



COURSE OUTLINE

ARC 134

Course Number

CONSTRUCTION FOR ARCHITECTURE

Course Title

3

Credits

3 / 0

Hours: lecture/laboratory/other (specify)

Catalog description:

Examines various forms and materials used in architecture design. Study of materials, structures and building systems, forms, functions, and appropriate applications for building construction.

Prerequisites: sophomore standing in Architecture or divisional permission.

Co-requisites: ARC227

Required texts/other materials:

Reference Division Booklist

Last revised: Fall 2007

Course coordinator: Garry A. Perryman

Information resources:

- Sweets Product Catalogs, in the studio and Library
- Architectural Graphic Standards, on reserve in Library
- Fine Homebuilding Magazine,
- Architecture and Architecture Record Magazines, in library

Other learning resources:

Many online product catalogs easily accessible.

Course goals:

1. Familiarize the student with a wide range of materials that can be used in architectural design and construction.
2. Make the student more aware of the capabilities and drawbacks of the more common structural materials, i.e., steel, concrete, brick, wood and stone.
3. Supply the student with fundamental knowledge, physical behavior, and practical values of architectural materials.
4. Show methods of construction required for proper installation, erection, and finishing of many materials.
5. To develop a practical approach in choosing architectural and construction materials based on use, desired results, durability, availability, and cost.

Course-specific General Education goals and objectives.

The Student will be able to:

1. Enumerate the advantages and disadvantages of the more common materials.
2. Recount facts about most materials such as weight per cubic foot, ultimate strength, normal working stress, nominal and actual sizes of common materials, durability due to weather or use, availability and relative cost.
3. Describe the methods of construction required by each material during its incorporation in a structure.
4. Reasonably predict the durability of materials under a set of given conditions.
5. Capable of choosing architectural finishing material wisely, based on their function.
6. Discuss the history of modern manufacturing methods for common materials.
7. Describe the construction steps in a simple wood, concrete, or steel structure and be able to relate the general methods of construction and installation of such items as doors, windows, hardware, locksets, wiring, water piping, and sanitary waste lines.

Units of study

Unit 1: Making Buildings

In this unit, you will learn:

- The various professionals who work together to create buildings, and how they relate to one another.
- The legal context within which we build.
- How building heights and areas are restricted according to the type of construction used.
- Why it is important to build sustainably.
- The information resources from which we work when we design buildings.

Unit 2: Foundations

In this unit, you will learn:

- What a building foundation does.
- The types of soils on which buildings are founded, and their characteristics.
- How soil is excavated for a building.
- How soil is kept from sliding back into an excavation.
- How water is kept out of an excavation.
- The various types of shallow and deep foundations, and the conditions under which each is appropriate.

Unit 3: Wood and Heavy Timber Frame Construction

In this unit, you will learn:

- The trees that are commonly sawed into construction lumber, and the characteristics of their wood.
- The effects of moisture on wood.
- How trees are processed into wood and wood products.
- Nominal and actual dimensions of lumber.
- The types of wood products used in construction.
- The many types of wood fasteners, and typical uses for each.
- Why wood decays, and how to prevent it.
- Preservative and fire-retardant treatments for wood and which species of wood are naturally resistant to decay and insects.
- Typical prefabricated wood components for building.
- The historical background of today's light and heavy timber frame buildings.
- Typical details of Mill construction.
- Why Mill construction is relatively resistant to fire.
- Typical details of contemporary heavy timber buildings.
- Why wood light frame construction is so popular in North America.
- How wood light frame construction evolved.
- The logic of platform frame construction, and why it is generally preferable to balloon framing.
- How to lay out light frame floors, walls, and roofs.
- Typical details of wood light framing.
- Fire safety precautions for wood light frame buildings.
- Why light frame construction can lead to both good and bad architecture.

Unit 4: Exterior and Interior Finishes for Wood Light Frame Construction

In this unit, you will learn:

- The sequence in which the exterior of a wood light frame building is finished and the reasons for this sequence.
- How to finish the edges of the roof and how to avoid ice dams.
- How to install windows and doors, typical siding materials and exterior trim details.
- All about paints and other coatings for exterior and interior use.
- The sequence in which interior finish operations are carried out, and why.
- How mechanical and electrical services are installed in wood light framing.
- Alternative ways of insulating wood light framing and how to increase levels of insulation beyond what a frame can normally accommodate.
- Wall and ceiling finish materials.
- Interior doors, casings, baseboards, stairs, cabinets, and other millwork.
- Installation of flooring materials.

Unit 5: Brick Masonry, Stone and Concrete Masonry and Masonry Load-bearing Wall Construction

In this unit, you will learn:

- Alternative ways of making mortar for masonry
- How bricks are manufactured and specified
- Standard sizes and shapes of bricks
- The basics of bricklaying
- Brick bonds

Unit 5 (cont'd)

- Spanning openings in brick walls and spanning space with brick domes and vaults
- Types of building stone and their properties
- How stone is quarried and milled
- Ways of building with stone
- How concrete masonry is manufactured
- Typical shapes and sizes of concrete masonry units
- Decorative concrete masonry units
- How to build concrete masonry walls
- Types of masonry walls
- Typical details for masonry walls
- All about flashings in masonry walls
- Typical spanning systems with masonry walls
- How to deal with special problems of masonry construction

Unit 6: Steel Frame Construction and Light Gauge Steel Frame Construction

In this unit, you will learn:

- The historical evolution of steel construction
- How steel structural shapes are manufactured
- Typical steel structural shapes
- Methods of connecting steel shapes to create a building frame
- Details of typical steel connections
- How a steel frame resists lateral loads
- The construction process for a steel frame: fabricator and erector
- Decking for steel frames
- Fireproofing of steel
- Spanning long distances with steel
- How light gauge steel framing is similar to wood platform framing
- How light gauge frame members are manufactured
- Typical details and framing procedures
- How to deal with the high thermal conductivity of steel framing members
- All about every architectural metal, from aluminum to zinc
- How to work metals

Unit 7: Concrete Construction and Concrete Framing Systems

In this unit, you will learn:

- A history of concrete construction
- The difference between cement and concrete
- How cement is manufactured
- Types of cement and their uses
- Aggregates, water, and admixtures for concrete
- How to make, place, and cure quality concrete
- Reinforcing bars and fabrics for concrete
- Concepts of reinforcing and pre-stressing concrete
- Concepts of one-way and two-way concrete floor and roof structures
- Standards for concrete construction
- How to cast and finish a concrete slab on grade
- How to form, reinforce, and cast a concrete wall
- How to form, reinforce, and cast a concrete column
- Formwork and reinforcing for typical one-way structures and two-way structures
- How to create satisfactory architectural concrete surfaces

Unit 7 (cont'd)

- How structures are post tensioned
- How to select an appropriate concrete framing system for any building
- How to cut and drill concrete, stone, and masonry
- The standard configurations of pre-cast slabs, beams, columns, and walls
- How pre-cast concrete structural elements are manufactured
- Typical details for joining pre-cast concrete elements
- Typical framing concepts for pre-cast concrete buildings
- Many ways of fastening things to concrete

Unit 8: Enclosing Systems; Roofing, Glass and Glazing, Windows and Doors, and Cladding Systems

In this unit, you will learn:

- The difference between low-slope and steep roofs
- Appropriate materials and systems for roofing both low-slope and steep roofs
- All about insulation, moisture vapor, and vapor retardants in roofs and walls
- Alternative ways of insulating low-slope roofs
- Typical details of every kind of roof
- A brief history of glass and glassmaking
- Types of glass and the uses of each
- The energy implications of glass and how to harness them to a building's advantage
- Managing solar heat gain with glass
- How to glaze small and large lights
- Miraculous ways of installing glass in buildings such as suspended glazing, mullionless butt-joint glazing, and four-sided silicone flush glazing
- Types of doors and how to install doors
- Types of window operation and the advantages and disadvantages of each
- Window frame materials and their advantages and disadvantages
- Window testing, standards, and labeling
- All about the plastics used in every phase of building construction
- The functions of building cladding
- Conceptual approaches to water tightness in cladding design
- The Rainscreen Principle
- Sealant materials and sealant joint design principles
 - Load-bearing walls and curtain walls
- How cladding systems are tested
- How to detail a masonry veneer curtain wall
- Alternative ways of attaching a stone curtain wall to a building
- Pre-cast concrete curtain walls
- Glass-fiber-reinforced concrete (GFRC) cladding panels
- Exterior insulation and finish system (EIFS) and how to avoid its traditional problems
- Aluminum extrusion design
- Using thermal breaks
- Modes of assembly of metal and glass walls
- Details of a typical outside-glazed curtain wall system
- Details of a typical inside-glazed curtain wall system
- Choosing a metal and glass curtain wall system
- Applying the Rainscreen Principle to metal and glass cladding
- How to keep water from penetrating slope glazing
- How the process of curtain wall design works

Unit 9: Interior Finishes, Walls and Partitions, Ceilings and Floors.

In this unit, you will learn:

- Alternative ways of fitting electrical and mechanical services into a building
- The sequence of interior finishing operations for a large building
- Building code provisions that relate to interior finishes
- Criteria for selecting interior finishes
- Some long-term trends in interior finishes for buildings.
- The various types of interior walls and their functions
- Applying plaster and gypsum board over interior framing
- Masonry partition systems
- Wall and partition systems
- How to reduce sound transmission between apartments and offices
- Masonry partition systems
- Standard accessories for good detailing of partitions
- Functions of finish ceilings and floors
- Pros and cons of exposing mechanical and electrical apparatus
- Code provisions that relate to ceilings and floors
- How to reduce noise transmission through floors
- Alternative choices of flooring materials, hard and soft
- Installation details for flooring and ceilings
- How to deal with different thicknesses of flooring.

Evaluation of student learning:

Quizzes will be given approx. at the end of each unit in the testing center. You will be given one week in which to take the quiz. If you miss the quiz there is no makeup, unless prearranged w/ the instructor and you will lose 50% of the grade.

Quizzes and written exercises = @ approx. end of each unit = 80%

Project = 20%

Academic Integrity Statement:

Students are expected to comply with the college-wide requirements for academic integrity. Mercer County Community College is committed to Academic Integrity—the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work. Presenting another individual's work as one's own and receiving excessive help from another individual will qualify as a violation of Academic Integrity. The entire policy on Academic Integrity is located in the Student handbook and is found on the college website (http://www.mccc.edu/admissions_policies_integrity.shtml).