Principles of Construction Technology

Course Description

This course provides an overview of the total construction process. Students will develop problem-solving and critical thinking skills by identifying the relationship between resources and requirements of a project/problem to accomplish realistic planning.

Course Code:

Program(s) of Study to which This Course Applies

- Architecture and Construction Cluster: Construction
- Architecture and Construction Cluster: Design/Pre-construction

Teacher Certification Note: To deliver OSHA or NCCER credentials for students, teachers need additional certification.

Course Framework	Reference Standards	Academic Crosswalk
Standard 1. Students will assess and control the types and sources of workplace hazards to ensure a safe workplace.	KS (ACC 06)	LA.12.1.5.b(1)
Benchmark 1.1 Demonstrate methods to correct common design and construction hazards. <u>Sample performance indicators:</u> • Identify and describe common hazards in the workplace. • Perform a safety check before beginning performance/lab work. • Identify and describe major sources of information about hazards in the workplace (e.g., Material Safety Data Sheets (MSDS), work procedures, exposure control plans, training materials, labels, and signage). • Identify sources of combustible/flammable materials, fire and emergencies to establish a fire safe environment. • Interpret safety signs and symbols. • Identify methods for disposing of hazardous materials.	KS (ACC 06.01.01) NCCER 00101-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)

Benchmark 1.2 Identify causes of accidents and the impact of accident costs. Sample performance indicators: • Describe both direct and indirect costs of incidents and accidents in the workplace. • Explain the role of OSHA in preventing accidents in the workplace.	KS (ACC06.01) NCCER 00101-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 1.3 Demonstrate personal and group health and safety practices. Sample performance indicators: • Demonstrate principles of safe physical movement to avoid slips, trips, and spills. • Inspect and use personal protective equipment (PPE). • Demonstrate safe lifting and proper materials handling.	KS (ACC06.01.03) NCCER 00101-09, 00109-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 1.4 Demonstrate safe operation of tools and equipment. Sample performance indicators: • Achieve 100% on all written safety exams. • Identify and describe how to correct electrical hazards within a work site. • Verify proper grounding of power tools. • Demonstrate proper placement and storing of tools when not in use. • Inspect, maintain, adjust, lubricate hand and power tools as appropriate. • Perform equipment pre-operation checklists. • Operate a power tool safely and according to manufacturer specifications.	KS (ACC10.02.03) NCCER 00101-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Standard 2. Students will use and apply common construction math concepts.	KS (ACC 01.01) NCCER 00102-09, various crafts	LA.12.1.5.b(1)
Benchmark 2.1 Use basic math functions to complete jobsite/workplace tasks. Sample performance indicators: • Identify whole numbers, decimals, fractions, complex numbers, and polynomials. • Apply basic arithmetic add, subtract, multiply, and divide operations. • Apply relational (equal, not equal, greater than, less then, etc.) and logical operators in a logical expression.	KS (ACC 01.01-.06) NCCER 00102-09	MA.12.1.1 (1) MA.12.1.3 (1) CCSS:MA (N-Q 3)
Benchmark 2.2 Use geometric formulas to determine areas and volumes of various structures. Sample performance indicators: • Calculate areas and volumes of structures.	KS (ACC 01.01-.06) NCCER 00102-09	MA.12.2.5 (1) MA.12.3.1f (1) CCSS:MA (F-IF 6)(1)

• Calculate angles for rise/run.		
Benchmark 2.3 Use appropriate formulas to determine percentages /decimals. <u>Sample performance indicators:</u> • Calculate percentages/decimals. • Use percentages and decimals to perform measurement tasks. • Use percentages and decimals to track project progress and costs.	KS (ACC 01.01-.06) NCCER 00102-09	MA.12.1.3 (1)
Benchmark 2.4 Use appropriate formulas to determine ratios, fractions, and proportion measures. <u>Sample performance indicators:</u> • Calculate ratios, fractions and proportion measures. • Use ratios, fractions and proportion measures to perform measurement tasks. • Create scale model of a structure.	KS (ACC 01.01-.06) NCCER 00102-09	MA.12.1.3 (1) MA.12.2.4 (2)
Benchmark 2.5 Use appropriate formulas to determine measurements of dimensions, spaces and structures (U.S. Standard Unit and metric system). <u>Sample performance indicators:</u> • Measure dimensions, spaces and structures using both U.S. Standard unit and metric system. • Use dimensions, spaces and structures calculations to estimate materials and supplies needed. • Convert U.S. Standard System to metric system and vice versa for a project task.	KS (ACC 01.01-.06) NCCER 00102-09	MA.12.2.5 (2) MA.12.1.4 (1)
Standard 3. Students will utilize construction documents to locate and communicate information, to perform measurements, and to develop and implement a project plan.	KS (ACC 01.01) NCCER (Core and various crafts	LA.12.1.5.b(1)
Benchmark 3.1 Recognize and identify basic construction drawing terms, components, and symbols. <u>Sample performance indicators:</u> • Identify abbreviations specific to basic construction drawings. • Define craft-specific symbols in a drawing. • Recognize and describe different classifications of construction drawings.	KS (ACC 10.01-all) NCCER 00105-09	

Benchmark 3.2 Interpret and use drawing dimensions. Sample performance indicators: • Calculate the distance between two components in a drawing. • Utilize the drawing to construct a project. • Apply scale measurements to estimate quantity of materials.		MA.12.2.5(1) MA.12.2.4(1) MA.12.2.2(1)
Benchmark 3.3 Use vocabulary and visual cues commonly in design and construction to be successful in workplace/jobsite communications. Sample performance indicators: • Ask questions concerning details of instructions. • Confirm understanding of visual and verbal instructions. • Use correct terminology to convey project information.	KS (ACC02) KS (ACC 02.01) NCCER 00107-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.3.1.a(1) LA.12.3.2.b(1)
Benchmark 3.4 Utilize drawings to plan, organize, schedule and manage a project. Sample performance indicators: • Develop a plan of procedure(s) applying correct terminology. • Estimate and develop bill of materials.	KS (ACC01.01.02) NCCER craft-specific and MT modules.	LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.3.1.a(1) LA.12.3.2.b(1)
Standard 4. Students will know and understand the importance of employability and career development, including the characteristics of entrepreneurship.	KS (ACC07, 09) NCCER Core, Management Modules?	LA.12.1.5.b(1)
Benchmark 4.1 Demonstrate critical thinking skills and the ability to solve problems using those skills. Sample performance indicators: • Develop alternative solutions to unforeseen project problems. • Select appropriate equipment for specific applications.	KS (ACC03) KS (ACC 09.01.02) NCCER 00108-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 4.2 Demonstrate effective relationship skills with teammates and supervisors, the ability to work on a team, and appropriate leadership skills. Sample performance indicators: • Organize work teams that effectively manage assignments. • Be punctual to every class, safety meeting, lab work, etc. • Compare and contrast the benefits of being self-employed versus working as an employee in the construction industry.	KS (ACC 09.02.01) KS (ACC 07.01.02) NCCER 00107-09, 00108-09 Other business courses?	LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.3.1.a(1) LA.12.3.2.b(1)
Benchmark 4.3 Demonstrate effective time management and reporting/written communication skills.	NCCER 00107-09, 00108-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1)

Sample performance indicators: • Keep a professional tracking notebook. • Fill out reports/updates on project progress. • Draft a technical report.		LA.12.2.1.f(1) LA.12.2.2.b,a(1)
Standard 5. Students will identify and understand different properties of construction materials and apply current construction techniques.	KS (ACC 10.02) WayneStateITE202-01 NCCER (modules below)	LA.12.1.5.b(1)
Benchmark 5.1 Identify and describe properties of different construction materials. Sample performance indicators: • Identify different species, grades and categories of wood materials and their properties. • Identify and describe the properties of concrete, masonry, and steel materials. • Identify use of various adhesives and fasteners.	KS (ACC 10.02.01) KS (ACC 10.02.03) NCCER craft-specific NCCER Carp. L1, L2	SC.12.2.1.a,b,c(1) LA.12.1.6.d,f(1)
Benchmark 5.2 Select the appropriate material to complete a project. Sample performance indicators: • Select and use the proper construction materials according to project specifications. • Assess and report on the craftsmanship and use of materials on an existing structure.	KS (ACC07) KS (ACC06) KS (ACC 10.02.02) NCCER Craft specific and management modules	SC.12.2.2.c-f(1) LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 5.3 Utilizing problem solving and leadership skills, proper safety practices, and specifications, construct a complete project. Sample performance indicators: • Work within groups to complete tasks effectively and safely. • Correct peers in the classroom when safety hazards appear. • Conduct a safety meeting before beginning work. • Develop a plan of procedures using the project specifications. • Size and cut materials for the project. • Sequence setup and construction to maximize efficiency and safety. • Lay out/install/build project components according to project specifications.	KS (ACC10.02) NCCER Core and various crafts	LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.3.1.a(1) LA.12.3.2.b(1)
Benchmark 5.4 Apply current and safe construction techniques. Sample performance indicators: • Operate tools and equipment safely and according to manufacturer specifications. • Select and apply industry best practices when joining construction components.	KS (ACC05.02) (all) NCCER Core 00101-09, Safety Orientation, Field Safety Modules	

• Select and use proper tools, equipment, and techniques for completing the project.		
Benchmark 5.5 Examine how the roles and responsibilities among trades/professions work in relationship to complete a job. Sample performance indicators: • Describe how relationships and hierarchy between trades and professions can facilitate smooth workflow and outcome to meet project goals. • Incorporate job functions in the reporting chain of supervision. • Evaluate the safety issues and responsibilities managed by each level of supervision.		LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.3.1.a(1) LA.12.3.2.b(1)

Reference Standards Sources

- KS = Career Clusters Knowledge and Skills Statements. Revised 2008. National Career and Technical Education Foundation, Silver Spring, MD. www.careerclusters.org.
- NCCER = National Center for Construction Education and Research
- Wayne State =course objectives for introduction to construction course at Wayne State College

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Approval date:

Revision date *(if changes made after final draft)*:

Other Information

Suggestions for innovative teaching and learning strategies:	•
Related assessments:	•
Extended learning opportunities:	• SkillsUSA Teamworks competition