

CONSTRUCTION TECHNOLOGY (Construction-Comprehensive 17002)

Grade Level:	11-12
Prerequisite:	Must take semesters in sequence. (Woodworking I or instructor approval without)
Length:	1 Year
Period(s) Per Day:	1
Credit:	1
Credit Requirement Fulfilled:	Vocational/Elective

Course Description:

Students will develop lifelong working habits and a strong respect for safety in a working environment. Employability skills such as: work ethic, punctuality, teamwork, problem solving and showing pride in your work are emphasized. Measurement and applied mathematics are emphasized in material calculations and detailed building estimates. Using a hands-on, problem solving and project oriented approach, students will gain construction specific knowledge, self-reliance and confidence. Students will become skilled in operating power tools while learning proper procedures, materials and techniques related to the building construction industry.

Course Objectives and Expectations:

1. Develop a foundation of knowledge and hands-on skills to prepare the student for a career in the construction industry or to become more self-reliant and confident adult in future construction projects.
2. To develop more employable young adults in our community by stressing skills such as: punctuality, work ethic, teamwork, problem solving, and respect for authority.
3. Develop good work habits such as working with a, detailed set of plans, using a good plan of procedure, and demonstrating pride in their work.
4. Formulate and analyze detailed material and labor estimates to develop a base understanding of construction costs, timelines, and complexity.
5. To create a greater awareness of safety in our everyday routines.
6. Use critical thinking, teamwork and problem solving techniques in class building projects.

Student Objectives:

The student will be able to:

1. Identify all the applicable tools and machines, follow safety rules, and demonstrate proper machine operation.
2. Identify construction components of a residential home then evaluate and demonstrate their function.
3. Develop self-reliance and confidence needed to solve problems in construction.
4. Identify and analyze different construction materials, equipment and fasteners.

5. Formulate a material list for construction projects.
6. Calculate residential building cost estimations and gain an awareness of real world costs and timelines.
7. Use critical thinking, teamwork and problem-solving techniques in building class projects.
8. Wire basic residential circuits safely, identify wiring materials and tools, and understand electrical theory.
9. Perform basic plumbing operations and be introduced to specialty tools and materials
10. Explore the career opportunities of different trades such as –carpenters, plumbers, and electricians. Evaluate job growth, work conditions, wages, and qualifications of construction relevant career paths.
11. Understand OSHA requirements and trainings.

Course Outline:

Scaled Reading and Construction Industry Measurement Tools
 Hand Tool Operation and Safety
 Power Tool Operation and Safety
 Site Preparation, Survey, Permits, Codes, and Utilities
 Building Plans and Scaled Measurement
 Concrete and Foundations
 Wall, Floor, and Roof Framing
 Estimating – Materials, Labor, Equipment, & Misc. Expenses
 Residential Building Design and Construction
 Plumbing
 House Wiring
 HVAC & Insulation
 Energy Conservation and Alternative Forms of Energy
 Finish Carpentry
 Wall Finishing – Painting, Alternative Products and Techniques
 Build Sequence and Scheduling – General and Subcontracting
 Career Exploration – Growth, Wages, Trainings, Apprenticeships, College Otions
 Working Conditions, Interviews, Bureau of Labor and OSHA

Pacing and Montana Standards for Career and Vocational Technical Education:

Work Habits, Work Ethics, and Employability Skills	3.II.2-3, 5.II.3, 3.III.2
Scale Reading	5.II.1
Applied Construction Mathematics	5.II.1, 5.III.1
Tool and Machine Identification and Operation	4.II.1-3, 5.II.4
Residential Construction	
Building Components /Fabrication	4.II.1-3, 4.III.3
Shed Construction – Class Project	2.II.2-4, 3.II.1, 3.II.4, 3.II.6, 4.II.1-3, 5.II.4

Scale Down House Construction

4.II.1-3

Career Exploration

1.II.1-2, 1.III.1, 1.III.3

Course Outline and Assessments:

First Semester

Work Ethic and Workplace Etiquette

- I. Employability Skills
 - a. Expectations and Examples
 - b. Leadership and Teamwork Expectations
 - c. Weekly Employability Skills Evaluations
- II. Workplace Ethics and Etiquette
 - a. Examples and class discussion and experiences
 - b. Scenarios, consequences and moral dilemmas
 - c. Real-word examples, short essay questions and opinions

Scale Reading and Math in woodworking

- I. Scale Reading Procedure
 - a. Types of scale and graduations, construction industry specialty tools
 - b. Practice worksheets and tests, online resources
 - c. Measurement methods, tips, tricks and standards in construction
- II. Math in Construction
 - a. Adding and subtracting fractions and imperial measurements
 - b. Multiplying and dividing fractions and imperial measurements
 - c. Changing decimals to a useable fraction and back to a decimal
 - d. Complex “real world” math demonstrations and assignment

Tool and Machine Identification and Operation

- I. Hand Tools
 - a. Identification, safety and demonstrations
 - b. Using hand tools – Measurement and Technique Lab
- II. Machine Identification: anatomy, setup, correct operation, safety, maintenance, and calibration. Safety tests and demos are dated and filed for each student.
 - a. Jointer and Planer – Instructor Demo, Student Demo, Test
 - b. Power Miter Saw - Instructor Demo, Student Demo, Test
 - c. Table Saw - Instructor Demo, Student Demo, Test
 - d. Drill Press - Instructor Demo, Student Demo, Test
 - e. Router - Instructor Demo, Student Demo, Test
- III. Machine Block Demonstration
 - a. discuss procedure
 - b. machine experience and safe operation demonstration
 - c. Milling rough lumber to square stock – Sequence and procedure lab and test

Saw Horse Construction

- I. Develop material list
- II. List Plan of Procedure
- III. Construction Process

Site Layout and Survey

- I. Permits, Codes, Orientation, Services & Underground Utilities
- II. Site Layout – Transit Elevations, Squaring, & Batter Boards
- III. Plan Reading – Scaled Ruler, Blueprints, Elevations
- IV. Build Site Layout Labs

Concrete and Foundations

- I. Concrete properties and ingredients
- II. Concrete tools, techniques, forms, cost calculations
- III. Paver lab
- IV. Foundation types and building procedure – Block, Wood, Concrete

Second Semester

Residential Construction

- I. Identify components, estimate materials, labor and equipment, and perform construction process
 - a. Foundation system
 - b. Floor framing
 - c. Wall framing
 - d. Roof framing
 - e. Doors and Windows
 - f. Insulation
 - g. Stairs
 - h. Painting and wall finishes
- II. Scale Down House
 - a. Perform house construction process using $\frac{3}{4}'' = 1'$ scale
 - b. Relate process to career exploration

Plumbing

- I. Identify basic plumbing components and techniques
 - a. Sweat soldering
 - b. PVC gluing, tools, measurement, and applications
 - c. PEX applications, tools, and fittings

House wiring

- I. Theory and Safety
 - a. Terminology-volts, amps, ohms

- b. Ohms Law, Watts Law
- c. Electrical Safety Unit
- II. Circuits
 - a. Schematics
 - b. Basic Code Requirements
 - c. Wiring Lab - Techniques, Tools and Industry Standard Practices

Shed Construction

- I. Develop material list and cost estimate
- II. List Plan of Procedure
- III. Construction Process

Various Construction Projects

- I. Develop material list and cost estimate
- II. List Plan of Procedure
- III. Construction Process
- IV. Remodel/Restore or Replace Analysis

Career Exploration – Montana Career Pathway: Design & Construction

- I. Bureau of Labor and Statistics Resources
 - a. Career Outlooks and growth
 - b. Regional and national wages and working conditions
 - c. Qualifications, schooling and training opportunities
 - d. Interview of Construction Industry Workers
 - e. OSHA Training Options

Timeline:

Employability Skills, Work Ethic	½ week
Scale Reading and Math	1 week
Hand Tool Technique, Safety	1 weeks
Machine Operation & Safety	2 ½ weeks
Material I.D. Cost and Fasteners	½ week
Saw Horse Construction	2 weeks
Site Layout	1 ½ weeks
Building Plans	1 week
Concrete and Foundations	1 ½ weeks
Scale Down House Construction	4 weeks
Residential Construction and Cost Estimates	4 weeks
Finish Carpentry, Stairs, Etc.	1 ½ weeks
House Wiring	2 weeks
Plumbing	1 ½ weeks
HVAC, Insulation, Energy Sources & Conservation	1 week
Shed Construction	7 weeks

Assorted Construction Projects
Career Exploration, OSHA

2 weeks
1 ½ weeks

Resources:

- Montana Standards for Career and Vocational Technical Education
- Mark D. Feirer, John L. Feirer,
Carpentry & Building Construction
Glencoe
- Mark Huth
Basic Principles for Construction 5th edition
Cengage
- Bureau of Labor and Statistic [Bureau of Labor and Statistic](#)