membranes
  - 5) Sprayed applied

XVI. Fire Protection
- A. Egress (doors/windows) (corridor sizing & stairwells)
- B. Flame spread and fire dynamics
- C. Wall ratings
- D. Fire walls and smoke doors/partitions
- E. UL wall and ceiling/roof assemblies
- F. Wall penetration
- G. Insulation materials
- H. Sprinklers
- I. Emergency lighting
- J. Fire rated materials
- K. Elevator shafts