Advanced Construction Technology

Course Description

This course is designed for the student pursuing a career as a construction professional. Technical skills are combined with planning and management topics to prepare the student for all stages of a project. This course explores opportunities and career pathways within the residential, commercial, and industrial sectors, and walks the student through the planning, execution, and reporting of a project. Students will master project setup (estimating, scheduling and planning), safety awareness, applying construction materials and techniques, and developing their own professional career goals.

Course Code:

Program(s) of Study to which This Course Applies

- Architecture and Construction Cluster: Construction

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

Course Framework (Capstone)	Reference Standards	Academic Crosswalk
Standard 1. Students will assess and control the types and sources of workplace hazards to ensure a safe workplace and jobsite.	KS (ACC06.01-06.03) NCCER 00101-09, 75501-04 OSHA 1926 Wayne State ITE202-01	LA.12.1.5.b(1) LA.12.1.6.d,f(1) LA.12.2.2.a(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. • 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.	All Standard 1 benchmarks: KS (ACC06) OSHA 1926 NCCER 00101-09, 00103-09, 00104-09, 75501-04	SC.12.1.1.f(1)

• Interpret safety signs and symbols. • Identify methods for disposing of hazardous materials.		
Benchmark 1.2 Identify types and sources of workplace hazards common to design and construction situations. <u>Sample performance indicators:</u> • Complete requirements for OSHA 10-hour and/or OSHA 30-hour.		
Benchmark 1.3 Demonstrate personal and group health and safety practices. <u>Sample performance indicators:</u> • Demonstrate principles of safe physical movement to avoid slips, trips, and spills. • Inspect and use personal protective equipment (PPE).		
Benchmark 1.4 Demonstrate safe operation of tools and equipment. <u>Sample performance indicators:</u> • Achieve 100% on all written safety exams. • Identify and describe how to correct electrical hazards within a work site. • Demonstrate 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.	Wayne State ITE202-1 NCCER 00103-09-00104-09	SC.12.1.1.d(1) LA.12.3.1.a(1)
Standard 2. Students will use and apply common construction math concepts and problem solving for estimating and setup for materials on a job site.	KS (EDC12.1) ACC01.01 ACC03.01.03 Wayne State ITE202-01 NCCER Core and MT	LA.12.1.5.b(1)
Benchmark 2.1 Estimate resources materials required for a specific project or problem. <u>Sample performance indicators:</u> • Perform Material Takeoff (MTO) from a set of plans. • Estimate cubic yardage of concrete required for a project. • Create a budget.	ACC03.01.03 NCCER MT206-01, 27104-06	MA.12.1.4 (2) MA.12.2.5(1) CCSS:MA (N-Q:1,2,3) SC.12.1.1. b-g,i(1) LA.12.2.2.a(1)

Benchmark 2.2 Perform site layout, distance measurements, and proper elevation of a given project. Sample performance indicators: • Lay out a specific project site. • Shoot elevations according to project specifications.	KS (ACC 10.01) NCCER 00105-09, 27104-06, 78101-04 thru 78104-04	MA.12.2.2 (1) MA.12.2.5 (2)
Benchmark 2.3 Apply measurement skills to accurately lay out and construct materials according to specifications. Sample performance indicators: • Calculate areas and volumes of structures. • Estimate materials and supplies as needed according to calculations. • Calculate rise and run of a specific roof pitch. • Calculate stairs according to specifications.	KS (ACC1.01.02) KS (ACC1.01.05) NCCER 00102-09	MA.12.2.1 (1) MA.12.2.5 (2) CCSS:MA (F-IF:6) CCSS:MA(G-CO:1,12,13)(1) CCSS:MA (G-SRT:8)(1) CCSS:MA (G-GMD:3)(1) CCSS:MA(G-MG:1,2,3)(2) SC.12.1.1. l(1)
Benchmark 2.4 Use available resources/materials effectively while completing a project or resolving a problem with a project plan. Sample performance indicators: • Evaluate waste of resources/materials. • Evaluate necessity for additional resources/materials. • Incorporate waste reduction in pre-planning for construction on a project. • Accurately measure and cut materials to reduce waste.	KS (ACC03.01.04) NCCER 00102-09 NCCER MT208-01	MA.12.1.4 (1) MA.12.2.5 (1) SC.12.1.1. b-g,i(1) SC.12.1.3.a-e,h(1)
Standard 3. Students will understand and demonstrate proficiency in construction communications.	KS (ACC 10.01) KS (ACC 03.02.04) KS (ACC05.01) NCCER MT201-208	SC.12.1.3.a-e,h(1) LA.12.1.5.b(1)
Benchmark 3.1 Interpret and apply construction drawings accurately. Sample performance indicators: • Perform material takeoff (MTO) from drawing specifications. • Determine locations of subcomponents. • Interpret schedules (examples: windows, doors, fixtures).	KS (ACC10.01.01) NCCER 00105-09 NCCER 27104-06 NCCER (craft-specific)	LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 3.2 Demonstrate understanding of codes and permitting processes.	KS (ACC 05.01.01) KS (ACC 08.02.01) NCCER (craft-specific)	LA.12.1.6.d,f(1) LA.12.2.2.a(1)

Sample performance indicators: • Complete requirements for building permit(s). • Schedule appropriate building inspections. • Use information given in regulations and building codes correctly. • Compare/contrast differences among residential, commercial and industrial sector requirements.		
Benchmark 3.3 Plan, organize, schedule and manage a project to optimize workflow and outcome. Sample performance indicators: • Develop a flowchart of project schedule. • Schedule materials in proper sequence.	KS (ACC 03.01.01) KS (ACC03.01.02) NCCER MT207-01	SC.12.1.1.f(1) LA.12.1.6.d,f(1) LA.12.2.2.a(1)
Benchmark 3.4 Interpret, evaluate and adjust design and construction project plans and schedules to respond to unexpected events and conditions. Sample performance indicators: • Modify existing plans, budgets, and/or schedules in response to unexpected changes. • Identify alternative solutions for project. • Generate project updates/change order reports.	KS (ACC 03.02) KS (ACC 03.02.02) ACC 03.02.04 NCCER MT205-01 thru 208-01	SC.12.1.1.k(1) LA.12.1.6.d,f,k(1)
Standard 4. Students will explore information on selected careers and entrepreneurial opportunities and develop professional goals.	KS (EDC12.1) KS (ACC09.02) KS (ACC 09.02.01) NCCER 00107-09, 00108-09,	LA.12.1.5.b(1)
Benchmark 4.1 Research a construction career pathway and identify responsibilities and characteristics of professionals in that pathway. Sample performance indicators: • Practice the responsibilities and characteristics of a professional craftsperson. • Present career information and research results. • Interview/host a construction entrepreneur and identify characteristics and factors to their success.	KS (ACC09.02) KS (ACC09.02.01) NCCER 00107-09, 00108-09	LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.2.1.f(1) LA.12.3.1.a(1) LA.12.3.2.a(1)
Benchmark 4.2 Research future opportunities and employability trends in various construction sectors (residential, commercial, industrial, energy, green technologies, etc.). Sample performance indicators:		LA.12.1.6.d,f(1) LA.12.2.2.a(1)

• Report on information gathered from workforce development sources and various governmental agency data (DOLs, DOEs, Bureau of Labor Statistics, etc. • Report on a local LEED-certified building or similar energy-efficient construction site. • Perform a research project/analysis using current trade publication sources.		
Standard 5. Students will identify and understand different properties of construction materials and apply current construction techniques.	KS (ACC 10.02) WayneSateITE202-01 NCCER (modules below)	SC.12.4.2.c(1) LA.12.1.5.b(1)
Benchmark 5.1 Select the tools, machinery, and construction materials that match the requirements of the job. <u>Sample performance indicators:</u> • Operate tools, machinery, and equipment in a safe manner. • Safely use tools, machines, and equipment productively and efficiently in alignment with industry standards. • Install proper materials according to project and manufacturer specifications. • Construct rough framing. • Complete exterior finish. • Complete interior finish.	KS (ACC 10.02.01) KS (ACC 10.02.03) NCCER craft-specific NCCER Carp. L1, L2	SC.12.1.1.d,e(1)
Benchmark 5.2 Identify and demonstrate the applicability of innovative equipment, materials, and building methods in a project. <u>Sample performance indicators:</u> • Given a project, identify alternative/innovative methods, materials and equipment. • Select and install materials according to current technologies.		SC.12.1.1.f,i(1) LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.2.1.f(1) LA.12.3.1.a(1) LA.12.3.2.a(1)
Benchmark 5.3 Utilize sources of information concerning current equipment, materials, and technologies. <u>Sample performance indicators:</u> • Research current periodicals/industry publications/manufacturer's catalogs and present reports on sample materials. • Utilize innovative equipment, materials and technologies. • Report on products and techniques that are energy efficient, "green", and	KS (ACC 10.02.02) NCCER Craft specific	SC.12.1.1.d,e(1) LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.2.1.f(1) LA.12.3.1.a(1) LA.12.3.2.a(1)

sustainable.		
Benchmark 5.4 Utilize and apply green/sustainable techniques in project. <u>Sample performance indicators:</u> • Install insulation at or above recommended levels. • Report on energy efficiency of own homes. • Perform "energy audit" of a home.	NCCER 70101-09, 70201-10, 03204-07,0304-09, 03409-09,	SC.12.2.3.e,d,I,f(1) LA.12.1.6.d,f(1) LA.12.2.2.a(1) LA.12.2.1.f(1) LA.12.3.1.a(1) LA.12.3.2.a(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 = Introduction to construction course at Wayne State College
- OHSHA = Occupational Safety and Health Administration

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Other Information

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