

I. COURSE INFORMATION:

- A. Division: Science and Math
- Department: Architecture
- Course ID: ARCH 250
- Course Title: Materials and Construction
- Units: 4
- Lecture Hours: 3
- Laboratory Hours: 3
- Prerequisite: ARCH 146
- Corequisite: None
- Dept. Advisory: None

- B. Catalog and Schedule Description: A survey of sources, properties and production of the common materials used in construction such as steel, iron, non-ferrous metals and their alloys, concrete, brick and wood. Construction project will give students knowledge and experience in building construction as it relates to architecture.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course, the student should be able to:

- A. Select the appropriate materials for a given structural requirement
- B. Apply proper selection principles in the choice of materials
- C. Analyze the critical points of a structure and identify why it may fail
- D. Apply cost benefit principles to the selection of construction materials
- E. Analyze the combinations of materials
- F. Apply the principles of sound building construction systems to new building situations
- G. Interpret topographic information
- H. Apply the knowledge of basic surveying techniques to a building layout
- I. Analyze the methods of obtaining many different shapes in concrete
- J. Apply building code requirements in the use of various materials

IV. COURSE CONTENT:

- A. Determinants influencing material selection
 - 1. Forces on structures
 - a. Rain
 - b. Wind
 - c. Heat
 - d. Earthquakes
 - e. Floods
 - f. Soil conditions
 - g. Fire
 - h. Tree roots
 - i. Etc.
 - 2. Economics
 - a. Expense of materials, labor, fees, etc.
 - b. Quality
 - 3. Appearance
 - a. Conformity
 - b. Style
 - c. Landscaping
- B. Elements that affect all materials
 - 1. Stress
 - 2. Tension
 - 3. Compression

4. Shear
5. Torsion
6. Bending
- C. Regulations affecting construction
 1. International Building Codes (IBC)
 2. OSHA requirements
 3. ADA compliance
 4. Electric, plumbing and fire codes
 5. Health department codes
 6. American Society for Testing Materials
- D. Electricity
 1. Understanding electricity
 2. Wires and wiring
 3. Switches, outlets and circuit breakers
 4. Planning circuits
 5. Wiring code
 6. Fluorescent fixtures
- E. Plumbing
 1. Home plumbing systems
 2. Water supply and disposal
 3. Plumbing repairs and installations
 4. Types of plumbing pipes and their fittings
 5. Installation of plumbing systems
 6. Gas
- F. Heating and Cooling
 1. Warm-air systems
 2. Hot-water systems
 3. Heat distribution
 4. Electric, gas and oil furnaces
 5. Heat pump
 6. Insulation
 7. Air conditioning systems
 8. Electronic air cleaners
 9. Dehumidifiers
 10. Ventilation
 11. Controls for heating and cooling systems
 12. Installation of HVAC Systems
- G. Soils engineering
 1. Bearing capacity of soils
 2. Water
 3. Subsidence of soil
 4. Soils and soils characteristics
 5. Landslides and slope stability
 6. Compaction
 7. Moisture content
 8. Footings and pilings
 9. Excavations
 10. Grading
- H. Asphalt
- I. Concrete
 1. Ingredients and admixtures
 2. Portland cement
 3. Light weight concrete
 4. Forms
 5. Steel reinforcement
 6. Methods of building

- 7. Concrete mixtures
- J. Wood
 - 1. Physical characteristics and growth
 - 2. Classifications
 - 3. Moisture
 - 4. Defects
 - 5. Manufactured lumber
 - 6. Plywood
 - 7. Installation of light wood frame and heavy timber systems
- K. Steel
 - 1. History and examples of structures
 - 2. General characteristics
 - 3. Production processes
 - 4. Types of alloys
 - 5. Strength
 - 6. Mechanical shaping and tempering
 - 7. Joining and fastening steel
- L. Non-Ferrous materials
 - 1. Copper
 - 2. Aluminum
 - 3. Alloys
 - 4. Application of non-ferrous materials
- M. Manufacturing of Masonry Units
 - 1. Concrete block
 - 2. Stone
 - 3. Brick
- N. Contemporary materials
 - 1. Glass
 - a. Composition
 - b. Wind loads
 - 2. Plastics
 - a. Characteristics
 - b. Production
 - 3. Other materials
 - a. Gypsum Wanboards
 - b. Paints
 - c. Roof Coverings
 - d. Waterproofing membranes

V. METHODS OF INSTRUCTION: (Please check all that apply and add any additional not listed.)

- [Lecture](#)
- [Class and/or small group discussion](#)
- Critical evaluation of texts, newspapers, journal articles, and other printed research
- [Critical evaluation of](#) films, [videotapes](#), audiotapes, or other media forms
- Classroom demonstrations
- Field trips
- Guest speakers
- Laboratory Activities

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

- A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: Read the chapter on steel production and write a brief outline of the production technique.
- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Write a comparative study of the use of materials in your proposed structure. Be sure to include an analysis of the cost, strength, and coding requirements for the materials you selected.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: Examine the newer construction projects on campus and compare the activity spaces to the activity spaces in older buildings. Hypothesize what lead the architect to design the newer buildings this way. How would the construction of your selected space differ if different materials were chosen?
- D. Laboratory Activity. Laboratory is an integral part of the course and may include projects such as: Construction of scale models of observed spaces while analyzing the code and materials considerations.

VII. EVALUATION:

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

- Portfolios
- Projects
- Written papers or reports
- Presentations (oral and visual)
- Work performance (internships or field work)
- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other:
- Other:
- Other:

VIII. TYPICAL TEXTS:

- A. Construction Principles, Materials, and Methods, Simmons, Leslie; Wiley, 2001.
- B. Fundamentals of Building Construction: Materials and Methods, Allen, Edward and Iano, Joseph; Wiley, 2003.
- C. Architectural Details 2003, Schittich, Green and Anderle, Neill; Architectural Press, 2004.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

DRAFTING PAPER
SKETCH PAPER/BOOK
ILLUSTRATION BOARD
X-ACTO KNIFE AND BLADES AND UTILITY KNIFE
A VARIETY OF DRAWING MEDIA: CHARCOAL, CONTE CRAYONS, PAINT
A VARIETY OF CONSTRUCTION MEDIA: PLYWOOD, GLUE, NAILS,
SCREWS
T-SQUARE
TRIANGLES

San Bernardino Valley College
Curriculum Approved: January 24, 2005

ARCHITECTURAL ENGINEERING SCALE
DRAFTING TAPE
TECHNICAL PENS/PENCILS/FELT TIP PENS
CUTTING BOARD
METAL STRAIGHT-EDGE
HAND SAW
HAMMER
SCREW DRIVERS – (PHILLIPS, FLAT HEAD, ETC
MEASURING TAPE – (20' MIN)
WORK GLOVES
EYE PRTECTION
BREATHING MASKS
PROTECTIVE SHMOUL (SP).
CARPENTER'S SQUARE
CARPENTER'S PENCIL