

# 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: 100110

## 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
<p><b>Standard 1. Students will assess and control the types and sources of workplace hazards to ensure a safe workplace.</b></p>	KS (ACC 06)	[TBD by NDE]
<p>Benchmark 1.1 Demonstrate methods to correct common design and construction hazards.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Identify and describe common hazards in the workplace.</li> <li>• Perform a safety check before beginning performance/lab work.</li> <li>• 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).</li> <li>• Identify sources of combustible/flammable materials, fire and emergencies to establish a fire safe environment.</li> <li>• Interpret safety signs and symbols.</li> <li>• Identify methods for disposing of hazardous materials.</li> </ul>	KS (ACC 06.01.01) NCCER 00101-09	[TBD by NDE]



<p>Benchmark 1.2 Identify causes of accidents and the impact of accident costs.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Describe both direct and indirect costs of incidents and accidents in the workplace.</li> <li>Explain the role of OSHA in preventing accidents in the workplace.</li> </ul>	<p>KS (ACC06.01) NCCER 00101-09</p>	
<p>Benchmark 1.3 Demonstrate personal and group health and safety practices.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Demonstrate principles of safe physical movement to avoid slips, trips, and spills.</li> <li>Inspect and use personal protective equipment (PPE).</li> <li>Demonstrate safe lifting and proper materials handling.</li> </ul>	<p>KS (ACC06.01.03) NCCER 00101-09, 00109-09</p>	
<p>Benchmark 1.4 Demonstrate safe operation of tools and equipment.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Achieve 100% on all written safety exams.</li> <li>Identify and describe how to correct electrical hazards within a work site.</li> <li>Verify proper grounding of power tools.</li> <li>Demonstrate proper placement and storing of tools when not in use.</li> <li>Inspect, maintain, adjust, lubricate hand and power tools as appropriate.</li> <li>Perform equipment pre-operation checklists.</li> <li>Operate a power tool safely and according to manufacturer specifications.</li> </ul>	<p>KS (ACC10.02.03) NCCER 00101-09</p>	
<p><b>Standard 2. Students will use and apply common construction math concepts.</b></p>	<p>KS (ACC 01.01) NCCER 00102-09, various crafts</p>	<p>[TBD by NDE]</p>
<p>Benchmark 2.1 Use basic math functions to complete jobsite/workplace tasks.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Identify whole numbers, decimals, fractions, complex numbers, and polynomials.</li> <li>Apply basic arithmetic add, subtract, multiply, and divide operations.</li> <li>Apply relational (equal, not equal, greater than, less then, etc.) and logical operators in a logical expression.</li> </ul>	<p>KS (ACC 01.01-.06) NCCER 00102-09</p>	
<p>Benchmark 2.2 Use geometric formulas to determine areas and volumes of various structures.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Calculate areas and volumes of structures.</li> </ul>	<p>KS (ACC 01.01-.06) NCCER 00102-09</p>	<p>[TBD by NDE]</p>

<ul style="list-style-type: none"> <li>• Calculate angles for rise/run.</li> </ul>		
<p>Benchmark 2.3 Use appropriate formulas to determine percentages /decimals.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Calculate percentages/decimals.</li> <li>• Use percentages and decimals to perform measurement tasks.</li> <li>• Use percentages and decimals to track project progress and costs.</li> </ul>	<p>KS (ACC 01.01-.06) NCCER 00102-09</p>	
<p>Benchmark 2.4 Use appropriate formulas to determine ratios, fractions, and proportion measures.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Calculate ratios, fractions and proportion measures.</li> <li>• Use ratios, fractions and proportion measures to perform measurement tasks.</li> <li>• Create scale model of a structure.</li> </ul>	<p>KS (ACC 01.01-.06) NCCER 00102-09</p>	
<p>Benchmark 2.5 Use appropriate formulas to determine measurements of dimensions, spaces and structures (U.S. Standard Unit and metric system).</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Measure dimensions, spaces and structures using both U.S. Standard unit and metric system.</li> <li>• Use dimensions, spaces and structures calculations to estimate materials and supplies needed.</li> <li>• Convert U.S. Standard System to metric system and vice versa for a project task.</li> </ul>	<p>KS (ACC 01.01-.06) NCCER 00102-09</p>	
<p><b>Standard 3. Students will utilize construction documents to locate and communicate information, to perform measurements, and to develop and implement a project plan.</b></p>	<p>KS (ACC 01.01) NCCER (Core and various crafts</p>	<p>[TBD by NDE]</p>
<p>Benchmark 3.1 Recognize and identify basic construction drawing terms, components, and symbols.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Identify abbreviations specific to basic construction drawings.</li> <li>• Define craft-specific symbols in a drawing.</li> <li>• Recognize and describe different classifications of construction drawings.</li> </ul>	<p>KS (ACC 10.01-all) NCCER 00105-09</p>	<p>[TBD by NDE]</p>



<p>Benchmark 3.2 Interpret and use drawing dimensions.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Calculate the distance between two components in a drawing.</li> <li>• Utilize the drawing to construct a project.</li> <li>• Apply scale measurements to estimate quantity of materials.</li> </ul>		
<p>Benchmark 3.3 Use vocabulary and visual cues commonly in design and construction to be successful in workplace/jobsite communications.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Ask questions concerning details of instructions.</li> <li>• Confirm understanding of visual and verbal instructions.</li> <li>• Use correct terminology to convey project information.</li> </ul>	<p>KS (ACC02) KS (ACC 02.01) NCCER 00107-09</p>	
<p>Benchmark 3.4 Utilize drawings to plan, organize, schedule and manage a project.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Develop a plan of procedure(s) applying correct terminology.</li> <li>• Estimate and develop bill of materials.</li> </ul>	<p>KS (ACC01.01.02) NCCER craft-specific and MT modules.</p>	
<p><b>Standard 4. Students will know and understand the importance of employability and career development, including the characteristics of entrepreneurship.</b></p>	<p>KS (ACC07, 09) NCCER Core, Management Modules?</p>	<p>[TBD by NDE]</p>
<p>Benchmark 4.1 Demonstrate critical thinking skills and the ability to solve problems using those skills.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Develop alternative solutions to unforeseen project problems.</li> <li>• Select appropriate equipment for specific applications.</li> </ul>	<p>KS (ACC03) KS (ACC 09.01.02) NCCER 00108-09</p>	<p>[TBD by NDE]</p>
<p>Benchmark 4.2 Demonstrate effective relationship skills with teammates and supervisors, the ability to work on a team, and appropriate leadership skills.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Organize work teams that effectively manage assignments.</li> <li>• Be punctual to every class, safety meeting, lab work, etc.</li> <li>• Compare and contrast the benefits of being self-employed versus working as an employee in the construction industry.</li> </ul>	<p>KS (ACC 09.02.01) KS (ACC 07.01.02) NCCER 00107-09, 00108-09 Other business courses?</p>	
<p>Benchmark 4.3 Demonstrate effective time management and reporting/written communication skills.</p>	<p>NCCER 00107-09, 00108-09</p>	



<p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Keep a professional tracking notebook.</li> <li>• Fill out reports/updates on project progress.</li> <li>• Draft a technical report.</li> </ul>		
<p><b>Standard 5. Students will identify and understand different properties of construction materials and apply current construction techniques.</b></p>	<p>KS (ACC 10.02) WayneState TE202-01 NCCER (modules below)</p>	<p>[TBD by NDE]</p>
<p>Benchmark 5.1 Identify and describe properties of different construction materials.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Identify different species, grades and categories of wood materials and their properties.</li> <li>• Identify and describe the properties of concrete, masonry, and steel materials.</li> <li>• Identify use of various adhesives and fasteners.</li> </ul>	<p>KS (ACC 10.02.01) KS (ACC 10.02.03) NCCER craft-specific NCCER Carp. L1, L2</p>	<p>[TBD by NDE]</p>
<p>Benchmark 5.2 Select the appropriate material to complete a project.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Select and use the proper construction materials according to project specifications.</li> <li>• Assess and report on the craftsmanship and use of materials on an existing structure.</li> </ul>	<p>KS (ACC07) KS (ACC06) KS (ACC 10.02.02) NCCER Craft specific and management modules</p>	
<p>Benchmark 5.3 Utilizing problem solving and leadership skills, proper safety practices, and specifications, construct a complete project.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Work within groups to complete tasks effectively and safely.</li> <li>• Correct peers in the classroom when safety hazards appear.</li> <li>• Conduct a safety meeting before beginning work.</li> <li>• Develop a plan of procedures using the project specifications.</li> <li>• Size and cut materials for the project.</li> <li>• Sequence setup and construction to maximize efficiency and safety.</li> <li>• Lay out/install/build project components according to project specifications.</li> </ul>	<p>KS (ACC10.02) NCCER Core and various crafts</p>	
<p>Benchmark 5.4 Apply current and safe construction techniques.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Operate tools and equipment safely and according to manufacturer specifications.</li> <li>• Select and apply industry best practices when joining construction components.</li> </ul>	<p>KS (ACC05.02) (all) NCCER Core 00101- 09, Safety Orientation, Field Safety Modules</p>	



<ul style="list-style-type: none"> <li>Select and use proper tools, equipment, and techniques for completing the project.</li> </ul>		
<p>Benchmark 5.5 Examine how the roles and responsibilities among trades/professions work in relationship to complete a job.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Describe how relationships and hierarchy between trades and professions can facilitate smooth workflow and outcome to meet project goals.</li> <li>Incorporate job functions in the reporting chain of supervision.</li> <li>Evaluate the safety issues and responsibilities managed by each level of supervision.</li> </ul>		

*Reference Standards Sources*

- KS = Career Clusters Knowledge and Skills Statements. Revised 2008. National Career and Technical Education Foundation, Silver Spring, MD. [www.careerclusters.org](http://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:	<ul style="list-style-type: none"> <li></li> </ul>
Related assessments:	<ul style="list-style-type: none"> <li></li> </ul>
Extended learning opportunities:	<ul style="list-style-type: none"> <li>SkillsUSA Teamworks competition</li> </ul>