Washington CTE

Construction Year 1 (2020)

Introduction to Construction 1	1 Introduction to Construction 1
Students will gain an understanding of the history of construction, contemporary construction practices and an overview of Construction management. This unit will also introduce the anatomy of a building, phases of construction and the various careers available in the construction industry.	Students will gain an understanding of the history of construction, contemporary construction practices and an overview of Construction management. This unit will also introduce the anatomy of a building, phases of construction and the various careers available in the construction industry.
Describe the essential elements of the Built Environment and their necessity in successful contemporary construction practice. 1.1	1 Describe the essential elements of the Built Environment and their necessity in successful contemporary construction practice. 1.1
Identify common traits from early civilizations 1.2	2 Identify common traits from early civilizations 1.2
Identify and describe the Seven Wonders of the World 1.3	3 Identify and describe the Seven Wonders of the World 1.3
Identify, research, and present to their peers a local “wonder” in their community. 1.4	4 Identify, research, and present to their peers a local “wonder” in their community. 1.4

Orally and in writing, describe types and key aspects of construction projects 1.5	**5** **Orally and in writing, describe types and key aspects of construction projects** 1.5
Explain construction project roles, their responsibilities, and their interdependencies. 1.6	**6** **Explain construction project roles, their responsibilities, and their interdependencies.** 1.6
Conduct a short research project to answer a question or solve a problem, organize the results to ensure comprehension by target audience, and present findings using digital media to display results. 1.7	**7** **Conduct a short research project to answer a question or solve a problem, organize the results to ensure comprehension by target audience, and present findings using digital media to display results.** 1.7
Describe the primary features distinguishing historic construction from contemporary construction 1.8	**8** **Describe the primary features distinguishing historic construction from contemporary construction** 1.8
Explain the critical function of construction management including cost management, schedule, budget, prints/drawings, quality, safety, compliance, communications and technology. 1.9	**9** **Explain the critical function of construction management including cost management, schedule, budget, prints/drawings, quality, safety, compliance, communications and technology.** 1.9
Describe the fundamental components in the anatomy of a building. 1.10	**10** **Describe the fundamental components in the anatomy of a building.** 1.10
Explain the phases of construction and why they are sequenced as they are. 1.11	**11** **Explain the phases of construction and why they are sequenced as they are.** 1.11

2 Materials Science 2

Through hands -on demonstrations, experiments, and projects, students will develop necessary critical thinking skills to evaluate and apply appropriate material choices for various types of construction projects in relation to the environments they are being built in.

Material Science, Construction Materials, and History

1 Define materials science and how it has changed through history 2.1

2 Explain the importance of materials sciences. 2.2

3 Identify construction materials 2.3

4 List several common materials used in the design and construction of structures. 2.4

5 Define simple properties of materials, such as strength, flexibility, transparency. 2.5

6 Select suitable materials for making a particular object based on their properties. 2.6

7 Explain the advantages and disadvantages of common materials used in engineering structures. 2.7

Classification of Matter

8 Classify matter 2.8

9 Summarize the spatial relationships found on the Periodic Table of Elements 2.9

10 Define types of structure, crystalline vs. amorphous 2.10

11 Apply basic chemistry to explain physical and chemical characteristics of the four categories of materials. 2.11

12 Apply knowledge of materials science to explain materials choices in design. 2.12

13 Use critical thinking to evaluate and apply appropriate materials choice for specific applications. 2.13

Bonding

14 Define types of bonding. 2.14

15 Identify types of properties 2.15

16 Relate properties to types of bonding 2.16

Physical and Mechanical Properties of Material Science

17 Distinguish between chemical and physical properties of a material. 2.17

18 Differentiate between oxidation and reduction especially as they pertain to galvanic corrosion. 2.18

19 Define thermal expansion. 2.19

20 Evaluate the effects of thermal expansion on design considerations. 2.20

21 Describe the response to force or stress using the terms: workability (malleability and ductility), brittleness, hardness, elasticity and plasticity, toughness and strength. 2.21

22 Define mechanical properties: tensile strength, compression, fatigue, flexure, impact, torsion, hardness, and shear. 2.22

23 Relate the physical characteristics of materials such as workability and brittleness to the mechanical properties such as tensile and compressive strength to impact design considerations. 2.23

Construction Tools 3

3 Construction Tools 3

Introduction to a variety of hand tools, portable power tools, and stationary equipment; students will become familiar with safety considerations for their correct use, features, distinguishing characteristics, normal operating techniques, and the applications for which they are commonly applied.

Lesson 1: General Tool Safety:

1 Explain personal choices that reduce the risk of safety hazards. 3.1

2 Name and properly don personal protective equipment for the use of basic construction tools. 3.2

3 Identify common hazards associated with tool use. 3.3

4 Describe the importance of tool inspection and care in preventing injuries. 3.4

5 Discuss how the ergonomics of tools use prevents injuries. 3.5

Hand Tools Identification and Application:

6 Identify key features and explain the application of each hand tool for particular workplace tasks. 3.6

7 Demonstrate the safe operation of hand tools. 3.7

8 Perform competent operation of hand tools in their intended use. 3.8

9 Properly choose and consistently wear proper PPE for hand tool use. 3.9

10 Describe proper maintenance and care for each hand tool. 3.10

11 Operate hand tools in practice skill building activities 3.11

12 Perform a small-scale construction project or activity 3.12

13 Students will create “User’s Manuals” for three hand tools. 3.13

Hand Power Tools Identification and Applications:

14 Identify basic maintenance that should be done. 3.14

15 List proper techniques for loading and activating the nail gun 3.15

16 Describe and select the appropriate nail gun to accomplish a particular workplace task. 3.16

17 Distinguish between nail guns that are similar in appearance, stating the commonly used terms for each tool and normal routine application. 3.17

18 Explain basic techniques and proper use of nail guns. 3.18

19 List workplace tasks or functions that require a nail gun to accomplish the task. 3.19

20 Specify the features and major components. 3.20

21 Operate hand tools in practice skill building activities 3.21

22 Perform a small-scale construction project or activity individually and with teammates. 3.22

23 Students will create “User’s Manuals” for three power tools. 3.23

Stationary Equipment Identification and Applications:

24 Identify key features and explain the application of each piece of equipment. 10.29.18 3.24

25 Demonstrate the safe operation of the stationary equipment. 3.25

26 Perform competent operation of stationary tools in their intended use. 3.26

27 Properly choose and consistently wear proper PPE for equipment use. 3.27

28 Describe proper maintenance and care for each piece of stationary equipment. 3.28

Construction Safety 4

4 Construction Safety 4

This unit provides a general overview of construction safety and in-depth specific environment, health, and safety issues, policies, procedures, and regulations that are relevant to construction industry.

History of Construction Safety

1 Describe the major developments that have influenced and improved construction safety over time. 4.1

2 Learn how to research and interpret the current construction accident data 4.2

3 Define personal protective equipment 4.3

4 Identify and explain reasons for PPE 4.4

General Construction Safety

5 Explain the purpose and organization of OSHA and use the 29 CFR 1926 to research and identify applicable safety regulations 4.5

6 Perform Hazard identification, site inspections, and hazard communication particularly related to: 4.6

- 1 Focus Four Hazards 4.6.1
- 2 Fire hazards 4.6.2

7 Explain the concept of Hazard mitigation and prepare written plans and procedures that address: 4.7

- 1 Safety Plans and Shop Safety 4.7.1
- 2 Proper use of PPE 4.7.2
- 3 Material handling, communication, and safety data sheets 4.7.3
- 4 Ergonomics 4.7.4
- 5 First aid and safety equipment 4.7.5
- 6 Drug-free workplace 4.7.6

The Focus-Four Hazards

8 Explain the meaning of the Focus Four hazards: fall, electrical, struck-by, caught-in/between 4.8

9 Define the critical role of safety with fall hazards 4.9

10 Define the critical role of safety with electrical hazards l 4.10

11 Define the critical role of safety with struck-by hazards 4.11

12 Define the critical role of safety with caught-in/between hazards 4.12

The lesson includes hands-on practice with a variety of common and precision measurement tools, instruction includes the review of geometric dimensioning and tolerances, and the use, care and calibration of precision measurement tools.

Measuring

1 Use a standard rule, metric ruler, and measuring tape and read to the 1/16th inch to measure lengths 5.1

2 Explain what the metric system is and how it is important to the construction industry 5.2

3 Add, subtract, divide, and multiply fractions 5.3

4 Add, subtract, divide, and multiply decimals 5.4

5 Convert fractions to decimals and decimals to fractions. 5.5

6 Convert decimals to feet and inches 5.6

7 Measure dimension Strings and Grids 5.7

8 Calculate area, perimeter, surface area and volume 5.8

Measuring Tools

9 Measuring tape 5.9

10 Framing square 5.10

11 Speed square 5.11

12 Simple combination square 5.12

13 Straight edges 5.13

14 Measuring wheel 5.14

15 Builder's level 5.15

16 Surveying equipment 5.16

Level and Plumb

17 Determine vertical plumb using measurement, builder levels, and laser levels 5.17

18 Determine horizontal level using measurement, builder levels, and laser levels 5.18

Miscellaneous Measurements

19 Calculate crane radius calculations 5.19

20 Determine arcs of pipe bends for electrical conduit 5.20

21 Measure large scale dimensions and grades using string measure, laser level, surveying equipment. 5.21

Introduction to Drawings, Print Reading, and Layout 6

6 Introduction to Drawings, Print Reading, and Layout 6

In this unit, students are introduced to basic blueprint reading and how to interpret

History of construction drawings and print documents; why are they used

1 Describe historic construction drawings/print tools and documents 6.1

engineer drawings; students will get hands-on experience drawing isometric and orthographic views, and constructing projects from sketches and prints.

Sections of Construction Prints

2 Locate the Title Block on a drawing and identify the name, purpose of a drawing, and other fields depicted. 6.2

- 1 Interpret geometric elements in a drawing. 6.2.1
- 2 Identify the Alphabet of Lines. 6.2.2
- 3 Identify types of views, including detail views, sectional views, auxiliary views, and be able to interpret cutting lines. 6.2.3
- 4 Interpret common drawing symbols used in industry. 6.2.4
- 5 Identify types of dimensioning: linear, progressive, typical, equally spaced, angles, arcs, cylinders, holes, size, location, baseline, and tabular. 6.2.5

3 Recognize different types of construction prints/drawings. 6.3

4 Explain the different sections in a set of drawings 6.4

5 Describe the details, symbols, and nomenclature in each section 6.5

Reading Print/Drawings

6 Identify lines, symbols, abbreviations, and nomenclature within prints 6.6

7 Explain the difference and significance between plan view and elevations 6.7

8 Explain scale and the mathematical concepts supporting it 6.8

9 Demonstrate correct interpretation of drawing/print information and specifications to the correct location on the plan. 6.9

10 Perform necessary mathematics to determine scale and measurements 6.10

11 Specifications 6.11

12 Components of the drawings: Title block, Border, Drawing area, Revision block, Legend 6.12

13 Orthographic and Isometric views 6.13

Construction Specifications

14 Explain the purpose of specifications in construction projects 6.14

15 Describe how specifications and construction drawings are used together on construction projects 6.15

16 Elaborate on the purpose and function of the Construction Specifications Institute (CSI) 6.16

17 Articulate what a “division” is in construction specifications and name the common divisions. 6.17

Layout

18 Demonstrate how to layout the foundation of a project 6.18

19 Translate drawing information into operational plans 6.19

7 Construction Math 7

This unit is project-based and requires students to work together practicing the designing, building and testing of a model footbridge, applying Common Core Standards: Number and Quantity, Algebra, Function, Modeling, and Geometry.

Data Analysis and Statistics

24 Collect and interpret quantitative data 7.24

25 Use normal distributions 7.25

26 Draw conclusions from samples 7.26

Trigonometric Functions

27 Apply right triangle trigonometry 7.27

28 Write and apply trigonometric functions and models 7.28

Applied Physics 8

8 Applied Physics 8

Students will gain the knowledge of the primary laws of physics and how they apply to construction, including safety considerations involving the workplace use of force and power.

Matter and Mass

1 Define physics 8.1

2 Explain the relationship between matter and mass, and name the three states of matter. 8.2

3 Define weight and gravity, and how weight relates to mass. 8.3

4 Solve for weight, mass and gravity using the given formula(s) and using appropriate units. 8.4

5 Define density and solve for density, mass, volume using the given formula(s) and using appropriate units. 8.5

6 Define Specific Gravity and calculate a Specific Gravity ratio given density or weight of an object. 8.6

7 Explain how density is dependent on temperature and pressure 8.7

8 Define energy and name the two types of energy in objects. 8.8

Force, Work and Power

9 Define force, work and power. 8.9

10 Apply the appropriate English and Metric units to force, work and power. 8.10

11 Describe the force of friction. 8.11

12 Apply torque and identify its units. 8.12

13 Convert between Horsepower and watts. 8.13

Simple Machines, Stress and Motion

14 Define machines and identify simple machines. 8.14

15 Distinguish between different types of levers and inclined planes. 8.15

16 Define mechanical advantage and calculate it using force/distance variables. 8.16

17 Solve for mechanical work using effort and resistance variables. 8.17

18 Define stress and its effects; define motion. 8.18

19 Distinguish between speed and velocity; explain how they are related to acceleration. 8.19

Heat and Pressure

20 Define heat, its relation to kinetic energy, and its units in both English and Metric. 8.20

21 List and describe forms of energy which can be converted to heat. 8.21

22 Explain how heat is transferred and list three methods of heat transfer. 8.22

23 Define Thermal Efficiency. 8.23

24 Define Specific Heat and solve for Thermal Expansion. 8.24

25 Define pressure, list different pressure gauges, and practice solving for psi. 8.25

Gas Laws and Fluid Mechanics

26 Define gas laws, and use them to solve for pressure, temperature or volume. 8.26

27 Identify the various components of air. 8.27

28 Explain how density is dependent on temperature and pressure 8.28

29 Define buoyancy and determine if something will sink or float using the buoyancy formula. 8.29

30 Calculate conversion problems 8.30

Construction Rigging 9

9 Construction Rigging 9

The Rigging unit is designed to prepare students to carry out a hands-on skill practice for rigging a load, lifting it and moving it, which includes: determining lifting task and job-site requirements, characterization of the load, selection of rigging equipment, safety precautions, and techniques and procedures for lifting, maneuvering, and moving the load.

Lift Planning

1 Refer to the ANSI/ASME standards that are observed regarding lifting and moving loads 9.1

2 List, explain and answer the four questions that must be asked before planning a lift or move. 9.2

3 Determine whether a proposed load movement would be classified as a critical lift, pre-engineered lift, or ordinary lift. 9.3

4 State the four major steps in planning a move, including two elements of what to look for in each step. 9.4

5 Apply elements of an ordinary lift plan to an actual lift. 9.5

6 Describe basic rigging safety practices 9.6

Calculating Load

7 Measure and determine the volume of a load. 9.7

8 Convert measurements expressed in different units into common units. 9.8

9 Calculate the weight of a load. 9.9

10 Determine the Center of Gravity(C/G) for a symmetrical load. 9.10

11 Determine the Center of Gravity (C/G) for an asymmetric load. 9.11

12 Determine the parameters of sling stress or sling angle factors. 9.12

Rigging Hardware

13 Identify types of rigging, describe their features, and explain uses & inspection criteria. 9.13

14 Differentiate in detail between three examples of steel rigging and three examples of synthetic rigging 9.14

15 Select and inspect rigging for an actual load lift and movement 9.15

16 Explain basic hitch configurations and connections. 9.16

Cranes

17 Distinguish between the various types of cranes, hoists and lifting devices encountered at a work sites 9.17

18 Conduct a pre-operational crane or hoist inspection. 9.18

19 Rig a load for lift and movement 9.19

Signaling

20 Perform hand signals to direct the load movement. 9.20

In this unit, students will receive an essential foundation in the physics, calculations, processes, terminology, and safety practices related to hydraulic and pneumatic systems.	**In this unit, students will receive an essential foundation in the physics, calculations, processes, terminology, and safety practices related to hydraulic and pneumatic systems.**
Explain the physics guiding hydraulics. 10.1	**1 Explain the physics guiding hydraulics.** 10.1
Calculate problems related to fluid power using Pascal's Law, Force, Work, and Power equations. 10.2	**2 Calculate problems related to fluid power using Pascal's Law, Force, Work, and Power equations.** 10.2
Identify the major historical events (and figures) behind the science of fluids. 10.3	**3 Identify the major historical events (and figures) behind the science of fluids.** 10.3
Describe the advantages and disadvantages of fluid power. 10.4	**4 Describe the advantages and disadvantages of fluid power.** 10.4
Identify and explain the factors to consider when setting up a hydraulic system. 10.5	**5 Identify and explain the factors to consider when setting up a hydraulic system.** 10.5
Define terminology common to hydraulics. 10.6	**6 Define terminology common to hydraulics.** 10.6
List the typical components of a basic hydraulics system. 10.7	**7 List the typical components of a basic hydraulics system.** 10.7
Recognize the fluid power components from schematics. 10.8	**8 Recognize the fluid power components from schematics.** 10.8
Learn and practice safe handling procedures of hydraulics. 10.9	**9 Learn and practice safe handling procedures of hydraulics.** 10.9

Apply the knowledge of hydraulics with a hands-on project. 10.10	**10 Apply the knowledge of hydraulics with a hands-on project.** 10.10
Fasteners 11	**11 Fasteners** 11
Students will gain an understanding of the various fasteners utilized in the construction industry. Through applied practice students will be able to identify the correct fastener for various materials and construction processes.	**Fastening Systems: General** 1 Identify the components of a fastening system using nuts and bolts 11.1 2 Specify the materials and style from which bolts and nuts are made 11.2 3 Distinguish between sheer and tension types of stress/load 11.3 4 List the four forces acting on installed bolts 11.4 5 Categorize and properly operate a torque wrench 11.5 6 Student Booklet: Reading, Writing, and Activities 11.6 **Permanent Fasteners** 7 Discuss permanent fasteners and identify features of hex-drive and lockbolts 11.7 8 Explain the limitations of lockbolts, detailing how they are used to fasten materials together 11.8 9 Demonstrate normal procedures for installation of lockbolt fasteners 11.9 **Screws** 10 Identify the different types of screws that are used in construction 11.10 11 Explain which screws to use in a specific application 11.11 12 Identify specific physical characteristics of screws 11.12 13 Explain the different installation methods 11.13 **Nails** 14 Identify the different types of nails that are used in construction 11.14 15 Explain which nails to use in a specific application 11.15 16 Identify specific physical characteristics of nails 11.16 17 Identify the different sizes of nails and their meanings 11.17 18 Explain the different installation methods 11.18

Adhesives

19 Identify the different types of adhesives that are used in construction 11.19

20 Indicate specific applications and the type of adhesives used 11.20

21 Provide a basic understanding of the physical make-up for the different adhesives 11.21

22 Explain the different techniques for applying adhesives. 11.22

Electricity in Construction 12

12 Electricity in Construction 12

Introduction to the foundation al concepts of electricity and the safe and proper way to work with electrically charged equipment. Basic electrical installation will be covered through hands on practice, group work and individual projects.

Science of Basic Electricity

1 State the difference between electricity and electronics 12.1

2 Describe the basic structure of the atom 12.2

3 List the parts of a molecule. 12.3

4 Discuss the relationship of atoms, protons, neutrons and ions 12.4

5 Describe how an atom becomes an ion 12.5

6 State the meanings of and the relationship between matter, element, nucleus, compound, molecule, mixture, atom, electron, proton, neutron, energy, valence, valence shell, and ion. 12.6

7 State, in terms of valence, the differences between a conductor, an insulator, and a semiconductor, and list some materials which make the best conductors and insulators. 12.7

8 Explain the process of conductance 12.8

9 Describe the fundamental concepts of electricity 12.9

10 Discuss the concept of static electricity and how it relates to charged bodies, Coulomb's Law of Charges, and electric fields. 12.10

11 Describe the importance of observing electrical safety. 12.11

Voltage, Current, and Resistance

12 Explain the concept of potential energy and how it relates to electrical potential and voltage 12.12

13 State, using the water analogy, how a difference of potential (a voltage or an electromotive force) can exist. Convert volts to microvolts, to millivolts, and to kilovolts. 12.13

14 Describe six methods for producing a voltage (emf) and state the operating principles of and the uses for each method. 12.14

15 Distinguish between wet cells and dry cells, giving examples of each. 12.15

16 Distinguish between primary cells and secondary cells, explaining the difference. 12.16

17 Define the term “battery” when used as a power source. 12.17

18 State the meanings of electron current, random drift, directed drift, and ampere, and indicate the direction that an electric current flows. 12.18

19 State the relationship of current to voltage and convert amperes to milliamperes and microamperes. 12.19

20 State the definitions of and the terms and symbols for resistance and conductance, and how the temperature, contents, length and cross-sectional area of a conductor affect its resistance and conductance values. 12.20

21 List the physical and operating characteristics of and the symbols, ratings, and uses for various types of resistors; use the color code to identify resistor values. 12.21

22 Calculate resistance values, voltage and wattage using Ohm’s Law. 12.22

23 Describe the importance of observing electrical safety 12.23

24 Describe why electrical safety hazards occur 12.24

25 Describe grounding 12.25

26 Describe how different current levels affect the human body 12.26

27 Describe the ways in which electric shock can be received 12.27

28 List the steps that should be followed when treating an individual who receives an electric shock 12.28

29 Describe the causes and the danger of burns caused by electricity 12.29

30 Describe how various types of electrical devices are engineered to prevent electrical hazardous conditions from occurring 12.30

Electrical Circuits

31 Explain the process of current flow. 12.31

32 List the six sources of electricity and explain how they produce electrical pressure. 12.32

33 List the requirements of an electrical circuit. 12.33

34 Define voltage and its unit of measurement, then write the letter abbreviation for the unit. 12.34

35 Define current and its unit of measurement, then write the letter abbreviation for the unit. 12.35

36 Define resistance and its unit of measurement, then write the letter abbreviation for the unit. 12.36

37 Define power and its unit of measurement, then write the letter abbreviation for the unit. 12.37

38 Define conductance and its unit of measurement, then write the letter abbreviation for the unit. 12.38

39 List the factors that determine resistance of wires, their current carrying capacity, and be able to size them. 12.39

40 Describe the construction of various types of variable resistors and explain the applications they are used for. 12.40

41 Describe the operation, terms and symbols of circuit protection devices. 12.41

42 Identify standardized symbols used in schematic diagrams that represent various electronic components. 12.42

43 Following a schematic diagram, assemble a simple electric circuit. 12.43

44 Describe the relationships of current, voltage, and resistance. 12.44

45 Use Ohm's Law equations to solve for electrical circuit values. 12.45

46 Describe branch circuits/ transformers/ circuit breakers/ panels/ and basic circuit materials (ie Romex/ conductors/ conduit) 12.46

Company Organization and Operations 13

13 Company Organization and Operations 13

An overview of the organizational structure that exists around construction project. Students will learn about the roles and responsibilities of the various parties involved in the construction process from concept and design to planning,

Basic Organization of a Construction Company

1 Understand and be able to articulate the organizational structure of a construction company 13.1

2 Analyze and explain the relationships on an organizational chart. 13.2

3 Describe the titles and general duties of typical roles in a standard construction company. 13.3

permitting, bidding and building of the project. Lean construction principles will be covered as they relate to solving organizational issues.

Systems, Processes, and Procedures

4 Describe the difference between systems, processes and procedures 13.4

5 Explain the importance of systems, processes, and procedures in an organization 13.5

6 Create basic systems, processes, and procedures to support a fictional company. 13.6

7 Discern the processes depicted in representations of construction projects. 13.7

8 Explain and apply basic concepts of LEAN Construction 13.8

Regulatory Agencies:

9 Name the key regulatory agencies supporting construction projects. 13.9

10 Describe the role of regulatory agencies in the construction industry. 13.10

Planning and Scheduling 14

14 Planning and Scheduling 14

Students will come to understand the value and importance of planning and scheduling as they relate to the successful completion of a construction project through group work as well as independent assignments.

Why do we Plan and Schedule

1 Describe the history of scheduling 14.1

2 Explain key terms used in scheduling 14.2

3 Identify different types of schedules we use in our daily routines 14.3

4 State how planning and scheduling helps keep us organized when changes are made in our routine 14.4

5 Identify the basic elements to include when creating a schedule 14.5

6 Discuss the importance of a schedule strategy. 14.6

7 Create a logic path. 14.7

Creating a New Project Schedule

8 Define what is a project 14.8

9 State what is a project activity and what are activity relationships. 14.9

10 Explain the key steps to planning and scheduling a construction project. 14.10

11 Show how changing variables impact the schedule. 14.11

12 Demonstrate the basic functions of developing a schedule using MS Project 14.12

Organizing a Project Schedule

13 Use MS Project to perform basic operations to alter and update project schedules including: 14.13

1 Calendars 14.13.1

2 Hierarchy 14.13.2

3 Formatting Columns 14.13.3

4 Work Breakdown Structure 14.13.4

Formatting and Printing in MS Project

14 Demonstrate how to format and print a project schedule 14.14

15 Identify a schedule critical path. 14.15

Managing the Project Schedule

16 Create a baseline schedule 14.16

17 Demonstrate how to update schedules 14.17

18 Explain the how to actualize the schedule 14.18

19 Show how to document a delay and represent it in the project schedule 14.19

Estimating 15

15 Estimating 15

Students will learn the basic concepts of estimating and preparing bids for various types of construction projects.

Students will learn the basic concepts of estimating and preparing bids for various types of construction projects.

Explain the purpose and function of cost estimating in construction projects 15.1

1 Explain the purpose and function of cost estimating in construction projects 15.1

Describe the organization of the Construction Specification Institute Divisions and how they relate to estimating 15.2

2 Describe the organization of the Construction Specification Institute Divisions and how they relate to estimating 15.2

Demonstrate common estimating techniques including: 15.3

1 Square foot estimating 15.3.1

2 Materials/Material Take Off by CSI code 15.3.2

Explain the basic considerations for estimating Earth work, concrete, steel, and wood 15.4	4 Explain the basic considerations for estimating Earth work, concrete, steel, and wood 15.4
Calculate labor costs and productivity rates 15.5	5 Calculate labor costs and productivity rates 15.5
Complete a project cost estimate with overhead and profit built in. 15.6	6 Complete a project cost estimate with overhead and profit built in. 15.6
Explain the importance of a risk analysis in preparing a cost estimate. 15.7	7 Explain the importance of a risk analysis in preparing a cost estimate. 15.7
Capstone Project 16	16 Capstone Project 16
Students will work as a team to apply the knowledge, skills and abilities gained through the previous units of instruction to complete a scaled construction project	Students will work as a team to apply the knowledge, skills and abilities gained through the previous units of instruction to complete a scaled construction project
Interact respectfully with fellow human beings of different cultures, genders, and backgrounds 16.1	1 Interact respectfully with fellow human beings of different cultures, genders, and backgrounds 16.1
Work cooperatively with others in the class 16.2	2 Work cooperatively with others in the class 16.2
Work cooperatively with others to complete work assignments. 16.3	3 Work cooperatively with others to complete work assignments. 16.3
Understand the roles and responsibilities of the individual as part of	4 Understand the roles and responsibilities of the individual as part of a team and the hierarchy of individual positions in the construction industry 16.4

a team and the hierarchy of individual positions in the construction industry 16.4	
Perform responsibly as a team member and assist other members of the work team 16.5	5 Perform responsibly as a team member and assist other members of the work team 16.5
Effectively communicate with all members of the group or team to achieve team goals 16.6	6 Effectively communicate with all members of the group or team to achieve team goals 16.6
Effectively resolve conflicts with co-workers to maintain a smooth workflow 16.7	7 Effectively resolve conflicts with co-workers to maintain a smooth workflow 16.7
Learn from other team members 16.8	8 Learn from other team members 16.8
Assist others who have less experience 16.9	9 Assist others who have less experience 16.9
Listens to other ideas and be open to opinions and ideas that are different from your own 16.10	10 Listens to other ideas and be open to opinions and ideas that are different from your own 16.10
Resolve conflicts and differences in a respectful manner to maintain a smooth workflow 16.11	11 Resolve conflicts and differences in a respectful manner to maintain a smooth workflow 16.11
Treat others with honesty, fairness, and respect 16.12	12 Treat others with honesty, fairness, and respect 16.12
Demonstrate respect for the property of others 16.13	13 Demonstrate respect for the property of others 16.13

Take responsibility for accomplishing work goals within accepted timeframes 16.14	14 Take responsibility for accomplishing work goals within accepted timeframes 16.14
Accept responsibility for one's decisions and actions and recognize the affect your actions have on others 16.15	15 Accept responsibility for one's decisions and actions and recognize the affect your actions have on others 16.15
Demonstrate the safe operation of hand tools. 16.16	16 Demonstrate the safe operation of hand tools. 16.16
Perform competent operation of hand tools in their intended use. 16.17	17 Perform competent operation of hand tools in their intended use. 16.17
Properly choose and consistently wear proper PPE for hand tool use. 16.18	18 Properly choose and consistently wear proper PPE for hand tool use. 16.18
Demonstrate the safe operation of the stationary equipment. 16.19	19 Demonstrate the safe operation of the stationary equipment. 16.19
Perform competent operation of stationary tools in their intended use. 16.20	20 Perform competent operation of stationary tools in their intended use. 16.20
Properly choose and consistently wear proper PPE for equipment use. 16.21	21 Properly choose and consistently wear proper PPE for equipment use. 16.21
Choose the right mathematical method or formula to solve a problem 16.22	22 Choose the right mathematical method or formula to solve a problem 16.22
Add, subtract, divide, and multiply	23 Add, subtract, divide, and multiply fractions 16.23

fractions 16.23	
Add, subtract, divide, and multiply decimals 16.24	**24 Add, subtract, divide, and multiply decimals** 16.24
Read gauges and measurement instruments accurately 16.25	**25 Read gauges and measurement instruments accurately** 16.25
Use and report measurements correctly 16.26	**26 Use and report measurements correctly** 16.26
Find level, plumb, and square 16.27	**27 Find level, plumb, and square** 16.27
Identify lines, symbols, abbreviations, and nomenclature within prints 16.28	**28 Identify lines, symbols, abbreviations, and nomenclature within prints** 16.28
Demonstrate correct interpretation of drawing/print information and specifications to the correct location on the plan. 16.29	**29 Demonstrate correct interpretation of drawing/print information and specifications to the correct location on the plan.** 16.29
Perform necessary mathematics to determine scale and measurements 16.30	**30 Perform necessary mathematics to determine scale and measurements** 16.30
Translate drawing information into operational plans 16.31	**31 Translate drawing information into operational plans** 16.31
Identify appropriate construction materials required for project per prints 16.32	**32 Identify appropriate construction materials required for project per prints** 16.32
Handle, install, position, move, and store	**33 Handle, install, position, move, and store materials properly** 16.33

materials properly 16.33	
Demonstrate knowledge of various material finishing techniques 16.34	34 Demonstrate knowledge of various material finishing techniques 16.34
Understand appropriate transport methods of various construction materials 16.35	35 Understand appropriate transport methods of various construction materials 16.35
Use appropriate combinations of building materials and components 16.36	36 Use appropriate combinations of building materials and components 16.36
Create a baseline project schedule 16.37	37 Create a baseline project schedule 16.37
Anticipate obstacles to project completion and develop contingency plans to address them 16.38	38 Anticipate obstacles to project completion and develop contingency plans to address them 16.38
Incorporate potential job disruptions into planning timelines 16.39	39 Incorporate potential job disruptions into planning timelines 16.39
Adjust plan/schedules to respond to unexpected events and conditions 16.40	40 Adjust plan/schedules to respond to unexpected events and conditions 16.40
Estimate the time required to perform activities needed to accomplish a specific task 16.41	41 Estimate the time required to perform activities needed to accomplish a specific task 16.41
Develop a timeline for sequencing the activities of a project/job 16.42	42 Develop a timeline for sequencing the activities of a project/job 16.42

Establish specific goals to accomplish work in a timely manner 16.43	**43** **Establish specific goals to accomplish work in a timely manner** 16.43
Stay on schedule 16.44	**44** **Stay on schedule** 16.44