FY 2021 Construction Technologies Career Field Pathways and Course Structure

Structural DD Pathway Courses	Mechanical, Electrical, Plumbing DE Pathway Courses	Design DF Pathway Courses
Construction Technology-Core and Sustainable Construction[1]	Construction Technology-Core and Sustainable Construction[1]	Construction Technology-Core and Sustainable Construction[1]
Carpentry and Masonry Technical Skills[4]	Carpentry and Masonry Technical Skills[4]	Carpentry and Masonry Technical Skills[4]
Mechanical, Electrical and Plumbing System	Mechanical, Electrical and Plumbing Systems	Mechanical, Electrical and Plumbing Systems
Structural Systems[2]	Construction Electrica	Structural Coverings and Finishes
Structural Coverings and Finishes	l Systems[2]	Construction Electrical Systems
Masonry-Brick and Block	Residential Electrical Systems[2]	Heating and Cooling Systems
Concrete and Residential Masonry	Commercial and Industrial Construction Electrical Systems	Construction Safety and Crew Leadership[4]
Construction Electrical Systems	Residential and Commercial Plumbing Systems	Plan Reading and Estimating[4]
Residential Electrical Systems	Pipefitting and Plumbing Systems[2]	Architecture Design – Structural and Mechanical/Electrical/Plumbing
Residential and Commercial Plumbing Systems	Heating and Cooling Systems[2]	Architecture Design – Site and Foundation Plans
Construction Safety and Crew Leadership[4]	HVAC Refrigeration	Construction Management
Plan Reading and Estimating[4]	Sheet Metal	Remodeling/Renovation
Construction Management	Alternative Power Generation Systems	Facility and Building Maintenance
Remodeling/Renovation	Powerline/Hi-Voltage Power Transmission	Heavy Equipment Operations
Heavy Equipment Operations	Construction Safety and Crew Leadership[4]	Construction Surveying and Site Logistics
Construction Surveying and Site Logistics	Plan Reading and Estimating[4]	Interior Design
Principles of Wood Construction	Construction Management	Principles of Wood Construction
Fundamentals of Architecture and Construction	Facility and Building Maintenance	Fundamentals of Architecture and Construction[2]
Construction Pre-Apprenticeship	Principles of Wood Construction	Construction Pre-Apprenticeship
Construction Capstone[3]	Fundamentals of Architecture and Construction	Construction Capstone[3]
Unmanned Aircraft Systems[4]	Construction Pre-Apprenticeship	Unmanned Aircraft Systems[4]
	Construction Capstone[3]	

[1]First course in the Career Field; [2]First course in the Pathway; [3]Does not count as one of the required four courses; [4]CTAG Available

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Construction Technology – Core and Sustainable Construction
Subject Code: 178000
Students will learn principles in basic safety (10-hr OSHA), construction math, hand and power tool are and operation, blueprint reading, material handling, communication and employability skills. An emphasis will be placed on safe and green construction practices.

Carpentry and Masonry Technical Skills
Subject Code: 178001
This first course in the pathway will introduce to students the materials, methods, and equipment used in carpentry and masonry. Students will organize a project work sequence by interpreting plans and diagrams within a construction drawing set. They will layout and install basic wall, floor and roof applications. Students will perform introductory concrete applications including formwork, reinforcement, mixing, and finishing. Current advancements in technology, safety, applicable code requirements and correct practices are learned.

Mechanical, Electrical and Plumbing Systems
Subject Code: 178002
Students learn physical principles and fundamental skills across mechanical systems in construction. Students will select materials, assemble, and test basic electrical circuits. Students will select materials and assemble simple copper and plastic plumbing applications for both supply and drains. They will perform simple maintenance of electric motors, electric fixtures and plumbing fixtures. Students will be able to select and install basic ductwork components and learn the operation and maintenance of heating and cooling equipment.

Structural Systems
Subject Code: 178003
Students will learn procedures and techniques required for layout and framing of walls and ceilings, including roughing-in door and window openings, constructing corners and partitions; bracing walls and ceilings; and applying sheathing. Students will learn methods of roof, cold formed steel, and wood stair framing. Students will learn site and personal safety, material properties, design procedures, and code requirements for structural systems.

Structural Coverings and Finishes
Subject Code: 178004
This course will address applications of interior and exterior finish work. Students will identify material properties and select for appropriate application. Students will install thermal and moisture protection including roofing, siding, fascia and soffits, gutters, and louvers. Students will install drywall; trim-joinery and molding and apply wall, floor and ceiling coverings and finishes. Throughout the course, the safe handling of materials, personal safety, prevention of accidents and the mitigation of hazards are emphasized.

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Masonry-Brick and Block
Subject Code: 178005
The focus of this course will be on the technical aspects of masonry with emphasis on developing introductory skills in laying block and brick. They will learn the physical attributes of masonry materials and the tools required in masonry construction. Students will learn the principles necessary to construct structures with a variety of brick and block materials. Throughout the course, the safe handling of materials and personal safety are emphasized.

Concrete and Residential Masonry
Subject Code: 178006
In this course, students will learn to read and interpret construction plans and drawings for masonry applications. They will learn to select materials based on physical attributes and job requirements. Students will set grades and construct forms, for concrete foundations, footings, and retaining walls. They will mix, reinforce, pour and finish concrete in various residential and commercial applications.

Construction Electrical Systems
Subject Code: 178007
This introductory electrical course will emphasize electrical theory, materials, equipment. Students will explore the National Electrical Code and learn worksite safety. They will interpret schematics; construct basic circuits, use test equipment and electrical hand and power tools.

Residential Electrical Systems
Subject Code: 178008
This course will emphasize electrical theory, materials, equipment and general methods used in residential construction. Students will navigate the National Electrical Code, learn worksite safety and understand licensing and permitting requirements. They will interpret plans and job specifications and calculate loads and service requirements. Students will install, test and repair receptacle outlet, lighting and small appliance circuits. They will understand circuit protection concepts and install a subpanel. Specialty circuit installation will be addressed.

Commercial and Industrial Construction Electrical Systems
Subject Code: 178009
Students will plan and install electrical systems in commercial settings. Students learn worksite safety and understand permitting requirements. Students interpret plans and job specifications and calculate loads and service requirements. Students install, test and repair receptacle outlet, lighting and equipment circuits. They will understand circuit protection concepts and be able to install entrance panels. Specialty commercial circuit installation will be addressed. Students apply operating principles to the installation and troubleshooting of motors and controls.

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Pipefitting and Plumbing Systems
Subject Code: 178010
This course will emphasize the physical principles, general methods, materials and equipment used in the plumbing and pipefitting. Students will learn worksite safety and understand licensing and permitting requirements. They will interpret plans and job specifications and calculate service requirements. Students will rough in water supply and drainage lines following plumbing codes and municipal building standards. Additionally, students will install and maintain plumbing fixtures.

Residential and Commercial Plumbing Systems
Subject Code: 178011
This course focuses on the advanced residential and commercial plumbing systems. Students will plan, install, and maintain water supply, wastewater and fuel supply components following codes and municipal building standards.

Heating and Cooling Systems
Subject Code: 178012
Students will apply principles of heating and cooling to the installation, troubleshooting and maintenance of residential and commercial Heating, Ventilation, and Air conditioning/Refrigeration (HVAC/R) Systems.

HVAC Refrigeration
Subject Code: 178013
Students will install, troubleshoot and service residential and commercial refrigeration systems. Students will learn laws of thermodynamics, pressure and temperature relationships, the refrigeration cycle, and refrigerant management. Students will address hydronic systems, chilled water systems, package units, and cooling towers.

Sheet Metal
Subject Code: 178014
The fundamentals of the sheet metal trade are the emphasis of this course. Students will learn components of a ductwork system and use architect and engineer's scales to read and interpret construction drawings for material calculations and selection. Students will layout sheet-metal patterns using parallel line, radial line, and triangular development procedures. Students will, also fabricate edges, joints, seams, and notches; seal and insulate; and install ductwork systems and accessories.

Alternative Power Generation Systems
Subject Code: 178016
Students will learn the technology and applications of solar and wind energy with an emphasis on installation and service processes. Content includes identifying the functions of photovoltaic, standby power and electric storage systems. Students will perform battery maintenance and implement principles and guidelines of energy analysis needed to carry out effective energy audits in accordance with standards and codes.

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Powerline/Hi-Voltage Power Transmission

Subject Code: 178017

This course focuses on the principles of hi-voltage power transmission. Students use code to build, maintain and repair both aboveground and belowground electrical transmission systems. Students will apply specific rigging techniques and equipment to field situations. Emphasis is placed on safety around high voltage equipment.

Construction Safety and Crew Leadership

Subject Code: 178018

This course covers OSHA standards (30-hr OSHA) and requirements as they apply to the construction industry and crew/project management. Topics include safety and health hazards, safe practices, construction safety management, and crew management. Emphasis is on hazard identification, avoidance, control and prevention.

Plan Reading and Estimating

Subject Code: 178019

Students learn blueprint reading as it relates to the architecture and construction. Students will use scaling, orthographic projections, dimensioning practices, symbols, notations, and abbreviations to perform area calculations and to interpret floor plan, section, and elevations and develop an estimate of material, time, personnel, and equipment needs, availability, and cost. Using construction plans, students will identify problems or shortcomings related to the layout and installation of materials for the project.

Architecture Design – Structural and Mechanical/Electrical/Plumbing

Subject Code: 178020

Students will use architecture design principles to organize and arrange structures to create a perspective of a building. Students will use orthographic/pictorial projection, freehand technical sketching and computer-aided drafting (CAD) skills to generate floor and wall plans, elevations, sections, details and schedules. Students will develop sets of structural framing and mechanical working drawings that include plumbing, HVAC and electrical power and lighting plans.

Architecture Design – Site and Foundation Plans

Subject Code: 178021

Students use advanced architectural design concepts to construct design models including perspective drawings for final presentations. Students use orthographic/pictorial projection, freehand technical sketching and computer- aided drafting (CAD) tools to create site foundation and section plans that include topographical details and schedules. Additionally, students perform zoning analysis, develop preliminary plot plans, and construct grading and utilities plans that include legal descriptions and cut and fill volumes.

Construction Management

Subject Code: 178022

This course provides an integrated look at balancing the planning, estimating, and directing of construction operations. Students learn the process of creating and monitoring a construction project including standard agreements, bidding, estimates and project schedules. Students will learn to manage change orders, accident prevention and loss control, closeouts, and claims with an emphasis in production and quality control. Additionally, students will apply leadership, communications, and problem-solving skills to construction management.

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Remodeling/Renovation
Subject Code: 178023
Students will apply structural and mechanical skills to remodeling and renovations. In addition, students will learn the process of securing the required building permits, the management of subcontractors, and the coordination of formal building inspections. Students will troubleshoot design or logistics issues and provide possible solutions. Throughout the course, the safe handling of materials, personal safety, prevention of accidents and the mitigation of hazards are emphasized.

Facility and Building Maintenance
Subject Code: 178024
Students are introduced to the maintenance and management processes used in public buildings and industrial facilities. Students will troubleshoot building and systems issues and provide solutions following applicable procedures and standards. Students will operate and maintain machinery and equipment used in grounds and facilities maintenance tasks. Throughout the course, the safe handling of materials, personal safety, prevention of accidents and the mitigation of hazards are emphasized.

Heavy Equipment Operations
Subject Code: 178026
Students perform heavy equipment operating techniques and perform operator level maintenance. Students will learn to survey using lasers, transits and machine control systems. Additionally, students learn the techniques and processes for clearing, grubbing, stripping, excavating, backfilling, stockpiling, and cutting and spreading of fill material. Throughout the course, safety is emphasized.

Construction Surveying and Site Logistics
Subject Code: 178027
Students use surveying, topographic, satellite positioning, and geomatic instruments to locate and prepare a site for construction. Students establish lot and building lines as well as grade levels, and use site plans and elevation drawings to determine excavation needs. Students locate and mark underground and overhead services, identity soil conditions that may require shoring and position batter boards. Additionally, students identify the parameters for site selection, zoning regulations, and the process for filing building permits.

Interior Design
Subject Code: 178028
Students learn principles and elements of design as they relate specifically to interior spaces. Students develop functional and aesthetic design concepts with an emphasis in providing design solutions. Students select materials for appropriateness, quality, performance, and cost for interior applications. Students develop an estimate of material, time, personnel, equipment needs and cost and use presentation techniques, technical drawings and other visual materials to enhance and present interior designs.

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Construction Capstone
Subject Code: 178029
The capstone course provides opportunities for students to apply knowledge, attitudes and skills that were learned in Construction programs in a more comprehensive and authentic way. Capstones often include project/problem-based learning opportunities that occur both in and away from school. Under supervision of the school and through community partnerships, students may combine classroom learning with work experience. This course can be delivered through a variety of delivery methods including cooperative education or apprenticeship.

Principles of Wood Construction
Subject Code: 178030
Students will engage in the introductory skills utilized in working with various wood construction materials. They will l earn to use basic measuring tools, hand tools and machines, common to the wood industry, to construct basic projects. Additionally, students will examine various wood construction materials and their properties. Throughout the course, students will learn components of site and personal safety.

Fundamentals of Architecture and Construction
Subject Code: 178040
In this first course in the career field, students will be introduced to the basic principles of architecture and construction. During this course, students will read and create construction drawings and use hand tools to create basic construction projects and models. Throughout the course, students will use hands-on skills and procedures in a laboratory setting. Additionally, students will investigate career opportunities in construction and architecture related fields.

Aviation Unmanned Aircraft Systems
Subject Code: 177024
Students will learn and simulate fundamentals of air traffic control. Subjects taught include principles of aircraft tracking using radar and transponders, controlling aircraft departures, takeoffs, ground operation and in air flight control. Students will learn and simulate techniques of sequencing aircraft approaches and departures using approach control radar. Students will study concepts of meteorology, the flight environment, identification of emergency codes, fundamental aspects of flight and air navigation.

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