

**CONS 103 Course Outline as of Fall 2022****CATALOG INFORMATION**

Dept and Nbr: CONS 103 Title: CONS MAT, MET &amp; EQPM

Full Title: Construction Materials, Methods and Equipment

Last Reviewed: 12:00:00 AM

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	1.50	17.5	Lecture Scheduled	26.25
Minimum	3.00	Lab Scheduled	4.50	6	Lab Scheduled	78.75
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 52.50

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

In this course students will explore the materials, methods of construction, tools, and equipment used in construction. Areas covered will include construction site organization, materials handling and staging, materials and product physical properties, suitable applications for different materials, manufacturing, and service life expectations. Included will be common construction methods and building component detailing to create functioning systems. Additionally, students will be introduced to the variety of tools and equipment typically utilized to incorporate the specific materials into the construction product. The course shall discuss proper use of Personal Protective Equipment (PPE) and safe work practices. Field trips may be required.

**Prerequisites/Corequisites:****Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: In this course students will explore the materials, methods of construction, tools, and equipment used in construction. Areas covered will include construction site organization, materials handling and staging, materials and product physical properties, suitable applications for different materials, manufacturing, and service life expectations. Included will be common construction methods and building component detailing to create functioning systems. Additionally, students will be introduced to the variety of tools and equipment typically utilized to incorporate the specific materials into the construction product. The course shall discuss proper use of Personal Protective Equipment (PPE) and safe work practices. Field trips may be required. (Grade Only)

Prerequisites/Corequisites:

Recommended:

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>		Effective:	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Certificate Applicable Course

## **Approval and Dates**

Version:	01	Course Created/Approved:	
Version Created:	12/11/2021	Course Last Modified:	12/20/2021
Submitter:	Robert Grandmaison	Course last full review:	
Version Status:	Draft New Course (First Version)	Prereq Created/Approved:	
Version Status Date:	12/11/2021	Semester Last Taught:	
Version Term Effective:	Fall 2022	Term Inactive:	

## **COURSE CONTENT**

**Student Learning Outcomes:**

Upon completion of the course, students will be able to:

1. State standard units of measure for all major construction materials.
2. Identify the differences between the properties of and the use of construction raw materials and finish materials.
3. List the typical variety of materials and products that are commonly used in construction projects.
4. Describe the general sequencing of the construction process.

## **Objectives:**

In order to achieve these learning outcomes, during the course students will:

1. Study the physical properties and proper applications of construction materials.
2. Describe the relationship between material properties and structural form.
3. Research relevant manufacturing processes and availability of various materials.
4. Develop an understanding of material delivery logistics, including product lead time, on the construction site.
5. Explain the basic safe use of equipment and tools.
6. Research the selection of materials based on availability, suitability, and costs.

## **Topics and Scope:**

### **I. Overview of Materials and Construction and Building Types**

- A. Variety of construction materials and uses
- B. Factors affecting choice of materials and structural form
- C. Material fundamentals in physical properties, durability, sustainability, strength, and structural performance

### **II. Construction Materials: Manufacturing, Properties, Comparative Performance, Applications in Construction, Associated Equipment, and Placement**

#### **A. Temporary construction components**

1. Scaffolding
2. Shoring
3. Fencing
4. Construction facilities
5. Vehicular access and parking
6. Barriers and enclosures
7. Cleaning, sorting, and waste management
8. Stormwater pollution prevention program (SWPPP) and erosion control

#### **B. Soil and aggregates**

1. Soil types
  - a. Soil characteristics
  - b. Moisture, density, and strength
  - c. Testing
2. Soil stabilization
  - a. Overexcavation and recompaction
  - b. Chemical additives
  - c. Geotextile fabrics
  - d. Retaining walls
  - e. Soil nails and piles
3. Manufactured aggregates
  - a. Select fill
  - b. Aggregate base
  - c. Specialty aggregate mixes

#### **C. Surfacing and pavement**

1. Asphaltic-concrete
2. Concrete
3. Permeable surfaces
  - a. Grass pavers
  - b. Decomposed granite
  - c. Asphalts
  - d. Concrete
4. Roadway surfacing

- a. Seal coat
- b. Slurry seal
- c. Chip seal
- 5. Striping, signage, and markings
- D. Underground utilities
  - 1. Sewer
  - 2. Storm drains
  - 3. Water and fire protection systems
  - 4. Joint trench
  - 5. Utility structure components
    - a. Vaults
    - b. Manholes
    - c. Inlets
    - d. Pump stations and mechanical systems
- E. Landscaping and irrigation
  - 1. Planting
  - 2. Irrigation systems
- F. Fencing and outdoor specialty equipment
- G. Concrete
  - 1. Site concrete versus building concrete
  - 2. Concrete mix and additives
  - 3. Testing
  - 4. Formwork
  - 5. Concrete finishes
  - 6. Construction and control joints
  - 7. Concrete accessories and embedments
  - 8. Concrete reinforcing
    - a. Steel bars
    - b. Welded wire mesh
    - c. Stressed tendons
  - 9. Precast concrete
  - 10. Lightweight concrete
- H. Masonry
  - 1. Concrete masonry units (CMU)
  - 2. Brick
  - 3. Stone
  - 4. Mortar
  - 5. Accessories
  - 6. Grouting
- I. Metals
  - 1. Structural steel
    - a. American Institute of Steel Construction (AISC) shapes and sizing
    - b. Connections
  - 2. Metal framing
  - 3. Metal fabrications
  - 4. Metal decking
  - 5. Non-ferrous metals
- J. Wood
  - 1. Rough carpentry
    - a. Heavy timber
      - i. Species
      - ii. Moisture content

- iii. Lumber grading
    - iv. Sizes
  - b. Dimensional lumber
    - i. Species
    - ii. Moisture content
    - iii. Lumber grading
    - iv. Sizes
  - c. Prefabricated structural components
    - i. Glulam beams
    - ii. Structural composite lumber
    - iii. I-joist
    - iv. Trusses
    - v. Structural insulated panels (SIP)
  - d. Sheathing products
    - i. Plywood
    - ii. Other sheathing products
  - e. Fasteners, hardware, and adhesives
    - i. Nail types
    - ii. Staples
    - iii. Screws
    - iv. Prefabricated connectors
    - v. Adhesives
- 2. Finish carpentry
  - a. Exterior finish carpentry
  - b. Interior finish carpentry
  - c. Cabinetry and casework
- K. Thermal and moisture protection
  - 1. Waterproofing
    - a. Membrane waterproofing
    - b. Sheet-applied
    - c. Fluid-applied
  - 2. Sealants
    - a. Joint fillers
    - b. Expansive
    - c. Acoustical
    - d. Fire and smoke sealants
  - 3. Insulation types
    - a. Fibrous insulation
    - b. Sound insulation
    - c. Batt insulation
    - d. Rigid insulation
    - e. Foam-in-place insulation
    - f. Fire-proofing insulation
- L. Roofing
  - 1. Membrane systems
    - a. Built-up systems
    - b. Single ply systems
  - 2. Shingle systems
  - 3. Metal roofing
  - 4. Foam roofing
  - 5. Insulation
  - 6. Specialty roofs

- M. Sheet metal
  - 1. Flashing: roof, door and window, caps, and parapets
  - 2. Gutters and downspouts
  - 3. Louvers
- N. Doors and door hardware
  - 1. Function and styles
    - a. Fire ratings
    - b. Accessibility requirement
  - 2. Metal doors and frames
  - 3. Wood doors
  - 4. Specialty doors
  - 5. Door hardware
- O. Windows and glass
  - 1. Function and styles
  - 2. Frame and sash materials
  - 3. Aluminum storefront
  - 4. Curtain wall
  - 5. Glass and mirror
- P. Lath and plaster
  - 1. Furring and lath
  - 2. Cement plaster
  - 3. Plaster accessories
  - 4. Finish
- Q. Gypsum wallboard
  - 1. Wallboard types
  - 2. Wallboard accessories
  - 3. Cementitious backer panels
  - 4. Finish
- R. Tile
  - 1. Ceramic
  - 2. Stone
  - 3. Stone slab
- S. Flooring
  - 1. Carpet
  - 2. Engineered
  - 3. Wood
  - 4. Liquid and emulsion applied flooring
  - 5. Resilient flooring and base
  - 6. Terrazzo
- T. Ceilings
  - 1. Suspended ceiling systems
  - 2. Other
- U. Painting and staining
  - 1. Volatile Organic Compounds (VOC)
  - 2. Exterior and interior uses
  - 3. Special Coatings
- V. Specialties
  - 1. Site furnishings
  - 2. Toilet partitions and restroom accessories
  - 3. Food Service and refrigeration
  - 4. Kitchen appliances
  - 5. Laboratory/medical

6. Fire extinguishing equipment
  7. Lockers and benches
  8. Postal specialties
  9. Wardrobes and closets
  10. Flagpoles
  11. Wayfaring devices
  12. Signage
  13. Loading dock equipment
  14. Unit kitchens
- W. Furnishings
- X. Window Coverings
- Y. Fixed seating
- Z. Special Construction
1. Pre-engineered buildings
  2. Manufactured units
  3. Swimming pools
  4. Solar energy systems
    - a. Passive systems
    - b. Photovoltaic (PV) systems
- AA. Conveying systems
1. Elevators
  2. Moving stairs and walks
  3. Accessibility lifts
- BB. Plumbing and piping
1. Cold water distribution
  2. Hot water distribution
  3. Fixtures
  4. Process piping
  5. Gas piping distribution
  6. Water supply and treatment
  7. Fluid waste disposal and treatment
- CC. Fire protection
1. Chemical suppression
  2. Fluid suppression
- DD. Heating, ventilation, and air conditioning (HVAC)
1. Heating systems
  2. Cooling systems
  3. Air Distribution
- EE. Control systems
- FF. Electrical
1. Power generation
  2. Power transmission
  3. Distribution
  4. Lighting
  5. Low voltage systems
- GG. Alternative building materials and processes

**Assignment:**

1. Reading assignments (10-20 pages per week)
2. Study question sets (1-3 weekly)
3. Field Reports (6-12)

4. Quizzes (1-4)
5. Midterm exam
6. Final exam

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Field reports	Writing 10 - 20%
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**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Study question sets	Problem solving 20 - 50%
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**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%
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**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes and exams	Exams 30 - 50%
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**Other:** Includes any assessment tools that do not logically fit into the above categories.

Class participation	Other Category 5 - 10%
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**Representative Textbooks and Materials:**

Fundamentals of Building Construction: Materials and Methods. 7th edition. Allen, Edward and Iano, Joseph. Wiley. 2019

Construction Planning, Equipment, and Methods. 9th edition. Peurifoy, Robert L., Schexnayder, Clifford, Schmitt, Robert, and Shapira, Aviad. McGraw Hill. 2018

Instructor prepared materials



## **OTHER REQUIRED ELEMENTS**

### **STUDENT PREPARATION**

Matric Assessment Required:	X	Exempt From Assessment
Prerequisites-generate description:	NP	No Prerequisite
Advisories-generate description:	NA	No Advisory
Prereq-provisional:	N	NO
Prereq/coreq-registration check:	N	No Prerequisite Rules Exist
Requires instructor signature:	N	Instructor's Signature Not Required

### **BASIC INFORMATION, HOURS/UNITS & REPEATABILITY**

Method of instruction:	02	Lecture
	90	Field Experience / Field Trip
	04	Laboratory
Area department:	ENGR	Engineering and Applied Technology
Division:	73	Science, Technology, Engineering & Mathematics
Special topic course:	N	Not a Special Topic Course
Program status:	1	Certificate Applicable Course
Repeatability:	00	Two Repeats if Grade was D, F, NC, or NP
Repeat group id:		

### **SCHEDULING**

Audit allowed:	N	Not Auditable
Open entry/exit:	N	Not Open Entry/Open Exit
Credit by exam:	N	Credit by examination not allowed
Budget code: Program:	0000	Unrestricted
Budget code: Activity:	0909	Construction Technology

### **OTHER CODES**

Discipline:	Construction Management OR Construction Technology OR Architecture	
Basic skills:	N	Not a Basic Skills Course
Level below transfer:	A	1 Level Below the Transferable Level
CVU/CVC status:	N	Not Distance Ed
Distance Ed Approved:	N	
Emergency Distance Ed Approved:	N	None
Non-credit category:	Y	Not Applicable, Credit Course
Classification:	Y	Career-Technical Education
SAM classification:	B	Advanced Occupational
TOP code:	0957.00	Civil and Construction Management Tech
Work-based learning:	N	Does Not Include Work-Based Learning
DSPS course:	N	Not a DSPS Course
In-service:	N	Not an in-Service Course
Lab Tier:	21	Credit Lab - Tier 1