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Comprehensive Program Guide

November 20, 2022



OUR MISSION

The Mission of the Lebanon County Career and Technology Center is to provide high school and adult students with the skill, knowledge, and understanding necessary to obtain employment, advance in careers, pursue postsecondary education, and enrich their lives.



Table of Contents

OUR MISSION	1
Table of Contents	2
Program Offerings and CIP Codes	22
Auto Body Technology	23
Task List	
Safety	
Tools/Fasteners	
Certifications	
Suspension and Steering	
Brakes	
Electrical/Electronic Systems	25
Engine Performance	
Engine Repair	27
Manual Drive Train and Axles	
Heating and Air Conditioning	
Pennsylvania Academic Standards (SAS)	
Mathematics	
Reading	29
Writing	
Examples of Course Material	30
Example #1 Auto Body Course Material	30
Textbook	31
Anticipated Costs Sheet (2021-22)	31
Articulation/College Credit	32
Career Pathways	32
Industry Certification	33
Program Safety & Physical Considerations	33
Aptitudes for Success	34
Standardized Testing Requirement	34
Automotive Technology	35
Task List	35

	Safety	. 35
	Vehicle Design and Construction	. 35
	Panel Replacement and Alignment	. 35
	Trim and Hardware	. 36
	Metal Finishing	. 36
	Body Fillers	. 36
	Glass and Hardware	. 36
	Structural Component Repair and Damage Analysis	. 36
	Structural Straightening	. 36
	Corrosion Protection	. 36
	Welding	. 37
	Cutting Processes	. 37
	Refinishing and Equipment Safety	. 37
	Automotive Finishes	. 37
	Surface Preparation	. 37
	Refinishing Equipment and Paint Area	. 37
	Refinishing Operations	. 38
	Blending Operations	. 38
	Detailing	. 38
	Estimating Damage Analysis	. 38
	Plastic Repair	. 38
	Restraint Systems	. 38
	Advanced Technology	. 38
P	ennsylvania Academic Standards	. 39
	Mathematics	. 39
	Reading	. 39
	Writing	. 40
E	xamples of Course Material	. 41
	Example #1 Automotive Course Material	. 41
	Example #2 Automotive Course Material	. 42
	Textbook	. 43
A	nticipated Costs Sheet (2021-22)	. 43
A	rticulation/College Credit	. 43
С	areer Pathways	. 45
	Industry Certification	. 46
	Program Safety & Physical Considerations	. 47

Aptitudes for Success	
Standardized Testing Requirement	
Carpentry/Residential Construction	
Task List	
Safety	
Hand Tools	
Power Tools	
Blueprints Reading	
Site Preparation and Layout	
Footings and Foundations	
Framing – Floor Construction	
Framing – Wall Construction	
Framing – Roof Construction	
Exterior Finish	50
Interior Finish	50
Estimation	50
Pennsylvania Academic Standards	50
Mathematics	50
Reading	
Writing	
Examples of Course Material	53
Example #1 Carpentry Course Material	53
Textbook	54
Anticipated Costs Sheet (2021-22)	54
Articulation/College Credit	54
Career Pathways	55
Industry Certification	55
Program Safety & Physical Considerations	56
Aptitudes for Success	56
Standardized Testing Requirement	
Cosmetology	
Task List	
Bacteriology, Disinfection, & Sanitation	
Professional Attitude	
Business Practices	
Pennsylvania Cosmetology Laws	

4

Cosmetologist	66
Program Safety & Physical Considerations	66
Aptitudes for Success	67
Standardized Testing Requirement	67
Commercial Art and Design	68
Task List	68
Safety	68
Drawing and Illustration	68
Color Theory and Application	68
Digital Imaging	69
Design, Layout, and Production	69
Typography	69
Digital Photography	69
Professional Practices	70
Pennsylvania Academic Standards	70
Mathematics	70
Reading	71
Writing	71
Examples of Course Material	73
Example #1 Commercial Art Course Material	73
Software Applications	75
Anticipated Costs Sheet (2021-22)	75
Articulation/College Credit	75
Career Pathways	76
Industry Certification	77
Program Safety & Physical Considerations	77
Aptitudes for Success	77
Standardized Testing Requirement	77
Culinary Arts	78
Task List	78
Safety and Sanitation Procedures	78
The Food Industry	78
Purchasing, Receiving, and Storage	79
Garde Manger (Cold Food Preparation)	79
Knife Skills	79
Food Service Tools and Equipment	79

Standardized Recipes and Measurement	
Nutrition	
Breakfast Foods	
Vegetables and Fruits	80
Pasta, Grains, and Potatoes	
Seasoning and Flavoring	80
Stocks, Soups, and Sauces	
Meats, Poultry, and Seafood	
Baking and Pastry Skills	
Menus	
Back of House Operations	
Front of House Operations	
Foodservice Information Technology	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Culinary Course Material	
Example #2 Culinary Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Dental Assistant	
Task List	
Introduction to Dental Assisting	
Principles of Infection Control	
Safety and Emergency Procedures	
Ethical/Legal Responsibilities	
Anatomy and Physiology	
Office Procedures	

Pharmacology	
Radiology Skills	
Operative Dentistry (Chair Side Dentistry)	
Dental Materials	
Dental Laboratory Procedures	
Oral Surgery	
Periodontics	
Prosthodontics	
Endodontics	
Certification	
Orthodontics	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Dental Course Material	
Example #2 Dental Course Material	
Example #3 Dental Course Material	
Textbook	101
Anticipated Costs Sheet (2021-22)	101
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
	103
Aptitudes for Success	103
Aptitudes for Success Standardized Testing Requirement	
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology	103
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List	
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety	
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety Tools and Fasteners/Hardware	
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety Tools and Fasteners/Hardware Suspension and Steering Systems	
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety Tools and Fasteners/Hardware Suspension and Steering Systems Preventive Maintenance	103
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety Tools and Fasteners/Hardware Suspension and Steering Systems. Preventive Maintenance Brake System	103
Aptitudes for Success Standardized Testing Requirement Diesel Truck Technology Task List Orientation and Safety Tools and Fasteners/Hardware Suspension and Steering Systems Preventive Maintenance Brake System Diesel Engines	103

Cooling Systems	
Fuel System	
Electrical/Electronic System	
Drive Line	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Diesel Truck Course Material	
Example #2 Diesel Truck Course Material	110
Textbook	
Anticipated Costs Sheet (2021-22)	
Diesel Truck	111
Articulation/College Credit	111
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Electrical Technology	
Task List	114
Basic Safety	114
Hand Tools	114
Power Tools	115
Blueprint Reading	115
Anchors and Supports	115
Residential Cabling Technology	115
Switches and Receptacles Circuits	115
Fixtures	115
Raceways	116
Wired Devices	116
Testing Equipment	116
Electrical Service	116
National Electrical Code (NEC)	116
Green Technology	116

Pennsylvania Academic Standards	117
Mathematics	117
Reading	118
Writing	118
Examples of Course Material	119
Example #1 Electrical Technology Course Material	119
Example #2 Electrical Technology Course Material	119
Textbook	120
Anticipated Costs Sheet (2021-22)	121
Articulation/College Credit	121
Career Pathways	121
Industry Certification	
Program Safety & Physical Considerations	122
Aptitudes for Success	123
Standardized Testing Requirement	123
Electromechanical Technology	
Task List	124
Safety	124
Electrical Quantities and Components	124
Instrumentation	
Ohm's Law/Power	
Series Circuits	124
Parallel Circuits	
Series-Parallel Circuits	
Alternating Current	
Oscilloscope	
Inductance	
Inductive Reactance	
Resistor Inductor (RI) Circuits in Alternating Current (AC)	
Transformers	126
Capacitance	126
Capacitive Reactance	
Resistance Capacitance (RC) Circuits	126
Resistance Inductance Capacitance (RLC) Circuits	126
Resonance	
Soldering/De-soldering	126

Diodes	126
Power Supplies	
Transistor Characteristics	
Small Signal Amplifiers	
Operational Amplifiers	127
Basic Digital Electronics	
Troubleshooting	127
Electronic Communications	127
Motors	127
History of Electronics – Past, Present, and Future	
Microcontrollers	
Pennsylvania Academic Standards	
Mathematics	
Reading	129
Writing	129
Examples of Course Material	130
Example #1 Electromechanical Technology Course Material	130
Example #2 Electromechanical Technology Course Material	131
Textbook	131
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	136
Program Safety & Physical Considerations	136
Aptitudes for Success	136
Standardized Testing Requirement	136
Health Careers Technology	
Task List	
Orientation and Safety	
Legal and Ethical Issues	
Communication	137
Infection Control	138
Emergency Care and Disaster Preparedness	
Human Needs and Human Development	
Body Mechanics, Moving, Lifting, and Positioning	
Personal Care Skills	

Urinary Elimination/Bowel Elimination	139
Nutrition and Hydration	139
Basic Clinical Skills	139
Mental Health and Mental Illness	139
Rehabilitation and Restorative Care	140
Death and Dying	140
Medical Terminology	140
Allied Health Skills	140
Anatomy, Physiology, and Pathophysiology	141
Mathematics in Allied Health	141
21 st Century Interpersonal Skills	141
Pennsylvania Academic Standards	142
Mathematics	142
Reading	143
Writing	143
Examples of Course Material	144
Example #1 Health Careers Technology Course Material	144
Example #2 Health Careers Technology Course Material	145
Textbook	149
Anticipated Costs Sheet (2021-22)	149
Articulation/College Credit	150
Career Pathways	150
Industry Certification	151
Program Safety & Physical Considerations	151
Aptitudes for Success	151
Standardized Testing Requirement	151
Landscape Technology	152
Task List	
Safety	152
Safe and Proper Plant Health Care Practices	152
Basic Botany	152
Horticulture Business Operations	153
Soils and Fertilizer	153
Sustainable Horticulture	153
Horticulture Technology	153
History and Current Status of Horticulture	153

Plant Identification	
Horticultural Careers and Opportunities	
Horticultural Pathways	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Landscape Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Law Enforcement & Security	161
Task List	161
Crime Scene Management	161
Use of Force	161
Criminal Law and Procedures	
Health Issues	
Police Concepts and Skills	
Corrections Concepts and Skills	164
Court Systems	164
Communications	164
Security: National, International, and Local	
Special Populations	
Private Security: National, International, and Local	
Pennsylvania Academic Standards	166
Mathematics	166
Reading	167
Writing	167
Examples of Course Material	
Example #1 Law Enforcement and Security Course Material	

Example #2 Law Enforcement and Security Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Law Enforcement - Rutter	
Law Enforcement – Mays/Lagonis	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Masonry	
Task List	
Safety Practices	
Blueprints	
Masonry Hand Tools	
Building Site	
Power Tools	
Masonry Fasteners	
Bricklaying Techniques	
Block Laying Techniques	
Mortar	
Chimneys and Fireplaces	
Arch Construction	
Masonry Estimation	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Masonry Course Material	
Textbook	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	

Aptitudes for Success	
Standardized Testing Requirement	
Media Communications Technology	
Task List	
Introduction to Cinematography, Film and Video Production	
Computer Technology	
Camera Foundationals	
Graphic Design for Media Production	
Audio Production	
Studio/Live Production/Operations	
Pre-Production/Creative Development	
Post-Production	
Script Writing	
Lighting	
Industry Software	
Media Distribution and Output	
Emerging Media Technologies	
Production Projects	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Media Communications Technology Course Material	
Example #2 Media Communications Technology Course Material	
Software Applications	191
Textbook	191
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	194
Program Safety & Physical Considerations	194
Aptitudes for Success	194
Standardized Testing Requirement	194
Medical Assistant	
Task List	

Introduction to Health Care	195
Medical Assistant Administrative Skills	
Pharmacology	
Infection Control	
Laboratory Procedures	
Healthcare Law and Ethics	
Introduction to Medical Insurance and Managed Care	
Concepts of Effective Communication	
Introduction to Basic Anatomy and Physiology	
Medical Assistant Clinical Laboratory Procedures	
Psychology	
Complete a Medical Assistant Externship	198
Pennsylvania Academic Standards	
Mathematics	198
Reading	199
Writing	199
Examples of Course Material	
Example #1 Medical Assisting Course Material	
Example #2 Medical Assisting Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Network Technology	
Task List	
Personal and Environmental Safety	
Computer Hardware	
Troubleshooting, Repair and Maintenance	
Operating Systems and Software	
Network Technologies	
Network Media and Topologies	
Network Devices	

Network Management	
Network Tools and Troubleshooting	
Security Foundationals	
Communication and Professionalism	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Network Technology Course Material	
Example #2 Network Technology Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
astry Arts	
Task List	
Introduction to the Hospitality and Baking Industry	
Sanitation and Safety	
Business and Math Skills	
Baking Preparation	
Baking Foundationals	
Purchasing, Receiving, Inventory and Storage	
Nutrition	
Baking Planning	
Human Relations Skills	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Pastry Arts Course Material	
· ·	

Example #2 Pastry Arts Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Plumbing, Heating, & Air Conditioning	234
Task List	
Blueprints and Sketching of Pipe Systems	
Pipe Specifications and Systems	
Hand and Power Tools	
Valves	
Copper Piping Operations	
Plastic Pipe and Tubing	
Pipe Hangers and Supports	
Water Distribution Lines	
Steel Pipe Operations	
Cast Iron Pipe Operations	
Drains, Stacks and Sewers	
Fixtures	
Appliances	
Vents	
Plumbing Systems Maintenance	
Tests on Systems	
Advanced Pipe Fabrication	
Pressure Boilers	
Hydronic Heating System	
Ladders and Scaffolds	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	

Example #1 Plumbing, Heating & Air Conditioning Course Material	
Example #2 Plumbing, Heating, & Air Conditioning Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Precision Machining Technology	
Task List	244
Part Inspection	
Bench Work	
Drill Presses	
Grinding Machines	
Lathes	
Milling Machines	
Power Saw	
Machines and Tools	
Metallurgy	
Charts and References	
Blueprint Reading	
CNC Programming/Operations	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Precision Machining Course Material	
Example #2 Precision Machining Course Material	
Example #3 Precision Machining Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	254
Career Pathways	

Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Sports Therapy Science	
Task List	
Organizational, Professional Health, and Wellbeing	
Documentation, Legal and Ethical Issues	
Emergency Care and Infection Control	
Injury Prevention and Protection	
Treatment, Rehabilitation, and Clinical Skills	
Nutrition and Hydration	
Exercise Science and Prescription	
Human Development and Mental Health	
Medical Terminology	
Anatomy, Physiology, and Pathophysiology	
Pennsylvania Academic Standards	
Mathematics	
Reading	
Writing	
Examples of Course Material	
Example #1 Sports Therapy Science Course Material	
Example #2 Sports Therapy Science Course Material	
Textbook	
Anticipated Costs Sheet (2021-22)	
Articulation/College Credit	
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Welding Technology	
Task List	
Occupational Orientation and Safety	
Principles of Welding	
Welding, Drawing, and Weld Symbol Interpretation	

Visual Examination, Inspection, and Testing	273
Visual Examination, Inspection, and Testing	273
Shielded Metal Arc Welding (SMAW)	273
Gas Metal Arc Welding (GMAW)	273
Flux Corded Arc Welding (FCAW)	274
Gas Tungsten Arc Welding (GTAW)	274
Manual Oxy-fuel Gas Cutting (OFC)	274
Mechanized Oxy-fuel Gas Cutting (OFC)	274
Manual Plasma Arc Cutting (PAC)	275
Manual Air Carbon Arc Cutting (CAC-A)	275
Pennsylvania Academic Standards (SAS)	275
Mathematics	275
Reading	276
Writing	276
Examples of Course Material	277
Example #1 Welding Technology Course Material	277
Example #2 Welding Technology Course Material	277
Textbook	278
Anticipated Costs Sheet (2021-22)	279
Articulation/College Credit	279
Career Pathways	
Industry Certification	
Program Safety & Physical Considerations	
Aptitudes for Success	
Standardized Testing Requirement	
Guidelines for Placement at LCCTC	
School District Guidelines	
Parent & Student Guidelines	
Special Populations Program	
FAQs	
Non-Discrimination Statement	

Program Offerings and CIP Codes

Half-Day Programs

Auto Body Technology	47.0603
Automotive Technology	47.0604
Carpentry/Residential Construction	46.0201
Cosmetology	12.0401
Diesel Truck Technology	47.0613
Electrical Technology	46.0399
Electro-Mechanical Technology	15.0403
Health Careers Technology	51.0899
Landscape Technology	1.0601
Law Enforcement & Security	43.0107
Masonry	46.0101
Medical Assistant	51.0801
Network Technology	11.0901
Plumbing, Heating, & Air Conditioning	46.0503
Precision Machining	48.0501
Sports Therapy Science	51.2604
Welding Technology	48.0508

Full Day Programs

Commercial Art & Design	50.0402
Culinary Arts	12.0508
Dental Assistant	51.0601
Media Communication Technology	50.0602
Pastry Arts	12.0501

Auto Body Technology

Auto Body Technology students repair damaged vehicles to like-new condition. Utilizing the latest technology, they rebuild damaged vehicles and learn body and frame alignment, parts repair/replacement including the latest fiberglass and plastic components, MIG welding, trim, accessories, interior components, glass replacement, and painting including basecoat/clearcoat/striping. Career opportunities range from the reconditioner to the collision repair technician and may begin in high school with a Co-Op position providing job experience and a salary. Students who successfully complete the program may receive college credits from PA College of Technology and the Automotive Training Center.

Task List

Safety

- Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.
- Demonstrate the ability to set-up/shut-down oxygen acetylene welding equipment.
- ✤ Identify chemical safety, Right-To-Know laws and Safety Data Sheets (SDS).
- ✤ Identify and use hand tools.
- ✤ Identify and use power tools.
- ✤ Wear personal protective equipment (PPE).
- ✤ Follow guidelines for use of fire protection equipment.
- Follow EPA and OSHA regulations.

Tools/Fasteners

- ✤ Identify and use fasteners and bolts.
- Drill and use re-threading tools.
- ✤ Read and interpret precision automotive measuring tools.
- ✤ Identify and use automotive specialty tools.
- Perform common fastener and thread repairs, including remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.

Certifications

- Prepare to obtain PA Safety Inspection Certification.
- ◆ Prepare to obtain EPA 609 Refrigerant Recovery and Recycling Certification.
- ✤ Prepare to obtain Emission Inspection Certification.

Suspension and Steering

- Identify and interpret suspension and steering system concerns and determine necessary actions.
- ✤ Inspect rack and pinion steering gear and mounting bushings and brackets.
- ✤ Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
- Determine proper power steering fluid type and inspect fluid level and condition.
- ✤ Flush, fill, and bleed power steering system.
- Diagnose power steering fluid leakage and determine necessary actions.
- Remove and reinstall power steering pump.
- Remove and reinstall press fit power steering pump pulley and check pulley and belt alignment.

- ✤ Inspect and replace power steering hoses and fittings.
- Inspect and replace pitman arm, relay (center link/intermediate) rod, idler arm and mountings, and steering linkage damper.
- ✤ Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
- ✤ Inspect, and replace upper and lower control arms, bushings, shafts, and rebound bumpers.
- ✤ Inspect and replace strut rods and bushings.
- ✤ Inspect and replace upper and lower ball joints.
- ✤ Inspect and replace steering knuckle assemblies.
- Inspect and replace short and long arm suspension system coil springs and spring insulators.
- ✤ Inspect, replace, and adjust suspension system torsion bars and inspect mounts.
- Inspect and replace stabilizer bar bushings, brackets, and links.
- Inspect and replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
- ✤ Inspect, remove, and replace shock absorbers.
- ✤ Lubricate suspension and steering systems.
- Perform pre-alignment inspection and measure vehicle ride height and perform necessary actions.
- Perform four-wheel alignment.
- ✤ Check front and rear cradle (subframe) alignment.
- ✤ Inspect tire condition, identify tire wear patterns, and check and adjust air pressure.
- ✤ Diagnose wheel/tire vibration, shimmy, and noise.
- * Rotate tires according to manufacturer's recommendations.
- ✤ Measure wheel, tire, axle flange, and hub runout.
- Dismount, inspect, and remount tire on wheel and balance wheel and tire assembly (static and dynamic).
- Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
- ✤ Inspect tire and wheel assembly for air loss.
- ✤ Repair tire using internal patch.
- Identify indirect and direct tire pressure monitoring systems (TPMS), calibrate system, and verify operation of instrument panel lamps.

Brakes

- ✤ Identify and interpret brake system concerns.
- ✤ Measure brake pedal height, travel, and free play as applicable.
- Check master cylinder for internal/external leaks and proper operation.
- Remove, bench bleed, and reinstall master cylinder.
- Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; and determine necessary actions.
- ✤ Replace brake lines, hoses, fittings, and supports.
- Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).
- Select, handle, store, and test brake fluid for contamination and fill to proper level.
- ✤ Inspect, test, and replace components of brake warning light system.
- ✤ Bleed and flush brake system.
- Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation concerns.

- ✤ Remove, clean, inspect, and measure brake drums.
- Refinish brake drum and measure final drum diameter.
- Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates then lubricate and reassemble.
- ✤ Inspect and install wheel cylinders.
- Pre-adjust brake shoes and parking brake, install brake drums or drum/hub assemblies, and wheel bearings.
- ✤ Install wheel, torque lug nuts, and make final checks and adjustments.
- ✤ Remove caliper assembly, inspect for leaks, and damage to caliper housing.
- Clean and inspect caliper mounting and slides/pins for operation, wear, and damage.
- Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads; and inspect for leaks.
- Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation.
- ✤ Remove and reinstall rotor.
- * Refinish rotor on vehicle and measure final rotor thickness.
- * Refinish rotor off vehicle and measure final rotor thickness.
- Check brake pad wear indicator system operation.
- ◆ Check vacuum supply to vacuum-type power booster and check power assist operation.
- Remove, clean, inspect, repack, and install wheel bearings, RACES and replace seals; install hub; and adjust bearings.
- Check parking brake cables and components including integral parking brake system for wear, binding, and corrosion then clean, lubricate, adjust, or replace as needed.
- ♦ Check parking brake and indicator light system operation.
- ✤ Check operation of brake stop light system.
- ✤ Inspect and replace wheel studs.
- ✤ Remove and reinstall sealed wheel bearing assembly.
- ✤ Identify and inspect electronic brake control system components.
- Diagnose electronic brake control system, electronic control(s), and components by retrieving diagnostic trouble codes and using recommended test equipment.
- ✤ Bleed the electronic brake control system hydraulic circuits.
- ✤ Identify traction control/vehicle stability control system components.
- ✤ Describe the operation of a regenerative braking system.

Electrical/Electronic Systems

- ✤ Identify and interpret electrical/electronic system concerns.
- Use wiring diagrams during diagnosis of electrical circuit problems.
- Check electrical circuits with a test light.
- Check electrical circuits using fused jumper wires.
- ✤ Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
- ✤ Measure and diagnose the cause(s) of excessive parasitic draw.
- ✤ Inspect and test fusible links, circuit breakers, and fuses.
- Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits.
- * Remove and replace terminal end from connector, replace connectors, and terminal ends.
- * Repair wiring harness and solder repair.
- Identify location of electric hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.
- Perform battery state-of-charge test.

- ◆ Perform battery capacity test and confirm proper battery capacity for vehicle application.
- ✤ Maintain and restore electronic memory functions.
- ✤ Inspect, clean, fill, and replace battery, battery cables, connectors, clamps, and hold-downs.
- Perform battery charge.
- Start a vehicle using jumper cables or an auxiliary power supply.
- Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.
- Perform starter current draw tests.
- ✤ Perform starter circuit voltage drop tests.
- ✤ Inspect and test starter relays and solenoids.
- ✤ Remove and install starter in a vehicle.
- Inspect and test switches, connectors, and wires of starter control circuits and perform necessary action.
- Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.
- ◆ Perform charging system output test and determine necessary action.
- Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
- Remove, inspect, and install generator (alternator).
- ✤ Inspect, replace, and aim headlights and bulbs.
- Diagnose the cause of incorrect operation of warning devices and other driver information systems.
- Diagnose incorrect horn operation.
- Diagnose incorrect wiper operation and diagnose wiper speed control and park problems.
- ✤ Diagnose incorrect washer operation.
- Diagnose incorrect operation of motor-driven accessory circuits.
- Remove and reinstall door panel.
- Use a digital multimeter (DMM).
- Demonstrate knowledge of an automatic idle start/stop system.

Engine Performance

- ✤ Identify and interpret engine performance concern.
- Diagnose abnormal engine noise or vibration concerns.
- ♦ Diagnose abnormal exhaust color, odor, and sound.
- Perform engine absolute (vacuum/boost) manifold pressure tests.
- Perform cylinder power balance test.
- Perform cylinder cranking and running compression tests.
- Perform cylinder leakage test.
- Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns.
- Verify engine operating temperature.
- Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data and clear codes when applicable.
- Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes and obtain, graph, and interpret scan tool data.
- ✤ Access and use service information to perform step-by-step diagnosis.
- Perform active tests of actuators using a scan tool.
- Describe the importance of running all OBDII monitors for repair verification.

- Inspect and test ignition primary and secondary circuit wiring and solid-state components and test ignition coil(s).
- ✤ Inspect and test crankshaft and camshaft position sensor(s).
- Inspect, test, and replace ignition control module and powertrain/engine control module and reprogram as necessary.
- Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems.
- ✤ Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume.
- ✤ Replace fuel filters.
- Inspect throttle body, air induction system, intake manifold, and gaskets for vacuum leaks and unmetered air.
- ✤ Inspect and test fuel injectors.
- Verify idle control operation.
- Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s).
- Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses.
- Inspect, test, service, and replace components of the EGR system, including electrical/electronic sensors, controls, and wiring, EGR tubing, exhaust passages, vacuum/pressure controls, filters, and hoses.
- ✤ Inspect and test mechanical components of secondary air injection systems.
- Inspect and test electrical/electronically operated components and circuits of air injection systems.
- ✤ Inspect and test catalytic converter efficiency.
- ✤ Inspect and test components and hoses of the evaporative emissions control system.
- Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems.

Engine Repair

- Verify operation of the instrument panel engine warning indicators.
- ✤ Install engine covers using gaskets, seals, and sealers.
- ✤ Adjust valves (mechanical or hydraulic lifters).
- Inspect, replace, and adjust drive belts, tensioners, and pulleys and check pulleys and belt alignment.
- Inspect and test coolant, drain and recover coolant, and flush and refill cooling system with recommended coolant.
- Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses.
- ✤ Identify components and inspect engine assembly for fuel, oil, coolant, and other leaks.
- * Remove and replace timing belt and verify correct camshaft timing.
- Remove and replace thermostat and gasket/seal.
- Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices.
- ✤ Perform engine oil and filter change.
- Check fluid level and fluid condition in a transmission or a transaxle equipped with a dipstick.

- Check fluid level and fluid condition in a transmission or a transaxle <u>not</u> equipped with a dipstick.
- Drain, replace, and exchange fluid and filter(s).
- ✤ Identify drivetrain components and configuration.
- Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral switch.
- ✤ Inspect for leakage at external seals, gaskets, and bushings.
- ✤ Inspect, replace, and align powertrain mounts.

Manual Drive Train and Axles

- Drain and refill manual transmission/transaxle and final drive unit.
- ✤ Check and adjust clutch master cylinder fluid level.
- ✤ Check for system leaks.
- Check and adjust differential housing fluid level.
- Drain and refill differential housing.
- ♦ Identify, inspect, and replace manual drivetrain and axle components and configuration.

Heating and Air Conditioning

- Inspect air conditioning (A/C) condenser for airflow restrictions.
- ✤ Inspect engine cooling and heating systems hoses.
- ✤ Inspect A/C heating ducts, doors, hoses, cabin filters, and outlets.
- ✤ Check for A/C leaks.

Pennsylvania Academic Standards (SAS)

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real	
	world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution	
	of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement	
	when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex	
	numbers	
2.1.7.D.1	Apply and extend previous understanding of operations with fractions	Yes
	to operations with rational numbers	
	Algebraic Concepts	Foundational
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric	
	ratios	
2.2.7.B.1	Apply properties of operations to generate equivalent expressions	Yes
2.2.7.B.2	Model and solve real-world mathematical problems by using and	Yes
	connecting numerical, algebraic, and/or graphical representations	

	Geometry	Foundational
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures	
2.3.HS.A.1 3	Analyze relationships between two dimensional and three dimensional objects	
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
	Measurement, Data, & Probability	Foundational
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.5.B.2	Draw informal comparative inferences about two populations	Yes

Reading

Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.	
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.	
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.	
	Craft & Structure	
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.11 -12.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.11 -12.F	Analyze the author's purpose in providing an explanation, describing a procedure &	
	analyze the structure of the relationships among concepts in a text	
Integrate Knowledge & Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a	
	table or chart)	
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.	
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto	
	solve a problem	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the	
	data when possible	
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes, etc.	

Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or	
	shared writing products	
Research		
3.6.11 -12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing		
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks,	
	purposes, and audiencesetc.	

Examples of Course Material

Example #1 Auto Body Course Material

Sample knowledge questions:

- 1. In the paint department of a large collision repair shop, multiple painters mix paint off of the same mixing station. They consistently need to tint only 5 percent of the paint jobs each month. Suddenly the percentage jumps to nearly 80 percent. What could be the problem?
- 2. Technician A says that a charcoal vapor respirator is the proper respirator to use when refinishing a vehicle. Technician B says that the way to find the correct respirator to use when finishing a vehicle is to check the MSDS for the coating being used. Who is correct?
 - A. Technician A onlyB. Technician B onlyC. Both Technicians A and BD. Neither Technician A nor B
- 3. Write the description for the steps necessary to adjust a spray gun.
- 4. What primer(s) or basecoat(s) should be used on the surface where foams are to be applied?

Collision Repair and Refinishing ISBN 978-1-4018-8994-4

Sample Textbook Reading:

"In the event the door has sustained some obvious damage, one should also check for uniform gaps between it and all the adjacent panels. Uneven gaps between it and the adjacent panels is an indication the hinges may again have been affected. If the door sustained a hard hit in the lower section, it may have bent the intrusion beam, causing a shortening effect which would require replacement of the entire panel. In a less severe damage scenario, the area where the door intrusion beam is welded to the door should also be checked for pulled spot welds or any distortion of the inner door frame. Any sign of damage to this area of the door warrants replacement, as no allowance is made for these to be repaired."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through ML) R or O (Required or Option	nal)
Cost - ML or YC - Your Choice for vendor the cost is approximate	

Item	Vendor	Cost	R or O
Work pants - blue, black, gray	ML	\$20.00	R
T-shirt short sleeve	ML	\$11.50	R
T-shirt long sleeve	ML	\$14.00	0
Hooded sweatshirt	ML	\$21.50	0
Short sleeve button down shirt	ML	\$37.00	0
Long sleeve button down shirt	ML	\$39.00	0
Leather rubber sole steel toe work boots	YC	\$100.00	R
Lock for student locker	YC	\$5.00	R
Air supply hood	CTC	\$38.00	R
Auto darkening weld helmet	Harbor Freight	\$40.00	0

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Thaddeus Stevens College of Technology		Credits
CORT 111	Collision Repair Welding	4.0
CORT 116	Repairing Damaged Panels and Metalworking Methods	4.0
CORT 107	Details of Body Construction	4.0

Total Credits Awarded: 12.0

Notes: Twelve (12) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 47.0603 Collision Repair Technology, Associate in Applied Science Degree (A.A.S).

Career Pathways

Reconditioner	Spray Painter	Body Repairman Helper
Automotive Detailer	Frame Technician	Estimator (Insurance)
Custom Accessories Installer	Collision Technician	
Body Shop Manager	Body Shop Owner	

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Auto Body Technician	8%	\$30,370	\$47,270	\$76,220
Spray Painter	7%	\$31,430	\$45,770	\$52,940
Insurance Appraiser	5%	\$48,070	\$65,090	\$68,180
Parts Salesperson	6%	\$21,520	\$32,870	\$38,540

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Intro to Tools, Equipment and	
	Attachment methods 1&2	
Automotive Lighting	Intro to Vehicle Construction	
	Materials	
Bolted-On Exterior Panels 1&2	Intro to Vehicle Part	
	Terminology 1&2	
Hazardous Airborne Pollutant	Refinishing Equipment	
Reduction		
Hazardous Material Storage and	Removing and installing	
Disposal	Exterior Trim, Pinstripe, and	
	Decals	
Intro to Collision Repair Process	Removing and Installing	
	Hardware Interior Trim	
Intro to Mechanical Repair	Surface Preparations and	
Terms and Vehicle Protection	Masking	
Into to Refinishing and	Vehicle Technology and Trends	
Corrosion Protection 1&2		
Intro to Safety Systems		

Program Safety & Physical Considerations

- Ability to focus on safety around moving equipment, hand tools, power tools, and other equipment
- Ability to work in tight spaces
- Frequent standing, bending and lifting required
- Ability to lift 50 pounds or more
- Ability to work independently and as a team, read and follow directions
- Stamina to stand for a long period of time
- Strong attention to detail
- Ability to diagnose the source of a problem quickly and accurately
- Ability to tolerate some chemicals and strong odors

Aptitudes for Success

- Good Eye/hand/foot coordination
- Good Finger and manual dexterity
- Arm/Hand steadiness
- Spatial Acuity
- Aptitude for mechanical, electrical, electronic, computer technology, technical drawings, and diagrams
- Form perception
- Reasoning
- Ability to discriminate between objects of similar size, shape, and color

Standardized Testing Requirement

$NOCTI-12^{th}\ Grade$

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Automotive Technology

Automotive Technology students diagnose, service, and repair late model vehicles following the Automotive Service Excellence (ASE) and Automotive Youth Educational System (AYES) national technician standards. Motivated students may obtain the PA Auto Safety Inspection Certification, PA Emission Inspection Certification and qualify to take the ASE tests after successfully completed the program. Students who are selected into the AYES program are guaranteed employment with a local auto dealership and may opt to complete two additional years of college.

Utilizing state-of-the-art repair equipment students learn brake systems, suspension and steering, engine performance, automotive electronics, and HVAC. Technical career opportunities range from maintenance mechanic to automotive technician and may begin in high school with a Co-Op or an AYES internship providing job experience and a salary. Students who successfully complete the program may receive 16 college credits from HACC. In addition, students can also earn credits from University of Northwestern Ohio, Automotive Training Center, and Northampton Community College.

Task List

Safety

- Follow general shop safety rules.
- ✤ Use of personal safety devices and clothing.
- Locate and identify fire extinguishers.
- ✤ Locate and operate emergency switches.
- Explain fire and tornado drill procedures.
- Demonstrate proper handling of hazardous materials.
- Follow proper chemical disposal techniques.
- ✤ Operate shop and spray area ventilation systems.
- ✤ Identify and follow rules for care and safe use of hand tools.
- ✤ Identify and demonstrate safe and proper use of power tools and equipment.
- ✤ Identify the proper methods and options for safely moving vehicles in the shop area.
- ✤ Identify information on Safety Data Sheets (SDS).
- Demonstrate the ability to secure vehicles on jack stands and/or hydraulic lifts.

Vehicle Design and Construction

- ✤ Identify the differences between various vehicle construction types.
- ✤ Identify and describe structural and nonstructural panels of a unibody vehicle.
- ✤ Determine the various materials used in vehicle construction.

Panel Replacement and Alignment

- Identify the principles of full or partial panel replacement (bonded, bolted, welded, or riveted).
- ✤ Remove, reinstall, and align bolt on panels.
- ✤ Remove and reinstall wheel/tire assembly.
- ✤ Aim headlights using mechanical aiming equipment.

Trim and Hardware

- Determine types of fasteners.
- * Remove and replace adhesive-held molding and trim.
- ✤ Remove and install seats.
- Remove and install interior parts and hardware.
- * Remove and install exterior parts and hardware.
- * Remove and install exterior trim, moldings, and emblems.

Metal Finishing

- Select proper metal straightening tools.
- Evaluate stretched metal for repair.
- ✤ Demonstrate weld-on nail gun to repair sheet metal.
- ✤ Repair metal to meet industry standards.
- Explain the characteristics of aluminum repair and tools required.

Body Fillers

- Select correct body filler and tools.
- Prepare surface for body filler.
- ✤ Mix and apply body filler.
- Sand body fillers to correct contour.

Glass and Hardware

- ✤ Remove and reinstall a door window regulator.
- ✤ Remove and reinstall moveable door glass.
- Describe the removal and replacement of stationary glass.

Structural Component Repair and Damage Analysis

- Classify the various types of structural damage a vehicle can sustain.
- Interpret body dimension specifications.
- Use a tram gauge to diagnose vehicle length and width damage and X measurements of body or frame.
- Diagnose vehicle height with datum line gauges.
- ✤ Identify various measuring systems.
- ✤ Identify repair methods for vehicle with diamond damage, twist, sag side swag, or mash.

Structural Straightening

- ✤ Mount and anchor vehicle to a pulling system.
- ✤ Measure vehicle structure and analyze data.
- ✤ Interpret data to make a structural pull back to factory specs.

Corrosion Protection

- ✤ Identify corrosion causes and OEM corrosion protection.
- ✤ Apply repair methods for corrosion protection.
- ✤ Demonstrate the application of seam sealers.
Welding

- Identify different methods of attaching components (MIG welding, squeeze type resistance spot welding (STRSW), structural adhesive, silicon bronze, etc.)
- Demonstrate personal safety practices.
- Set up and tune the MIG welder.
- Complete a butt joint with backing in various welding positions.
- Complete an overlap weld in various positions.
- Complete a plug weld in various positions.
- Define protection of adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.

Cutting Processes

- ✤ Identify cutting processes.
- ✤ Demonstrate sheet metal cutting processes.

Refinishing and Equipment Safety

- Explain various environmental regulations.
- ✤ Locate hazardous warning information.
- Select and inspect personal protection equipment (PPE).
- Demonstrate safe painting practices.
- ✤ Identify personal health and safety hazards.

Automotive Finishes

- Describe the difference between paint systems (water borne, solvent, multi-stage).
- Describe causes and cures of paint defects.
- ✤ Identify various undercoats.
- ✤ Identify various topcoats (single stage, basecoat/clearcoat, tricot, quad coat).

Surface Preparation

- ✤ Demonstrate proper steps to pre-wash entire vehicle.
- ✤ Use wax and grease remover.
- Demonstrate proper use of sanding and featheredging techniques.
- ✤ Wet, sand, and featheredge.
- ✤ Locate and obtain the vehicle paint code.
- ✤ Apply undercoats.
- Prepare panels for blending.
- ✤ Identify masking materials.
- Perform masking.
- Select the appropriate abrasive.

Refinishing Equipment and Paint Area

- ✤ Operate the spray booth.
- ✤ Maintain the paint mixing area.
- Set up, test, and adjust spray guns.
- ✤ Inspect, clean, and determine conditions of spray guns and equipment.
- Select and use the National Institution of Safety and Health (NIOSH) approved personal painting/refinishing respirator system.

Refinishing Operations

- ✤ Prepare surface for topcoat system (degrease and tack).
- ✤ Apply primer-sealer.
- ✤ Apply single-stage finish.
- ✤ Apply basecoat/clearcoat finish.
- Describe the application of stone chip-resistant coating to lower body areas
- Demonstrate paint manufacturer's mixing ratio when preparing paint products.

Blending Operations

- Blend basecoat/clearcoat finish.
- ✤ Tint and blend color coat.

Detailing

- ✤ Remove overspray.
- ✤ Clean exterior of vehicle.
- ✤ Clean interior of vehicle.
- ✤ Apply decals and stripes.
- Demonstrate color sanding and polishing techniques.
- Clean body openings.
- Clean exterior and interior glass surfaces.

Estimating Damage Analysis

- ✤ Identify vehicle by vehicle identification number (VIN).
- Collect vehicle and customer data.
- ✤ Use collision estimating guides/estimating software.
- ✤ Identify different types of vehicle damage (direct and indirect).
- ✤ Indicate repair and replace decisions.
- Prepare an estimate/repair and sequence/calculate repair costs/supplements.
- Explain the need for a pre-repair scan and post-repair scan of the vehicle computer.

Plastic Repair

- ✤ Identify plastic to make repair decisions.
- ♦ Use plastic repair methods (adhesives and welding).
- ◆ Repair plastics with two-part adhesives, with and without reinforcement.
- Research recommended repair processes for bumper cover repair on Advance Driver Assistance System (ADAS) vehicles.

Restraint Systems

- Research auto manufacturers' recommended safety procedures to prevent accidental deployment of supplemental restraint systems.
- ✤ Identify supplemental restraint systems.
- ✤ Remove and reinstall seat belt components.

Advanced Technology

- Explain function and components of the Advance Driver Assistance System (ADAS).
- Describe precautions required when working on high voltage vehicles.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy on measurement when reporting quantities appropriate to limitations	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	
2.1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems	Yes
2.1.7.D.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers	Yes
2.1.8.E.1	Distinguish between rational and irrational numbers using their properties	Yes
	Algebraic Concepts	Foundational
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric ratios	
2.2.7.B.1	Apply properties of operations to generate equivalent expressions	Yes
2.2.7.B.2	Model and solve real-world mathematical problems by using and	Yes
	connecting numerical, algebraic, and/or graphical representations	
	Geometry	Foundational
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures	
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects	
2.3.7.A.1	Solve real-world and mathematical problems involving angle	Yes
22742	measure, area, surface area, circumference, and volume	Vaa
2.3.1.A.2	relationships between them	res
	Foundational	
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.7.B.2	Draw informal comparative inferences about two populations	Yes

Reading

Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.	
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.	

3.5.11-12.C	Follow precisely a complex multistep procedure, etc.			
	Craft & Structure			
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words			
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.			
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure & analyze the structure of the relationships among concepts in a text			
	Integrate Knowledge & Ideas			
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)			
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem			
3.5.9-10. I	Compare and contrast findings presented in a text to those from other sources, etc.			
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem			
3.5.11-12. H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible			
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding			
Range of Reading				
3.5.11-12.J	Comprehend technical texts independently and proficiently			

Writing

Text Types and Purpose				
3.6.11-12.A	Write arguments focused on discipline specific content			
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes, etc.			
	Production & Distribution of Writing			
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience			
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience			
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products			
Research				
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem			
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation			
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research			
Range of Writing				
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc.			

Examples of Course Material

Example #1 Automotive Course Material

Disc Brake Inspection

Student:		Date:	Period:	
VIN:	Year:	Make:	Model:	
Engine: Tra	nsmission:	Product	ion Date:	
OBJECTIVE: Student neces	will inspect the fro ssary to bring syste	nt disc brakes o em up to manuf	on an automobile and o acturer's specifications	determine what is
MATERIALS: 1.	EYE PROTECT	ION		
2.	Lug wrench, Ha	nd tools		
3.	Dial Indicator an	d Digital Calipe	r	
4.	Specification bo	ok, Fast Spec,	or All-Data	
5.	Vehicle (see inst	tructor)		
PROCEDURE: WEA	R EYE PROTECTI	ON! Watch pov	ver point presentation	and write procedu

ROCEDURE:	WEAR EYE PROTECTION! Watch power point presentation and write procedure
	on back of this skill sheet or on a repair order.

Item Inspected	Metric or SAE	Discard Specifications		
	(mm) or (Inches)		Circle o	ne below
	(What did you measure?)	(What is the limit?)		
Brake Pad Thickness			Good	Replace
Brake Rotor Thickness			Cood Nood Ma	chining Poplace
Brake Rotor Warpage			Good Need Ma	ichining Replace

	Appearances	Service Needed? Circle one	
Brake Hoses		Good	Replace
Brake Lines		Good	Replace
Caliper Leakage		Good	Replace

Summary for needed brake repairs:

INSTRUCTORS EVALUATION

LEVEL OF SKILL ATTAINED	Initial	OVERALL SKILL EVALUATION	Points
DEMONSTRATES MASTERY (5)		DOCUMENTATION COMPLETENESS (1)	
PERFORMS SATISFACTORILY (4)		SAFETY COMPLIANCE (1)	
CAPABLE, NEEDS PRACTICE (3)		WORK PROFESSIONALISM (3)	
Assisted in Performing (2)		LEVEL OF SKILL ATTAINED (1-5)	
EXPOSURE, OBSERVATION (1)		TOTAL SCORE	
INSTRUCTOR'S SIGNATURE:			

2. Label the problems that can occur in the steering system.



3. Explain two methods of checking the causes of steering wheel play.

Modern Automotive Technology ISBN 978-1-64564-688-4

Sample Textbook Reading:

"A transmission oil cooler is often placed in the radiator on cars with automatic transmissions or transaxles to prevent the transmission fluid from overheating. It is a small tank enclosed in one of the main radiator tanks. Since the transmission fluid is hotter than the engine coolant, heat is removed from the fluid as it passes through the radiator and cooler."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Short sleeve button down shirt	ML	\$21.50	R
Long sleeve button down shirt	ML	\$24.00	R
Black shoes/boots oil resistant sole	YC	\$100.00	R
Mechanics gloves	YC	\$20.00	0
Mechanics belt	YC	\$35.00	R
Pocket flashlight	YC	\$25.00	R
Pocket screwdriver	YC	\$5.00	R
Binder 3-ring with pockets	YC	\$3.00	R
Text workbooks	YC	\$40.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Delaware Cou	nty Community College	Credits
AUT 100	Introduction to Automotive Service Operation and Shop Practices	2.0
AUT 101	Automotive Electricity and Electronics	4.0
AUT 102	Automotive Engines	4.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Delaware County Community College POS: CIP 47.0604, Automotive Technology I Certificate (AUT).

Luzerne County Community CollegeCreditsAUT 103Automotive Foundationals3.0AUT 105Brake Systems and Chassis Repair3.0AUT 106Steering and Suspension Systems3.0====

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Luzerne County Community College POS: CIP 47.0604 Automotive Technology, Associate in Applied Science (A.A.S.) Degree

Northampton	County Area Community College	Credits
AUTO 104	Automotive Suspension and Alignment	3.0
AUTO 105	Automotive Electrical Systems	3.0
AUTO 103	Automotive Brakes	3.0
====		

Total Credits Awarded: 9.0

Notes: Nine (9) credits align to CIP 47.0604 Automotive Technology Associate Applied Science Degree, CIP 47.0604 Automotive Technology Specialized Diploma

Community College of Philadelphia		Credits
AT 121	Auto Elec & Elec Sys	3.0
AT 150	Automotive Braking Systems	2.0
AT 111	Auto Suspen & Steer	4.0
====		

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Community College of Philadelphia POS: CIP 47.0604 Automotive Technology, Associate in Applied Science (A.A.S.) Degree.

Community College of Philadelphia		Credits
AT 121	Auto Elec & Elec Sys	3.0
AT 150	Automotive Braking Systems	2.0
AT 111	Auto Suspen & Steer	4.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Community College of Philadelphia POS: CIP 47.0604 Automotive Service I, Proficiency Certificate (PC).

Commonwealth Technical Institute		Credits
AT 101	Shop Foundationals	3.0
AT 102	Engine Repair	3.0
AT 104	Brake Systems	5.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits apply to Commonwealth Technical Institute's CIP 47.0604 Automotive Technology Diploma program.

Rosedale Te	echnical College	Credits
GD 101	Electrical Systems	4.5
GD 102	Electrical Troubleshooting	5.0
Total Credit	s Awarded: 9.5	

Notes: Nine and a half (9.5) credits are aligned to the following Rosedale Technical College POS: CIP 47.0604 Automotive Technology, Associate in Applied Specialized Technology (A.S.T.) Degree.

Lancaster County Career and Technology Center		Credits
Auto 101	Introduction to Automotive	3.0
Auto 102	Braking Systems	4.0
Auto 106	Steering and Suspension	4.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to CIP 47.0604 Automotive Technology, Associate in Specialized Technology (AST) Degree.

Career Pathways

Automotive Parts Alignment Technician Service Manager Sales Manager Air Conditioning Technician Automotive Service Technician Drivability Technician Automotive Mechanic Service Writer Inspection Technician

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Automotive Technician	3%	\$24,650	\$39,510	\$46,930
Automotive Service Supervisor	6%	\$47,220	\$68,940	\$79,800
Electrical Equipment Installer/Repairer	6%	\$25,920	\$39,290	\$45,970
Automotive Service Attendant	10%	\$17,790	\$23,520	\$26,390

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification Certified Safety Inspector		
	Cat1&2	
Lifting it Right	Certified Emissions Inspector	
Section 609 Certification for	Automotive Scanner	
Refrigerant Recycling and	Diagnostics	
Recovery		
NC3 Electronics/Electrical	Meter Certification	
Certification		
Automotive Service Excellence		
(ASE)		

Program Safety & Physical Considerations

- Ability to focus on safety around moving equipment, hand tools, power tools, and other equipment
- Ability to bend, stretch, twist, or reach with body, arms, and legs and stamina to stand for long periods of time
- Ability to lift 50 pounds or more
- Ability to diagnose the source of a problem quickly and accurately and apply problem solving skills
- Ability to tolerate some chemicals and strong odors

Aptitudes for Success

- Eye/hand/foot coordination
- Finger and manual dexterity
- Ability to pay attention to detail
- Arm/hand steadiness
- Form Perception
- Spatial Acuity

Standardized Testing Requirement

NOCTI - 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Carpentry/Residential Construction

Carpentry students work on construction projects within the school and community. They learn skills including transit and blueprint reading, selection of building materials and estimating, framing (floors, stairs, walls, and roofs), selection and installation of windows and doors, roofing, interior and exterior finishing, concrete finishing, and foundations. Career opportunities range from a siding installer to a finish carpenter and may begin in high school with a Co-Op position providing job experience and a salary. The 500 employers in the Lebanon County Builders Association sponsor this program, provide student scholarships, and employ graduates. Students who successfully complete the program may receive college credits from HACC, Penn College of Technology, and Thaddeus Stevens College of Technology.

Task List

Safety

- Follow basic, lab, and construction industry safety practices and procedures.
- Follow procedures in Safety Data Sheets (SDS) system.
- ♦ Identify and follow all OSHA safety standards at the construction site.

Hand Tools

- ✤ Use and maintain small hand tools.
- ✤ Use and maintain sawing tools.
- ✤ Use and maintain fastening tools.
- ✤ Use and maintain measuring tools.
- ✤ Use and maintain cutting tools.
- ✤ Use and maintain ladders.
- ✤ Use and maintain finishing tools.
- ✤ Construct scaffolding.

Power Tools

- ✤ Use and maintain stationary electric power tools.
- ♦ Use and maintain pneumatic/fastening tool systems.
- ✤ Use and maintain portable electric power tools.

Blueprints Reading

- ✤ Interpret blueprints.
- ✤ Interpret and comprehend standard symbols and abbreviations.
- Interpret building specifications.
- ✤ Interpret a plot plan.
- ✤ Interpret a foundation plan.
- ✤ Interpret elevation plans.
- Interpret details and section views.
- ✤ Interpret floor, wall, and roof framing plans.
- ✤ Interpret building and zoning codes.
- ✤ Interpret Americans with Disabilities Act (ADA) regulations.

Site Preparation and Layout

- Determine factors needed to be considered before the start of a building project.
- ✤ Acquire a building permit.
- ✤ Use PA One Call System.
- Establish elevations and grades from benchmarks using leveling instruments.
- Stake out a building foundation using the Pythagorean Theorem.
- ✤ Layout and construct batter boards.

Footings and Foundations

- ✤ Identify footer and foundation materials.
- ✤ Use leveling instruments.
- Establish footer lines and elevations.
- ✤ Layout and construct forms for footers.
- ✤ Layout foundations.
- ✤ Layout and construct forms for concrete slabs.
- ✤ Install reinforcing materials.
- Construct vertical and horizontal formwork.

Framing – Floor Construction

- ✤ Layout and install sill plates.
- ✤ Layout and install floor joists, including manufactured floor joists.
- ✤ Layout and install joists for a cantilever floor.
- ✤ Construct and install cross and solid bridging.
- ✤ Layout and install sub-flooring.
- ✤ Layout and construct floor openings.

Framing – Wall Construction

- ✤ Layout and construct a wall.
- ✤ Layout and construct door openings.
- ✤ Layout and construct window openings.
- ✤ Construct a load bearing header.
- ✤ Layout and install sheathing.
- Plumb, align and brace walls.
- ✤ Layout and install metal studs.

Framing – Roof Construction

- ✤ Layout and install a ridge board.
- ✤ Layout and install common rafters.
- ✤ Layout and install roof trusses.
- ✤ Layout and install roof sheathing.
- ✤ Layout and construct roof openings.
- ✤ Layout and install roofing materials.
- ✤ Layout and install capping.

Exterior Finish

- ✤ Install house wrap.
- ✤ Install exterior doors.
- ✤ Install windows.
- ✤ Layout and install siding.
- ✤ Layout and install soffits and facias.
- ✤ Layout and install gutters and downspouts.
- ♦ Layout and install exterior deck, stair, and railing systems.

Interior Finish

- ✤ Layout, install and finish drywall.
- Layout and install suspended and tile ceilings.
- ✤ Layout and install interior doors.
- ✤ Layout and install door trim, casings, and hardware.
- ✤ Layout and install window trim, casings, and hardware.
- ✤ Layout and install baseboard and molding.
- ✤ Layout and install flooring materials.
- ✤ Layout and install interior stair systems.
- ✤ Install various types of insulation.

Estimation

- Estimate the amount and cost of bricks and blocks needed to complete a given task.
- ✤ Estimate the amount and cost of concrete needed to complete a given task.
- ✤ Estimate the amount and cost of materials to finish an exterior wall.
- Estimate the amount and cost of materials to finish an interior wall.
- ✤ Estimate the amount and cost of materials to construct a finished floor.
- ✤ Estimate the amount and cost of materials to construct a finished roof.
- Estimate the amount and cost of materials to install siding for a house.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or	
	mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of	
	multistep problems	
2.1.HS.F.5	Choose a level of accuracy on measurement when reporting quantities	
	appropriate to limitations	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex	
	numbers	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions to	Yes
	operations with rational numbers	

	Algebraic Concepts	Foundational
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric ratios	
2.2.5.A.1	Interpret and evaluate numerical expressions using order of operations	Yes
2.2.7.B.2	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations	Yes
2.2.6.B.2	Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems	Yes
	Geometry	Foundational
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures	
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles	
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects	
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	Yes
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
Measurement, Data, & Probability Fo		Foundational
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.7.B.2	Draw informal comparative inferences about two populations	Yes

Reading

Key Ideas/Details			
3.5.11-12 A	Cite specific textual evidence, etc.		
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.		
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.		
	Craft & Structure		
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &		
	analyze the structure of the relationships among concepts in a text		
	Integrate Knowledge & Ideas		
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)		
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.		
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem		
3.5.11-12. H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible		
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding		

Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
	Production & Distribution of Writing	
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or	
	shared writing products	
Research		
3.6.11 -12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11 -12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11 -12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing		
3.5.11 -12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc.	

Examples of Course Material

Example #1 Carpentry Course Material

Find centerlines of window openings using a tape measure Program Task: Find the center line on the top and bottom

plates of 4 windows equally spaced on a length of a wall.

Program Associated Vocabulary: DIMENSION, FRACTION, INCH, WIDTH

Program Formulas and Procedures:

Carpenters will be given a length of a wall and will be required to equally space out centerlines of four windows. Each window will need to be an equal distance apart. The length of the wall will be located on the floor plan. With the length of the wall, the carpenter will need to divide the wall length by 5.

Using a tape measure, the carpenter will mark the center dimension of the windows on the top and bottom plates.



Example:

Wall Length = 29' 7 3 / 16" 7 3 / 16" = 7.1875" → 7.1875' ÷ 12 = 0.5989583' 29 + 0.5989583' = 29.5989583'

29.5989583'+5 = 5.9197916'

Rewrite the number to the nearest hundredth digit

5.9197916' - 5.920'

Convert into feet and inches 5.92' $0.92 \times 12 = 11.04''$ $0.04 \times 16 = 0.64(round)$ $5.92' = 5'11 \ 1/16''$

Using a tape measure, start from the end of the wall plates and place centers mark every 5' 11 1/16" apart.

Residential Construction Academy: Carpentry ISBN 978-1-111-30826-1

Sample Textbook Reading:

"Lay out steel-framed partitions as you would wood-framed partitions. To cut metal framing to length, tin snips may be used on 18-mil steel. A chop saw or chop box, a specially designed power miter box with a metal-cutting saw blade, is the preferred tool. With this tool, an entire bundle of studs may be cut at one time. Use 3/8-inch self-drilling pan head screws, or crimp the track and stud together using a crimping tool designed for steel studs."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt	ML	\$8.50	R
Hooded sweatshirt	ML	\$18.50	R
Work pants - jeans	YC	\$20.00	R
Work boots	YC	\$100.00	R
Calculator	YC	\$20.00	R
Tape measure 20'-25'	YC	\$17.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Delaware C	ounty Community College	Credits
TME 115	Basic Technical Skills	3.0
CPT 102	Carpentry Foundationals	3.0
CPT 115	Interior Finishing	3.0

==== Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Delaware County Community College POS: CIP 46.0201, Carpentry (Residential) Certificate of Proficiency (CPT).

Career Pathways

Rough Carpenter/Carpenter He Siding Installer Drywall Installer and Finisher General Contractor	elper In R C Fi	nsulation Worker oofer ement Finisher inish Carpenter	Cabinetmal Mill Worke Remodeling	ker er g Contractor
Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Carpenter	10%	\$31,110	\$50,770	\$60,600
Roofer	12%	\$30,310	\$42,320	\$48,330
Construction Manager	5%	\$57,670	\$98,220	\$118,500
Construction Laborer	15%	\$25,460	\$39,180	\$46,040

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification Step Ladder		
Single and Extension Ladder	Pennsylvania Builders	
	Association Skills Certificate	

- High degree of self-discipline and focus needed for safety in and around equipment, hand tools, power tools and other equipment found in the industry
- Ability to learn and work in an environment with various chemical odors and wood smells
- Exposure to noise levels, dust, dirt and debris associated with the carpentry profession
- Ability to work in all weather conditions
- Must have strength and physical stamina and ability to lift 50 pounds overhead
- Ability to do work on ladders and scaffolding and not have fear of heights
- Ability to work in closed spaces and stand for a long period of time
- General body coordination while standing, sitting, or lying down
- General body coordination and stamina that requires considerable use of arms, legs, and whole body
- Coordination ability to adjust actions in relation to other actions
- Must be able to work independently and with teams
- Ability to diagnose the source of a problem quickly and accurately and apply problem solving skills

Aptitudes for Success

- Finger and manual dexterity
- Spatial acuity
- Arm-hand steadiness
- Fine motor skills
- Attention to detail
- Ability to discriminate between objects of similar size, shape, and color
- Depth perception
- Form perception
- Motor coordination
- Mechanical aptitude
- Eye/hand/leg and multi-limb coordination
- Problem solving/diagnostic skills

Standardized Testing Requirement

$NOCTI - 12^{th}$ Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Cosmetology

Cosmetology students learn skills necessary to become a licensed professional in a salon. Major topics include hairstyling, haircutting, perming, chemical relaxing, haircoloring, manicuring, facials, and makeup. Students learn the theory and procedures about these topics. When finished with the program and state mandated 1,250 hours, students must take and pass a state board exam to receive a cosmetology license.

Task List

Bacteriology, Disinfection, & Sanitation

- Define the classifications and reproduction of bacteria and viruses.
- Differentiate the differences between sanitation, disinfection, and sterilization.
- Perform infection control procedures for various salon tools and services.
- ✤ Apply concepts of universal/standard precautions.

Professional Attitude

- Perform a client consultation and maintain documentation.
- Exhibit professional ethics.
- Use communication skills, to include listening, speaking, and writing.

Business Practices

- Design a management plan.
- Design a personal financial plan.
- Execute safety regulations, including SDS and OSHA.

Pennsylvania Cosmetology Laws

• Follow cosmetology laws, rules, and regulations.

Histology

- ✤ Identify the structure and composition of the integumentary system.
- ✤ Identify the structure and composition of the nail.
- ✤ Identify the structure and composition of the skeletal system.
- ♦ Identify the structure and composition of the muscular system.
- ✤ Identify the structure and composition of the nervous system.
- ✤ Identify the structure and composition of the circulatory system.

Trichology

- ✤ Identify the structure and composition of the hair.
- * Recognize diseases and disorders of the hair and scalp.
- Analyze the characteristics of a client's hair and scalp.

Chemistry

- ✤ List the five elements of the hair.
- Measure the effects of pH, pertaining to hair and skin.
- ◆ Differentiate between the physical and chemical changes involved in various hair services.
- $\boldsymbol{\bigstar}$ Assess chemical reactions as they relate to various services.
- Determine chemical contents of hair, skin, and nail products.

Physiology

- ✤ Identify the functions of the integumentary system.
- ✤ Identify the functions of the nail.
- ✤ Identify body structures and systems.
- ✤ Determine the function of the skeletal system.
- ✤ Determine the function of the muscular system.
- ✤ Determine the function of the nervous system.
- Determine the function of the circulatory system.

Cosmetic Dermatology

- * Recognize skin diseases and disorders and contributing factors.
- ✤ Analyze clients' skin.

Electricity

- ✤ Define principles of electricity.
- Follow the safety measures related to electricity.
- Explain the types, uses, and benefits of light therapy.
- Explain the types, uses, and benefits of electrotherapy.

Shampooing and Conditioning

- Perform draping for all hair services.
- Determine a product based on individual client needs.
- Perform various shampoo and conditioning treatments on a client.

Hair Shaping

- Execute safe handling of hair cutting tools.
- Perform various haircutting techniques with shears.
- ✤ Perform various haircutting techniques with a razor.
- ✤ Perform various clipper cutting techniques.
- Perform various texturizing techniques.
- ✤ Perform facial, ear, and neck hair removal.

Hairstyling/Finger wave Techniques

- Perform finger wave techniques.
- Recognize hairstyling implements and equipment.
- Design a hairstyle to compliment the client's features.
- Perform roller setting and comb-out techniques.
- ◆ Perform pin curl setting and comb-out techniques.
- Perform braiding techniques.
- ✤ Perform various techniques using a thermal iron.
- Perform various blow-drying techniques.

Chemical Texturizing

- Select appropriate products for chemically straightening hair.
- Perform various chemical relaxing services.
- ✤ Investigate the procedure of a soft curl permanent.

Permanent Waving

- Perform various wrapping techniques.
- Select the appropriate solution according to client's needs.

Hair Coloring

- Perform and evaluate a predisposition test.
- Perform and evaluate a strand test.
- Perform a temporary hair color service.
- Perform a semi-permanent/demi-permanent hair color service.
- Perform a permanent hair color service.
- Perform a hair lightener and toner application.
- Create special effect techniques.
- Perform corrective color techniques.
- ✤ Formulate color as it relates to the law of color.

Hair Straightening

Perform hair pressing techniques showing soft, medium, and hard press.

Skin Care

- Drape client for basic skin care services.
- Select products based on individual client needs.
- Perform a basic facial.
- ✤ Recognize skin care implements and equipment.

Nail Technology

- ✤ Prepare a manicure table.
- ✤ Recognize nail care implements and equipment.
- Perform a basic manicure.
- ◆ Perform massage treatments on the hands and feet.
- Perform various specialty manicures.
- ✤ Determine components of artificial nail services.
- Perform pedicure procedures.
- Recognize nail diseases and disorders and contributing factors.

Temporary Hair Removal

- Differentiate between various methods of temporary hair removal.
- Perform various methods of temporary hair removal.

Scalp Treatment

- Perform a basic scalp treatment.
- Explain the use of electrical equipment during a scalp treatment.

Release 1.2

Care of all Hair Types and Textures

- Select and apply products according to styling needs.
- ✤ Use specialty hairstyling equipment.
- * Recognize implements, equipment, and products used with synthetic and human hair.
- Compare and contrast synthetic and human hair services.
- Perform application and styling services on wigs, hair pieces and extensions.

Make-up

- ✤ Create basic daytime make-up techniques.
- ✤ Create basic evening make-up techniques.
- Perform corrective make-up techniques according to client's needs.
- ✤ Apply false eyelashes.

Other

- ✤ Telephone skills
- Scheduling and appointment book maintenance
- ♦ Model for peer learning and practice (shampoo, manicure, etc.)

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
2.1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems	Yes
Measurement and Data, and Probability		Foundational
2.4.2.A.3	Solve problems and make change using coins and paper currency with appropriate symbols	Yes
	Geometry	Foundational
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	

Reading

Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.	
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.	
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.	
	Craft & Structure	
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &	
	analyze the structure of the relationships among concepts in a text	
Integrate Knowledge & Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a	
	table or chart)	
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.	
3.5.11 -12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose			
3.6.11-12.A	Write arguments focused on discipline specific content		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
	Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience		
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products		
Research			
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
	Range of Writing		
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc.		

Examples of Course Material

Example #1 Cosmetology Course Material

Give a Basic Facial

IMPLEMENTS & MATERIALS

Facial chair	Shampoo cape	Cleanser
Footrest	Magnifying lamp	Toner/astringent
Head rest	Spatula	Massage cream
Manicure table	Esthetic wipes	Mask
Manicure stool	Cotton swabs	Mask bowl
Trash container	Disposable gloves	Moisturizer
Disinfectant	Eye pads	Optional supplies
Hand sanitizer	2 Round cotton pads	Steamer
6 Towels	Rectangle cotton pad	Hot towel cabinet
Head band	Exfoliant	Comedone extractor
Record card	Safety Glasses	Mask brush
Eye makeup remover pads	-	

PROCEDURE

- 1. Sanitize hands and disinfect workstation
- 2. Gather materials.
- 3. Drape the client.
- 4. Apply eye makeup remover pads to the eyes.
- 5. Remove lipstick.
- 6. Remove eye makeup.
- 7. Apply cleanser.
- 8. Cleanse the face.
- 9. Remove the cleanser.
- 10. Analyze the skin.
- 11. Steam the face for three to five minutes.
- 12. Apply an exfoliant to the skin.
- 13. Extract comedones and clogged pores (optional).
- 14. Apply astringent if extracting was done.
- 15. Apply massage cream.
- 16. Massage the face.
- 17. Remove the massage cream.
- 18. Apply toner or astringent to the face.
- 19. Apply a mask to the face.
- 20. Allow the mask to dry.
- 21. Remove the mask using a mummy mask.
- 22. Apply toner or astringent to the face.
- 23. Clean under the eyes with a cotton swab.
- 24. Apply a moisturizer to the face.
- 25. Complete the client record card.
- 26. Clean up work area and disinfect implements.

63

PEDICURE

PREPARATION:

- 1. Disinfect work area.
- 2. Sanitize hands.
- 3. Gather necessary materials.

towels (6)	orangewood stick
hand sanitizer	toenail clippers
sanitizer jar	emery board
cotton	metal nail file
soil bag	foot file
basin & bucket	foot soak
powder	spatula
manicure brush	astringent
base/topcoat	colored polish

nail polish remover sani-soft tablet foot scrub cuticle remover massage cream foot masque (optional) pedicure slippers (optional)

- 4. Sanitize hands.
- 5. Sanitize client's feet in a basin containing 1 inch of warm water and an ounce of alcohol or 1 sani-soft tablet.

PROCEDURE:

- 6. Remove the old polish.
- 7. Trim the nails if necessary.
- 8. Shape the nails with an emery board.
- 8. Bevel the nails with a metal nail file.
- 9. Smooth the skin on the ball and heel of the foot with a foot file.
- 10. Soak the feet in the basin.
- 11. Add water and foot soak to the basin.
- 12. Apply cuticle remover.
- 13. Loosen dead skin from toenail gently with an orangewood stick. (Do not cut cuticle, only nip loose tags of skin)
- 14. Soak the feet in the basin.
- 15. Apply foot scrub to the feet.
- 16. Soak and rinse the feet in the basin.
- (Remove first towel)
- 17. Apply massage cream and massage the feet. (See PROCEDURE SHEET 23.7 Foot Massage)
- 18. Soak and rinse the feet in the basin.
- 19. Apply foot masque to the feet and let dry for approximately 5 minutes. Do not apply to toenails. (optional)
- 20. Soak and rinse the feet in the basin.

(Remove second towel)

- 21. Scrub the nails with a manicure brush.
- 22. Remove the feet from the basin and dry.
- 23. Apply astringent to the feet.
- 24. Apply powder to the feet.
- 25. Remove soap film and oil from the nails with polish remover.



(Remove third towel) 26. Place cotton between the toes.

- 27. Apply base coat.
- 28. Apply two coats of colored polish.
- 29. Apply topcoat.

CLEANUP:

30. Place pedicure slippers on client.

31. Clean up work area.

Textbook

Milady Standard Cosmetology ISBN 978-1-285-76941-7

Sample Textbook Reading:

"Toners are traditional semipermanent, demipermanent, and permanent haircolor products that are used primarily on pre-lightened hair to achieve pale and delicate colors. Toners can also be used after dimensional haircolor services. After a highlight service is completed using a lightener, you can tone the hair to create a softer shade of blond. Once the lightener is rinsed, simply towel dry and apply the desired shade of toner over the pre-lightened hair. This will take up to five minutes for the result."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Notarized Cosmetology Application form	YC	\$5.00	R
Cosmetology kit payment	CTC	\$425.00	R
Stylist jacket	ML	\$33.00	R
Ladies' cargo pant	ML	\$12.50	R
Unisex drawstring pant	ML	\$11.00	R
Pennsylvania Cosmetology Exam		\$130.00	0

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Lancaster School of Cosmetology & Therapeutic Bodywork

Hours earned at CTC. Contact the school for more information.

Career Pathways

Receptionist Manicurist Makeup Artist Platform Artist Cosmetology Teacher	Sales Representative Pedicurist Hairstylist Salon Manager	SI SI C Sa	hampoo Person kin Care Specialist osmetologist alon Owner	
Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Hairstylist	10%	\$17,360	\$26,570	\$31,180
Manicurist/Pedicurist	11%	\$17,410	\$22,200	\$24,590
Skincare Specialist	11%	\$21,110	\$37,910	\$46,310
Cosmetologist	10%	\$17,360	\$26,570	\$31,180

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Nail Technician	
Esthetician	Cosmetologist	

Program Safety & Physical Considerations

- Ability to stand for long periods of time
- Ability to work with strong, odorous chemicals (perms, nails, etc.)
- Good hand/eye coordination
- Ability to converse and interact with others
- Reflective and listening skills

- Finger & manual dexterity
- Color discrimination
- Ability to use tools of trade
- Ability to detect differences/details visually such as symmetry
- Students must complete 1,250 hours of class time over a two-year period to sit for the state board exam. Passing the exam is required to practice cosmetology
- Appropriate speaking and listening skills
- Ability to work with others

Standardized Testing Requirement

NOCTI - 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Commercial Art and Design

Commercial Art students work with a variety of media to create logos, brochures, posters, advertisements, greeting cards and a variety of artwork for the school and the community. They participate in Art Shows and Competitions to develop a portfolio emphasizing their creative talents and technical skills including mastery of state-of-the-art computer systems and software such as: InDesign, Adobe Illustrator, and Adobe Photoshop. This "learning while doing" strategy brings reality to the course topics, which includes typography, media techniques, color theory, graphic design, perspective, and computer applications. This full day course promotes creativity and expression through photography, web page design. Career opportunities range from a production artist to a creative director. Adobe certifications can be earned through Certiport. Graduates have been successful at four-year colleges and several students have won scholarships at two-year art schools. Students who successfully complete this program may earn college credits from Pennsylvania College of Art and Design and The Art Institute of Pittsburgh.

Task List

Safety

- ✤ Identify safety protocols related to ergonomics.
- Follow safety requirements for use of hardware, software, and equipment.
- ♦ Use and maintain hand tools following established safety protocols.
- ♦ Use, store, and dispose of paints, solvents, and chemicals according to OSHA regulations.
- Demonstrate cutting procedures following established safety protocols.
- ✤ Investigate hazard communication, environmental, and SDS laws.

Drawing and Illustration

- Draw using perspective.
- ✤ Draw basic geometric and organic forms showing texture and tone.
- ✤ Draw line art.
- ✤ Apply anatomy concepts in drawing.
- ✤ Draw from direct observation.
- Produce illustrations using various media.
- Illustrate using value.

Color Theory and Application

- Apply the basic structure of color (hue, saturation, brightness) to generate color solutions.
- ✤ Apply appropriate color schemes to generate design solutions.
- ✤ Identify color models including additive and subtractive color.

Digital Imaging

- Execute image scanning procedures.
- ✤ Identify the properties of vector and raster images.
- ✤ Utilize basic functions of a page layout software.
- Utilize intermediate functions of a page layout software.
- ◆ Utilize basic functions of a vector-based drawing program.
- Utilize intermediate functions of a vector-based drawing program.
- ♦ Utilize basic functions of a raster-based image editing software.
- ♦ Utilize intermediate functions of a raster-based image editing software.
- ♦ Utilize use of input, output, and storage devices.
- ✤ Utilize different file formats.
- ✤ Organize and manage digital files.
- ✤ Utilize basic functions of web or mobile design software.

Design, Layout, and Production

- ✤ Research the history of advertising design.
- ✤ Apply elements and principles of design.
- ✤ Interpret a creative or design brief.
- ✤ Produce thumbnails, roughs, and comprehensive.
- ✤ Design a logo.
- Create a design for a 3-D package.
- ✤ Utilize basic knowledge of printing processes.
- Design promotional materials.
- Prepare files for output.
- ✤ Utilize printer's marks and color separations.
- ♦ Utilize basic math functions, proportions, and measurements.

Typography

- ✤ Identify the anatomy and classification of type.
- ✤ Identify typographic styles.
- ✤ Manipulate type through character and paragraph formatting.
- ✤ Choose and apply an appropriate typeface.

Digital Photography

- ✤ Operate a digital camera and accessories.
- ✤ Compose a photograph through the lens.
- ✤ Determine lighting options and their effects.
- Stabilize a camera.
- Download and manage digital images.
- ✤ Identify principles of the exposure triangle.

Professional Practices

- Prepare and present a portfolio.
- ✤ Prepare and present a visual concept presentation.
- ✤ Estimate time and materials for a project.
- ✤ Participate in critiques of commercial art projects.
- Explore current industry trends.
- Demonstrate research, employability, and organizational skills.
- ✤ Create personal branding materials.
- Explore the importance of social media as it relates to employability.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real	
	world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the	
	solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on	
	measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	Yes
2.1.6.E.2	Identify and choose appropriate processes to compute fluently	Yes
	with multidigit numbers	
Algebraic Concepts		Foundational
2.2.6.B.3	Represent and analyze quantitative relationships between	Yes
	dependent and independent variables	
2.2.5.A.4	Analyze patterns and relationships using two rules	Yes
2.2.4.A.1	Represent and solve problems involving the four operations	Yes
Geometry		Foundational
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional object	
2.3.7.A.2	Visualize and represent geometric figures and describe the	Yes
	relationships between them	
2.3.8.A.2	Understand and apply congruence, similarity, and geometric	Yes
	transformations using various tools	
2.3.5.A.1	Graph points in the first quadrant on the coordinate plane and	Yes
	interpret these points when solving real world and mathematical	
	problems	

	Measurement, Data, & Probability	Foundational
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.4.A.2	Translate information from one type of data display to another	Yes
2.4.7.B.2	Draw informal comparative inferences about two populations	Yes
2.4.7.B.1	Draw inferences about populations based on random sampling concepts	Yes
2.4.6.B.1	Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions	Yes

Reading

Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.	
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.	
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.	
	Craft & Structure	
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure & analyze the structure of the relationships among concepts in a text	
Integrate Knowledge & Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)	
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.	
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
Production & Distribution of Writing		

3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or	
	shared writing products	
Research		
3.6.11 -12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11 -12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11 -12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing		
3.5.11 -12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc.	
Examples of Course Material

Example #1 Commercial Art Course Material

SkillsUSA T-Shirt Design Directions

Step 1: Thumbnails

- Sketch 12 thumbnail design sketches following the specs on the SkillsUSA T-Shirt Design Contest handout.

Step 2: Thumbnails

- Choose 2 of your best design concepts. (*Make sure you add the required text if you didn't already*)

- Draw a 6" x 6" box on a sheet of paper (for each) and draw a more detailed/cleaner comp. of each of the two (2) designs you chose (**NO COLOR YET**)

Step 3: Turn in to the "turn-in" box

- INCLUDE the original thumbnail sheet and BOTH designs with your name on them.

Step 4: Final Comp. (Remember Skills Company Pantone Colors)

- FULL COLOR final comp of ONE of the Step: 2 designs.

- Size 12"x12"

- Use a ruler/straight edge for clean, straight lines.

- Solid, clean color.

Step 5: Final Computer Design

(Save in new folder called: Skills Shirt Design; <u>File name</u>: Name_Skills Shirt Design)

- Full Color final computer generated design of the Step 4: Design
- Size 12"x12"
- Can use Illustrator or Photoshop

(IF Photoshop MUST BE 300ppi Resolution!)

- Print Final Copy, Turn in with. . .
 - 12 thumbnails
 - 2 Comps.
 - 1 Full color Comp.

Save a 2nd file as a "Print PDF"

Analysis of A Work of Art SkillsUSA T-Shirt Design 100 pts. Competency 600: Design, Layout & Production 608: Design promotional materials.

Name	Date		
Thumbnails	10	9 - 5	4 - 0
Accuracy/Followed Directions	Did all 12 thumbnails. Used boxes provided. No color.	Didn't complete 12 sketches. Or didn't use supplied thumbnail boxes.	Less than 6 sketches and didn't use supplied thumbnail boxes.
Time, Effort & Creativity	Took time to create useful idea sketches.	Some sketches thrown in as filler just to get done.	All or most sketches done with no purpose just to get done.
Step 2: Comps	10	Q _ 5	4 - 0
Accuracy/Followed Directions	Did both comps. Used supplied 6" sq. boxes. No color. Include <i>ALL</i> <i>required text</i> & NO Skills Logo/Emblem.	Only did one comp OR Not correct size OR Used color OR Not all required text used OR Used Skills Logo or Emblem.	Only did one comp AND Not correct size AND Used color AND Not all required text used AND Used Skills Logo or Emblem.
Time, Effort & Creativity	Made effort to do neat/clean 2 nd step. Creatively executed.	Made some effort to do neat/clean 2 nd step, Not very creative	Not very clean, no creative effort
Step 3: Final Comp.	12.5	12 - 6	5 - 0
Accuracy/follow Directions	12" sq., Full Color. <i>ALL required text &</i> NO Skills Logo/Emblem.	Not correct size OR Not full color OR Not all required text used OR Used Skills Logo or Emblem.	Not correct size AND Used no color AND Not all required text used AND Used Skills Logo

	NO Skills	all required text used	Not all required text
	Logo/Emblem.	OR Used Skills Logo	used AND Used Skills
		or Emblem.	Logo or Emblem.
Time & Effort	Neat/Clean lines. Clean/Saturated color.	Not Neat/Clean lines OR Not	Not Neat/Clean lines AND Not
	Accurate to Step 2	Clean/Saturated color	Clean/Saturated color
	comp.	OR Not Accurate to	AND Not Accurate to
		Step 2 comp.	Step 2 comp.

(Continued)

Final Computer Design	12.5	12 - 6	5 - 0
Accuracy/follow Directions	Followed ALL directions for saving document, file name, folder, etc. 12" sq., Full Color. <i>ALL</i> <i>required text</i> & NO Skills Logo/Emblem.	Shows student followed most of the directions. file name, folder, etc. 12" sq., Full Color.	Shows student followed some of the directions and missing requirements.
Time & Effort	Neat/Clean lines. Accurate to Step 4 final comp. Cleanly designed.	Spent most time on project. Some text or images missing.	Time not well spent and not well done
On time	Completed On Time 10 pts.	One Day Late 5 pts.	

Software Applications

Adobe Creativity: Photoshop, Illustrator, In Design, and Brain Buffet

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Vendor	Cost	R or O
ML	\$11.50	R
ML	\$26.50	Ο
ML	\$18.50	О
ML	\$12.00	Ο
ML	\$19.50	Ο
YC	\$20.00	R
	Vendor ML ML ML ML ML YC	Vendor Cost ML \$11.50 ML \$26.50 ML \$18.50 ML \$12.00 ML \$19.50 YC \$20.00

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Butler County	Community College	Credits
COMM 105	Creative Thinking	3.0
ARTS 102	Drawing	3.0
ARTS 101	Introduction to Art	3.0
====		
Total Credits A	Awarded: 9.0	

Notes: Nine (9) credits are aligned to the following Butler County Community College POS 11E CIP 11.0801 Graphic Design, Associate of Applied Science (A.A.S.) Degree.

Harcum College		Credits
ART 110	Basic Drawing	3.0
DDN 151	Digital Imaging Production	3.0
DDN 152	Layout and Design	3.0
~		

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Harcum College POS: CIP 50.0409 Graphic Design, Associate of Science (A.S.) Degree.

Lehigh Carbon Community College		Credits
ART 108	Two-Dimensional Design	3.0
ART 107	Digital Design	3.0
ART 111	Color Theory	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Lehigh Carbon Community College POS: 10.0304 - Computer Generated Animation and Digital Arts Associate in Applied Science (A.A.S.) Degree; 50.0409 - Graphic Design Associate of Arts (A.A.); 50.0701 - Fine Arts/Studio Arts Associate of Arts (A.A.).

Career Pathways

Graphic Designer Art Director	Desktop Publisher Layout Artist	Productior Multimedi	ı Artist a Artist & Anin	nator
Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Graphic Designer	-1%	\$30,340	\$50,570	\$60,690
Art Director	1%	\$50,290	\$85,800	\$103,560
Multimedia Artist and Animators	2%	\$38,420	\$66,800	\$80,990
Desktop Publisher	-18%	\$23,450	\$38,290	\$45,710

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
Adobe Certified Associate:	Adobe Certified Associate:	
Visual Communicator using	Graphic & Design Media	
Adobe Illustrator	Publication using Adobe	
	Illustrator	
Adobe Certified Associate:	Adobe Certified Associate: Print	
Visual Communication using	& Design using Adobe InDesign	
Adobe Photoshop		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Must be able to work independently and with teams
- Ability to sit at workstation and focus on a project for an extended period of time

Aptitudes for Success

- Color discrimination
- Finger and manual dexterity
- Spatial acuity
- Eye/hand coordination
- Fine motor skills
- Attention to detail
- Ability to discriminate between objects of similar size, shape, and color
- Depth perception
- Visual acuity
- Form perception
- Visualization
- Clerical perception
- Intermediate or better computer skills

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Culinary Arts

Culinary Arts students operate a contemporary sixty-seat full-service restaurant located within the school. They plan, prepare, and serve a variety of traditional, ethnic, and contemporary menus as well as cater banquets, dinner meetings, and special events. Students develop artistic skills through ice carvings and special exhibits of Culinary Arts students operate a contemporary sixty-seat full-service restaurant located within the school. They plan, prepare, and serve a variety of traditional, ethnic, and contemporary menus as well as cater banquets, dinner meetings, and special events. Students develop artistic skills through ice carvings and special events. Students develop artistic skills through ice carvings and special exhibits of pastillage, tallow, and aspic work. Local, state, and national competitions enrich the curriculum which includes appetizers, soups and sauces, vegetables and salads, meat/poultry/seafood/shellfish, desserts, garnishing, catering, service, sanitation, and management. Career opportunities range from a prep cook to an executive chef and may begin in high school with a Co-Op position providing job experience and a salary.

Students who successfully complete the program may receive college credits from PA College of Technology, HACC, Johnson & Wales University, Pennsylvania Culinary Institute, and The Restaurant School. The program is nationally recognized and certified by the American Culinary Federation (ACF)., tallow, and aspic work. Local, state, and national competitions enrich the curriculum which includes appetizers, soups and sauces, vegetables and salads, meat/poultry/seafood/shellfish, desserts, garnishing, catering, service, sanitation, and management. Career opportunities range from a prep cook to an executive chef and may begin in high school with a Co-Op position providing job experience and a salary. Students who successfully complete the program may receive college credits from PA College of Technology, HACC, Johnson & Wales University, Pennsylvania Culinary Institute, and The Restaurant School. The program is nationally recognized and certified by the American Culinary Federation (ACF).

Task List

Safety and Sanitation Procedures

- Wear appropriate apparel in the food preparation area.
- ✤ Lift and carry heavy objects.
- ✤ List causes and preventions of accidents and injuries in the foodservice industry.
- ✤ Follow emergency procedures for injuries and accidents.
- ✤ Use fire extinguishers in the foodservice area.
- Review Safety Data Sheets (SDS) and explain their requirements in handling hazardous materials and describe personal protective equipment (PPE).
- Describe and apply ServSafe certification requirements.

The Food Industry

- ✤ Identify professional organizations within the foodservice industry.
- ✤ Investigate career opportunities in the foodservice industry.
- Examine the kitchen brigade system.
- ◆ Define hospitality and the importance of quality customer service.

Purchasing, Receiving, and Storage

- Follow procedures for purchasing, receiving, and storing of foodservice supplies.
- ✤ Label foodservice products for storage.
- Inventory foodservice supplies.

Garde Manger (Cold Food Preparation)

- ✤ Create cold food plate presentations and displays.
- ✤ Prepare garnishes.
- Prepare cold hors d'oeuvres, canapés, and appetizers.
- Prepare cold sandwiches.
- ✤ Identify and prepare various categories and types of dishes using cheese.
- ✤ Identify and prepare various categories and types of salads.
- Prepare various salad dressings.
- Set-up, maintain, and breakdown salad bars.

Knife Skills

- ✤ Identify parts of a knife.
- Perform various knife cuts.
- Sharpen and hone knives.
- ✤ Identify various types of knives and their uses.

Food Service Tools and Equipment

- Operate, clean, and sanitize large equipment.
- ✤ Operate, clean, and sanitize small equipment.
- ✤ Pass safety tests for all equipment.
- ✤ Identify and use hand tools and smallware.

Standardized Recipes and Measurement

- Prepare food following standardized recipes within industry time limits.
- Cite US standard weight and volume measurement equivalencies.
- ♦ Measure ingredients using US standard weight and volume.

Nutrition

- Investigate current dietary guidelines.
- ✤ Interpret food labels in terms of the portion size, ingredients, and nutritional value.
- ✤ List major nutrients, their sources, and functions.
- Perform cooking techniques for maximum retention of nutrients.
- Discuss current nutritional concerns, food allergies, and dietary restrictions.

Breakfast Foods

- Prepare eggs using a variety of methods.
- Prepare breakfast potatoes.
- Prepare breakfast meats.
- ✤ Prepare and cook breakfast batter products.
- Prepare hot breakfast cereals.

Vegetables and Fruits

- ✤ Identify vegetables and fruits and their various market forms.
- ◆ Prepare vegetables and fruits using dry, moist, and combination cooking methods.
- ✤ List the factors to consider when preparing vegetables and fruits.
- Follow the standards of quality for cooked vegetables.
- ✤ Peel, cut, and zest fruits and vegetables.

Pasta, Grains, and Potatoes

- ◆ Prepare pasta, grains, and potatoes using dry, moist, and combination cooking methods.
- Follow the standards of quality for pasta, grain, and potato dishes.

Seasoning and Flavoring

- ✤ Identify herbs, spices, seasonings, and condiments and their market forms.
- ♦ Use herbs, spices, seasonings, and condiments.
- Evaluate foods for proper seasoning and flavor balance.

Stocks, Soups, and Sauces

- Prepare and evaluate a variety of stocks.
- Prepare and evaluate a variety of mother sauces and small/derivative sauces.
- Prepare and evaluate types of soups.
- Prepare thickening agents for sauces and soups.

Meats, Poultry, and Seafood

- ✤ Fabricate retail meat cuts and their sources.
- ♦ Determine cooking techniques for retail cuts of meat, poultry, and seafood.
- Prepare meat, poultry, and seafood recipes using dry, moist, and combination cooking methods.
- Check for degrees of doneness.
- ✤ Fabricate poultry.
- ✤ Fabricate seafood.

Baking and Pastry Skills

- ✤ Identify the factors influencing the quality of baked products.
- Prepare a variety of quick breads.
- Prepare a variety of pies and tarts.
- Prepare a variety of fillings and toppings for baked goods.
- Prepare a variety of yeast raised products.
- ✤ Determine the function of baking ingredients.
- Prepare and finish cakes.
- Prepare various types of cookies.
- ✤ Prepare pate a choux.
- Prepare custards and puddings.
- Prepare dessert sauces.

Menus

- ✤ Determine the methods for giving variety to a menu.
- ✤ Create an a la carte restaurant menu with item descriptions.
- ✤ Create menu formats.

Release 1.2

Back of House Operations

- Set up, operate, clean, and break down a ware-washing station
- Set up, operate, and break down hot line stations.
- Set up, operate, and break down garde manger stations.

Front of House Operations

- ✤ Determine various types of service used in restaurants.
- Perform duties of a host.
- Perform duties of a beverage professional.
- Perform duties of a cashier.
- Perform duties of a server.
- Perform duties of a food runner.
- Perform side work duties.
- ✤ Follow rules of table service.
- Use sales techniques for service personnel including menu knowledge and suggestive selling.
- Follow procedures for workflow between dining room and kitchen.
- Provide customer service and customer relations.
- ✤ Process guest checks.
- Perform duties of a bus person.

Foodservice Information Technology

- Describe use of foodservice industry operations technology, e.g., point of sale (POS) system.
- Use industry communication technology, such as email and social media.
- Create hot food plate presentations and displays.
- Prepare hot hors d'oeuvres and appetizers.
- Prepare hot sandwiches.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
2.1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems	Yes
Measurement and Data, and Probability		Foundational
2.4.2.A.3	Solve problems and make change using coins and paper currency with appropriate symbols	Yes
	Geometry	Foundational
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes

Key Ideas/Details			
3.5.11-12 A	Cite specific textual evidence, etc.		
3.5.11-12. B	Determine the central ideas or conclusions of a text; etc.		
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.		
	Craft & Structure		
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &		
	analyze the structure of the relationships among concepts in a text		
Integrate Knowledge & Ideas			
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a		
	table or chart)		
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.		
3.5.11 -12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem		
3.5.11-12.Н	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the		
	data when possible		
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding		
	Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently		

Writing

	Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
	Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience		
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products		
	Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range of Writing			
3.5.11 -12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc.		

Examples of Course Material

Example #1 Culinary Course Material

Study Guide Chapter 10 Level 2

A chart that shows employees' names and the days and times they are to work is called a(n) crew schedule.

The amount of sales an operation is doing for a given time period is called **business volume.**

A template showing the number of people needed in each position to run the restaurant and foodservice operation for a given time period is called a(n) **master schedule.**

Labor is often the highest expense incurred while running a restaurant.

<u>**2 to 6 percent**</u> is the typical profit margin that a restaurant runs on.

Controllable, semi variable are types of cost in labor.

<u>Semi variable</u> is a type of cost made up of both fixed and variable costs.

Sales represent a <u>Variable</u> type of cost element.

Fixed is a type of cost do salaried employees make up.

Variable is a type of cost do part-time employees make up.

The number of employees hired to fill one position in a year's time is called employee turnover.

The specifications of the operation with regard to products and services is called **quality standards.**

The specifications of an operation with regard to products is called **operational standards.**

If a chef prepares a product that does not meet the operation's standards, Labor and food. costs increase.

Labor costs go up and down in relation to sales volume.

The Manager's salary usually stays the same regardless of the operation's sales volume.

Variable is a type of cost is it when additional staff is added to cover demand.

Variable is a type of cost changes depending on the amount of sales at an operation.

Historical data serves as a baseline for making predictions about future revenue.

As projected sales decrease, the number of employees needed decreases.

<u>Master</u> schedule is a template showing the number of people needed in each position to run the foodservice operation for a given time period.

Names are not included in a master schedule.

When creating a crew schedule, A Master Schedule should be used as a template.

A plan designed to take a possible future event or circumstance into account is called a contingency plan.

At least <u>**Three**</u> employees should understand and practice every recipe, technique, or task used in the foodservice operation.

<u>Staff can handle responsibilities outside of their primary work responsibilities</u> is the benefit of cross-training employees in a foodservice operation.

If too many employees are scheduled for a particular shift, what will happen? <u>It will cost the restaurant</u> more in labor expenses than necessary.

<u>To ensure a profit is made while keeping customers happy</u> is why does management need to balance sales with labor costs.

<u>Management may need to alter the schedule to deal with environmental changes</u> is why does a crew schedule need to be created with flexibility.

LEBANON COUNTY CAREER AND TECHNOLOGY CENTERArt Show Judging Sheet ~ PortfolioOut of 6000 Points

STUDENT'S NAME:

TOTAL SCORE:

	160pts. + Bonus			
CATEGORY	PROFESSIONAL	SATISFACTORY	NEEDS WORK	INCOMPLETE
Culinary Code- Table of Contents- <u>Resume -</u> <u>Career Objective</u>	Included – 10pts. Included – 10pts. Perfect = 10 pts. Corrected clean copy = 10 pts.		Imperfect = 5 pts. Imperfect = 5 pts. Corrections needed = 2 pts. Corrections needed = 2 pts.	Not included = 0 pts. Not included = 0 pts. Not included = 0 pts. Not included = 0 pts.
<u>Task List</u>	Included & Used = 10 pts.		Included but not current=5pts.	Not included $= 0$ pts.
Equipment Certification Completed & Signed.	Included & Completed=10 pts		Included but not signed by Chef & Student=5pts.	Not included = 0 pts.
Awards	38 or more $= 10$ pts.	15 - 37 = 7 pts.	1 - 14 = 5 pts.	None $= 0$ pts.
Show Work Photos	15 or more $= 10$ pts.	4 or 5 = 7 pts.	1 or $2 = 5$ pts.	None $= 0$ pts.
Menus	8 or more $= 10$ pts.	4 or $5 = 7$ pts.	1 or $2 = 5$ pts.	None $= 0$ pts.
Production Sheets	Chronological, complete (30 or more weeks) = 10 pts.	24 – 29 weeks, chronological = 7 pts.	19 – 23 weeks and/or disorganized = 5 pts.	10 - 19 weeks = 2pts. Less than $10 = 0$ pts.
Product Sheets	38 or more $= 10$ pts.	24 or more $=$ 7 pts.	18 or more $= 5$ pts.	12 or more = 3 pts. Less than $10 = 0$ pts.
<u>Skills USA</u>	Evidence of participation, program, award(s), photo(s) =10pts. 5 extra pts. For State info or pics	Evidence of participation = 7 pts.	Skills USA related material included = 4 pts.	Nothing included = 0
Pictures	50 or more, typed captions = 10 pts	25 – 49, typed captions = 7 pts.	12 - 24 and/or un-typed or no captions = 5 pts.	10 or more = 3 pts. Less than $10 = 0$
Virtual Learning	Evidence of participation- certificates 9 to 12=10pts.	6 to 8 certificates =7pts.	4 to 5 certificates =5pts.	Less than 4 =0pts.
Community Service or Other Added Section - 10pts.	10pts 4 or more community services	7pts. 3- community services	5pts. 2- community services	2pts. 1- community service
Overall Appearance	Typed tabs and section title sheets, plastic sleeves, individualized and decorative cover, neat, orderly = 10 pts.	Typed tabs and section title sheets, plastic sleeves, individualized cover, neat = 7	Tabs, section title sheets, cover sheet = 4	Sloppy, disorganized, no section title sheets and/or typed tabs, no plastic sleeves, no cover sheet = 0
TOTALS				

Textbook

Foundations of Restaurant Management and Culinary Arts ISBN 978-1-58280-342-5

Sample Textbook Reading:

"Dairies make cheese by separating a milk's solids from its liquid, or whey, in a process called curdling. The proteins, or curds, that form are then usually processed in some way to make a particular type of cheese. A wide variety of processing techniques, ripening methods, and types of milk are used to make cheese."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Chef coat	ML	\$35.00	R
Neckerchief	ML	\$4.50	R
Checked cook pant	ML	\$24.00	R
Black cook pant	ML	\$24.00	R
Dining room dress shirt or blouse	ML	\$22.50	R
White bib apron	ML	\$6.00	R
Chef hat 2 options for hair length	ML	\$0.50/\$7.00	R
Black leather work shoes (NO sneakers)	YC	\$75.00	R
Binder 3" or 4" D-ring	YC	\$3.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Montgomery	Credits	
CUL 120	Introduction to Culinary Techniques	3.0
CUL 101	Culinary Foundations	3.0
CUL 198	Culinary Practicum I	1.0
CUL 298A	Culinary Practicum II	3.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Montgomery County Community College POS: CIP 12.0503 Culinary Arts, Associate in Applied Science (A.A.S.) Degree Program and CIP 12.0503 Culinary Arts, Certificate Program.

Harrisburg A	rea Community College-Harrisburg	Credits
HTMT 104	Nutrition for Food Service	3.0
HTMT 110	Menu Design and Marketing	3.0
HTMT 125	Dining Room Management	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits to the Harrisburg Area Community College CIP 12.0503 Culinary Arts, Associate of Applied Science Degree Program.

Westmoreland County Community College		
FSM 103	Introduction to The Hospitality Industry	3.0
FSM 235	Supervision and Training	3.0
CUL 104	Foundations of Cooking and Baking	3.0

Total Credits Awarded: 9.0

Notes: The Secondary CIP 12.0508 Institutional Food Worker aligns nine (9) credits to the Westmoreland County Community College CIP 12.0503 Culinary Arts, Non-Apprenticeship Option, Associate of Applied Science Degree (AAS) Program and 12.0503 Culinary Arts, Apprenticeship, Associate of Applied Science Degree (AAS) Program.

Westmoreland County Community College		
BKP 141	Baking I	4.0
FSM 103	Introduction to The Hospitality Industry	3.0
FSM 105	Foods I	4.0

Total Credits Awarded: 11.0

Notes: The Secondary CIP 12.0508 Institutional Food Worker aligns eleven (11) credits to the Westmoreland

County Community College CIP 12.0501 Baking and Pastry Degree, Non-Apprenticeship Option, Associate of Applied Science Degree Program.

Delaware County Community College		
CUL 115	Professional Cooking I	3.0
CUL 150	Baking and Pastry Foundations I	3.0
HRM 110	Food Sanitation and Safety Supervision	3.0

Total Credits Awarded: 9.00

Notes: Nine (9) credits are aligned to the Delaware County Community College CIP 12.0508 Culinary Arts, Certificate of Competency program

Pittsburgh	Technical College (formerly Pittsburgh Technical Institute)	Credits
CUL 113	Foundational Concepts of Cooking	2.0
CUL 114	Sanitation	2.0
CUL 115	Basic Knife skills	1.0
CUL 145	Culinary, Hospitality, and Supervision	4.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the Pittsburgh Technical College Program of Study, CIP 12.0503 Culinary Arts, Associate of Science Degree Program.

Allegany Col	Credits	
CULA 150	Food Preparation I	3.0
CULA 212	Baking I	3.0
HRMG 101	Introduction to Hospitality	3.0

Total Credits Awarded: 9.0

Notes: Aligns nine (9) credits to the Allegany College of Maryland CIP 12.0503 Culinary Arts, Associate of Applied Science Degree Program.

Commonwealth Technical Institute		
CA 010	Careers in Food Service	3.0
CA 060	Introduction to Preparation & Service of Food	3.0
CA 101	Tools and Stationery Equipment	3.0

Total Credits Awarded: 9.0

Notes: The Secondary CIP 12.0508 Institutional Food Workers aligns Nine (9) credits to the Commonwealth Technical Institute's CIP 12.0503 Culinary Arts Associate in Specialized Technology (AST) Degree program.

Career Pathways

Cook Pastry Cook Caterer Sous Chef Bakery Manager

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Restaurant Cook	16%	\$18,390	\$25,540	\$29,120
Chef/Head Cook	11%	\$36,110	\$54,110	\$63,110
Sous Chef	11%	\$22,660	\$37,380	\$44,740
Private Household Cook	-3%	\$21,270	\$27,880	\$31,190

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification	ServSafe Allergen Certification		
Certified Culinarian	ServSafe Food Handler		
	Certification		
Certified Foundational Cook	Food Safety Manager		
Certified Pastry Culinarian	Prostart National Certificate of		
	Achievement		
Allergen Management	Heartsaver CPR		
ProStart National Certificate of	Heartsaver First Aid		
Achievement			
ServSafe/Manager Food Safety			
Certification			

Program Safety & Physical Considerations

- High degree of self-discipline and focus on safety around kitchen equipment knives and other tools and equipment found in the industry
- A focus on preparing, holding, and serving food safely
- Ability to handle stress of work in a fast-paced environment
- Good personal hygiene
- Ability to lift and carry 50 pounds
- Tolerance for heat, handling and manipulating hot objects/items, and working in a hot environment
- Exposure to all food types including known allergens
- Stamina needed to stand for long periods of time
- Trunk strength (ability to use abdominal and lower back muscles to support part of body repeatedly or continuously over time with fatigue)

Aptitudes for Success

- Eye/hand/foot coordination
- Finger and manual dexterity
- Arm and hand steadiness
- Size, shape, and color discrimination
- Ability to multi-task
- Ability to pay attention to detail and be creative
- Spatial acuity
- Ability to adjust actions in relation to other actions

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

The Dental Assistant program integrates lectures, demonstrations, and hands-on experiences to teach students a variety of dental-related subjects. The major areas of study include anatomy and physiology, chair-side dental assisting, radiology, dental materials, and microbiology/sterilization. During the program, students participate in clinical rotations in private dental offices, clinics, and hospitals. Experience gained in the Dental Assistant program prepares students to take the Commonwealth of Pennsylvania State Dental Radiology Certification Test.

Task List

Introduction to Dental Assisting

- Identify career: role, function, obligations, and limitations of the dental care provider as a member of the dental team.
- ✤ Define dental related terms and abbreviations.
- Practice appropriate personal hygiene, dress practices, and personal qualities/characteristics.

Principles of Infection Control

- ✤ Wash hands and use hand sanitizer.
- Prepare and bag/wrap instruments for sterilization.
- ✤ Use and care for ultrasonic cleaner.
- ✤ Use chemicals to sterilize and disinfect instruments.
- Sterilize instruments using autoclave and maintain equipment.
- Perform disinfection and sterilization procedures on dental equipment.
- Practice OSHA regulations with respect to dental occupations.
- Follow Safety Data Sheets (SDS) and label appropriate materials.
- Dispose of sharps, infectious and hazardous wastes.
- * Maintain evacuation system and dental unit waterlines.
- ✤ Maintain dental handpieces.
- Follow infection control procedures to send/receive dental laboratory items.
- Follow Personal Protective Equipment (PPE) procedures.
- Identify the components for infection transmission, routes of transmission of infectious organisms and the different microorganisms and diseases.

Safety and Emergency Procedures

- Practice general/personal safety standards/precautions.
- Practice proper body mechanics.
- Perform CPR/AED procedures.
- ✤ Prepare for and recognize various medical emergencies.

Ethical/Legal Responsibilities

Adhere to legal and ethical standards of behavior and compliance, including HIPAA policies

- ✤ Identify parts, names, shapes, and surfaces of teeth.
- ♦ Identify head and neck anatomy, e.g., muscles, nerves, arteries, and veins.
- ✤ Describe disturbances in dental development.
- ✤ Identify landmarks and structures of the face.
- ✤ Identify landmarks, structures, and normal tissues of the mouth.
- ✤ Identify primary and permanent teeth eruption dates/arches/types.
- ♦ Use Universal, Palmer and FDI Designation Systems for permanent and primary teeth.
- Identify the anatomy of the temporomandibular joint (TMJ) into the dental treatment of patients.
- ✤ Identify occlusal relationships into the dental treatment of a patient.

Office Procedures

- Demonstrate the use of dental software systems.
- ✤ Maintain inventory system.
- Process insurance claims.
- ✤ Preparing and maintaining patient's file/ file systems.
- ✤ Use written and verbal communication.
- Schedule and maintain appointment book/daily schedule.

Pharmacology

- Describe methods of pain, anxiety control and pre-meds used in dentistry.
- Use Physician's Desk Reference (PDR) as a resource and/or digital resources.
- * Recognize pharmacology terms and abbreviations, related to the field of dentistry.

Radiology Skills

- Discuss history of dental radiology.
- Follow safety measures for exposing dental radiographs.
- Position patient and select accessories for radiographic technique.
- Select film size appropriate for patient's mouth.
- Describe proper storage of unexposed radiographic film.
- Expose intra-oral radiographs using long-cone paralleling technique with film and digital receptors.
- Develop radiographs.
- ✤ Mount full-mouth series of radiographs.
- ✤ Maintain radiographic records.
- Duplicate dental radiographs.
- ✤ Identify normal radiographic landmarks of the teeth and jaws.
- Evaluate dental radiographs for diagnostic quality.
- Expose an intra-oral maxillary and mandibular anterior and posterior occlusal radiograph.
- Expose a panoramic radiograph.
- ✤ Discuss computerized digital radiography.
- ✤ Describe the properties of dental radiation.
- Discuss/expose intra-oral radiographs using long-cone bisecting technique with film and digital receptors.

Operative Dentistry (Chair Side Dentistry)

- Seat/dismiss a patient, including special needs and elderly.
- Prepare and set up examination tray.
- * Record and chart oral conditions using paper and computerized charting.
- * Take and record patient dental/medical history and vital signs.
- ✤ Prepare oral prophylaxis tray.
- ✤ Transfer instruments for four-handed dentistry.
- Evacuate oral cavity.
- ✤ Identify various types of dental hand instruments.
- Prepare set up and assist with administration of topical and local anesthesia.
- Prepare set up and assist with applying and removal of rubber dam.
- ✤ Identify/change burs in low and high-speed hand pieces.
- ◆ Prepare Tofflemire Matrix Band and sectional matrix systems.
- ✤ Prepare set up and assist with amalgam restoration.
- Prepare set up and assist with composite/resin restoration.
- ✤ Prepare set up and assist with pit and fissure sealants.
- Prepare set up for whitening procedures and give patient instructions.
- Provide patients with preventative dentistry information and techniques.
- Obtain and record intra/extra oral photographs.

Dental Materials

- ✤ Mix/prepare various dental cements.
- Mix/prepare set up for and take alginate impressions of the maxillary and mandibular arches.
- ♦ Mix/prepare various dental liners and desensitizing materials.
- ✤ Mix/prepare various dental bases.
- ✤ Mix/prepare various elastomeric materials.

Dental Laboratory Procedures

- Pour maxillary and mandibular alginate impression with gypsum product.
- ✤ Trim a maxillary and mandibular study cast.
- ✤ Construct an upper and lower custom tray.
- ✤ Fabricate a temporary crown/provisional.
- ✤ Fabricate a bleaching tray.
- ✤ Expose students to digital impression.

Oral Surgery

- ✤ Identify instruments and prepare set ups for various oral surgical procedures.
- Explain pre-operative and post-operative procedures to patient.

Periodontics

- Chart periodontal probing and periodontal findings using paper and/or digital recordings.
- Provide post-operative instruction for periodontal procedures.

Prosthodontics

- Identify dental instruments and describe the total process of providing a fixed prosthesis for a patient.
- Identify dental instruments and describe the total process of providing a removable prosthesis for a patient.
- Give instructions regarding maintenance of fixed and removable prostheses.
- Explain the concept of dental implants.

Endodontics

- ✤ Identify instruments and prepare the setups for endodontic procedures.
- Describe the techniques involved in endodontic procedures.
- Prepare to obtain various Dental Assistant National Board Certifications (RHS, ICE, NELDA).
- ✤ Obtain CPR/AED certification.
- ✤ Obtain OSHA certification.
- ✤ Obtain Bloodborne Pathogens certification.
- Obtain HIPAA certification.

Certification

- Prepare to obtain various Dental Assistant National Board Certifications (RHS, ICE, NELDA).
- ✤ Obtain CPR/AED certification.
- Obtain OSHA certification.
- ✤ Obtain Bloodborne Pathogens certification.
- Obtain HIPAA certification.

Orthodontics

✤ Identify various instruments, appliances, and techniques.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
2.1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems	Yes
	Measurement and Data, and Probability	
2.4.HS.B.2	Summarize, represent, and interpret data on two categorical and quantitative variables.	
2.4.7.B.1	Draw inferences about populations based on random sampling concepts	Yes
2.4.6.B.1	Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions	Yes
	Geometry	
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
	Algebraic Concepts	
2.2.HS.D. 7	Create and graph equations or inequalities to describe numbers or relationships	
2.2.1.A.2	Understand and apply properties of operations and the relationship between addition and subtraction.	Yes
2.2.3.A.2	Understand properties of multiplication and the relationship between multiplication and division	Yes

Reading

Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
	Craft & Structure	
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words	
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3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
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3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form	
	(e.g. a table or chart).	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10.I	Integrate and evaluate multiple sources of information presented in diverse	
	formatsto solve a problem	
3.5.11-12.Н	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying	
	the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range Of Reading		
3.5.11-12.J	Read and comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
	Production & Distribution of Writing	
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the Internet, to produce, publish, and update individual or	
	shared writing products.	
	Research	
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing Grades		
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc	

Examples of Course Material

Example #1 Dental Course Material

Objective: Prosthodontics: The student will explain the concept of dental implants

Instructions: Read Chapter 24 of your textbook to review the dental implant procedure. Choose one type of dental implant and explain the procedure

<u>Content</u>: 3-on-6 Dental Implants

An alternative to an implant-retained denture is a 3-on-6 implant. It consists of three individual dental bridges attached to six dental implants. The cost of 3-on-6 implants can range from \$10,000 to \$15,000 per arch.

What are 3 on 6 Dental Implants?

3 on 6 dental implants consist of three individual dental bridges that are attached to six dental implants. This restoration is similar to a dental bridge but with artificial roots instead of natural teeth.

The approach is ideal for full-mouth reconstruction, as it restores the natural function of the teeth by evenly distributing bite forces. It is an excellent solution to missing an entire arch of teeth and is an alternative to a permanent denture that uses two to four implants. Since it does not require synthetic gums, it is also aesthetically pleasing.

Who is a Candidate for These Implants?

Your eligibility for 3-on-6 implants largely depends on how much bone you have. Your dentist will examine your mouth and do a 3D scan during your initial consultation. The findings from these diagnostic tests will determine the most suitable treatment plan for your condition.

You may be a candidate for implants if you:

- Have a good general and oral health standing
- Do not have cavities or gum disease
- Have enough healthy bone structure remaining to support the implant
- You may not be a candidate for implants if you:
- Have untreated dental health conditions
- Grind your teeth (bruxism), which can damage the implant over time
- Take steroid drugs or other medications that suppress your immune system
- Do not have enough healthy bone structure remaining due to advanced gum disease

How Do 3 on 6 Implants Function?

3 on 6 implants work by separating each arch into three independent sections, called bridges. Each bridge holds four artificial crowns and is anchored into the jaw by two implants. Since it takes 3 bridges to cover an arch, you will have a total of six implants.

Release 1.2

3 on 6 Dental Implant Procedure (Step-by-Step)

The procedure for 3 on 6 dental implants consists of the following steps:

Step 1. Consultation

The process starts with a consultative meeting with a certified dentist, who will examine your mouth, then perform X-Ray and CT scans to determine if the 3 on 6 treatment is right for you. During this session, you'll also discuss financing and payment options and when to start the treatment.

Step 2. Implant surgery

Your doctor will perform implant surgery at your second appointment. While the procedure can be achieved with local anesthesia, you may also choose general anesthesia if you're nervous. Your implants will need to heal after the procedure. The process may take anywhere from a few weeks to a few months. Your dentist will give you a removable denture during this time, so you don't remain toothless while your gums heal.

The dental team will use scans of your teeth or pre-designed models to design a new smile for you. You will have input on the shade and design of the teeth.

Step 3. Temporary restoration

Once your implants heal, your doctor will remove the denture, attach abutments, and give you temporary bridges. They'll help you test the look and feel of your new teeth before the dentist orders a more durable ceramic replacement.

You'll have them on for a week or two, then meet with your dentist to provide feedback. If you're not happy with your smile or would like to make some changes, the doctor will take note of your concerns and forward them to his or her team.

Step 4. Final bridges

Your doctor will schedule one more appointment to place your zirconia bridges and ensure everything meets your expectations.

Example #2 Dental Course Material

<u>Objective</u>: The student will Investigate and describe geometric characteristics

Instructions: Analyze the images and describe the affect

Content: Sharpness is defined by the dimensions of the partially shaded outer region or the penumbra of an object. The wider the penumbra, the less sharp the image

Using the diagram below, describe how the size of the focal spot affects the sharpness of an image.



Example #3 Dental Course Material

Objective:

- Understand the application of the Inverse Square Law as it pertains to Radiation Safety
- Apply the Inverse Square law to create safe distances, times, or radiation amounts.

<u>Content</u>: *Inverse Square law-* The radiation Intensity is inversely proportional to the square of the distance. Notice in the diagram that as the distance doubles, the area quadruples and thus, the initial radiation amount is spread over that entire area and is therefore reduced, proportionately.

Imagine we are trying to expose a piece of x-ray film (radiograph) and we move the x-ray source twice as far away on each shot, will the film be more or less exposed? Therefore, while the inverse square law pertains to radiation safety, it also helps us to determine source to film distances (SFD), time of x-ray exposure, and the intensity (KV) of our x-ray tube.



$$\frac{I_1}{I_1} = \frac{D_2^2}{D_1^2}$$

 I_1 = Intensity with a distance measured as (R/hr or mR/hr) D_1 = Distance with an intensity (usually measured in feet) I_2 = Intensity without a Distance D_2 = Distance without Intensity

 I_1 = Intensity with a distance measured as (R/hr or mR/hr) D_1 = Distance with an intensity (usually measured in feet) I_2 = Intensity without a Distance D_2 = Distance without Intensity

Textbook

Modern Dental Assisting edition 13 Doni L. Bird and Debbie S. Robinson ISBN 978-0-323-62485-5

Sample Textbook Reading:

"The prophylaxis attachments, or "prophy angles," are used during polishing procedures to hold the prophy cup and the bristle brush. The most common type of prophy angle is the plastic disposable prophy angle, which is discarded after a single use. This attachment is available with a rubber cup or a bristle brush already in place."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Mock wrap tunic women	ML	\$13.50	R
Cargo pant women	ML	\$19.50	R
Snap front warm-up jacket women	ML	\$17.00	R
V-neck scrub top men	ML	\$13.75	R
Unisex draw string pant men	ML	\$11.00	R
Snap front warm-up jacket men	ML	\$18.50	R
Full-zip fleece	ML	\$24.50	R
Black or white plain sneakers or crocks (no holes)	YC	\$50.00	R
Binder 3-ring	YC	\$3.00	Ο
Pens, pencils, colored pencils, highlighters	YC	\$5.00	Ο
Folders and notebook paper	YC	\$3.00	Ο
Notebook dividers	YC	\$2.00	Ο
Criminal background check clearance	PA State	\$22.00	R
FBI fingerprint clearance	PA State	\$23.85	R
Hepatitis injections (proof from a doctor)	Physician		R
Tetanus update (proof from a doctor)	Physician		R
Dental exam	Dentist		R
Medical exam	Physician		R
Must have transportation for clinical rotation			

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Harrisburg Area County Community College		Credits
DA 170	Dental Assisting Pre-Clinic	4.0
DA 171	Dental Assisting I	4.0
DA 173	Dental Radiology	4.0

Total Credits Awarded: 12.0

Career Pathways

Dental X-Ray Technician	Chair-side assistant	Dental Receptionist
Dental Insurance Claim Reviewer	Dental Hygienist	Dental Lab Technician
Dental Laboratory Technician Assistant		

Position	Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Dental Assistant	8%	\$27,590	\$37,870	\$43,010
Dental X-Ray Technician*	4%	\$40,200	\$56,140	\$64,110
Dental Hygienist*	8%	\$52,960	\$66,270	\$72,920

(*Career opportunities listed require further education)

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
Heartsaver CPR	Infection Control (ICE)	
Adult CPR	National Entry Level Dental Assistant	
OSHA Certification	Radiation Health & Safety	
Certified Dental Assistant		

Program Safety & Physical Considerations

- Ability to adhere to health codes, personal and tool cleanliness, and overall cleanliness in workstation
- Wear gloves, masks, and other protective equipment while working and confined to small spaces
- Ability to safely use tools of the trade such as small tools, dental tools, steam autoclaves or sterilizers, orthodontic pliers, dental hand pieces or accessories, dental forceps, and dental supplies
- Work with bodily fluids, blood, saliva, bad breath, injections, and surgery, and be exposed to possible diseases
- Professional dress, grooming, and hygiene
- Prolonged standing, bending, and stooping
- Ability to work independently, read and follow directions
- Good hand-eye coordination

Aptitudes for Success

- Manual/finger dexterity
- Ability to discriminate between objects of similar: size, shape, color, and spatial relationships
- Ability to organize work process
- Ability to see details at close range
- Verbal communication

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Diesel Truck Technology

Diesel Truck Technology students restore late model over-the-road diesel truck-tractors to like new condition. Each year they refurbish or repair vehicles providing "hands-on" experience in diagnosing, servicing, and repairing all major heavy truck systems. Students learn the importance of teamwork and qualify for the PA State Safety Inspection program. The major course topics include Preventive Maintenance, Engine Systems Theory & Repair, Electrical Systems, and Brakes (air & hydraulic), Power Trains, Steering, Suspension and Drivelines. Career opportunities range from maintenance mechanic to fleet manager and may begin in high school with a Co-Op position providing job experience and a salary. Employers in the South-Central Motor Truck Association sponsor this program, provide student scholarships, and employ graduates. Students who successfully complete the program may receive college credits from the University of Northwestern Ohio (UNOH) and Automotive Training Center.

Task List

Orientation and Safety

- Explain diesel occupations and certification programs.
- ✤ Identify truck classifications and configurations.
- ✤ Use service manuals and online service information.
- ✤ Follow safety procedures and safe equipment operation.
- Follow EPA standards for cleaning and disposal of waste and fluids.
- Exhibit professional and personal standards and work habits and ethics in a diesel shop.
- ✤ Comply with OSHA regulations.

Tools and Fasteners/Hardware

- ✤ Identify and use basic hand tools and power tools.
- ✤ Identify and use fasteners, fittings, and hardware.
- ✤ Drill and use threading tools and extractors.
- ♦ Identify and use fractional and precision measuring tools, both standard and metric.
- Set up/Shut down, cut, and heat with an oxy-acetylene torch.

Suspension and Steering Systems

- ✤ Inspect and repair or replace steering linkage.
- ✤ Inspect and adjust basic wheel alignment and inspect tires.
- ✤ Inspect and test/service a power steering system.
- Service wheel bearings and hubs according to TMC guidelines.
- ✤ Inspect and replace shock absorbers.
- ✤ Inspect and replace kingpins.
- ✤ Inspect and replace leaf springs.
- ✤ Inspect and repair or replace air suspension components.
- ✤ Inspect and service wheel assemblies.

Preventive Maintenance

- Determine preventive maintenance intervals and procedures.
- ✤ Perform preventive maintenance inspection.

Brake System

- Inspect and repair or replace hydraulic disc brake components.
- ✤ Inspect and repair or replace hydraulic drum brake components.
- ✤ Inspect and repair or replace S-cam drum brake components.
- ✤ Inspect and replace or adjust air governors.
- Replace hydraulic brake lines and bleed brakes.
- ✤ Inspect and repair or replace air brake lines.
- ✤ Inspect and diagnose and replace air brake chambers.
- ◆ Inspect and diagnose and replace master cylinder and hydraulic system components.
- ✤ Diagnose and repair or replace ABS components.
- ✤ Inspect and repair or replace air brake valves.
- ✤ Inspect and repair or replace air dryers.
- ✤ Inspect and repair or replace air disc brake components.
- ✤ Inspect and replace and adjust slack adjusters.

Diesel Engines

- Explain diesel engine operation and identify parts.
- * Remove, inspect, and install camshaft and valve train components.
- ◆ Remove, inspect, and install piston, connecting rod, and liner.
- * Remove, inspect, and install crankshaft and bearings (mains and rods).
- ✤ Replace engine oil seal.
- Perform diesel tune-up (set overhead).
- * Remove, inspect, and install cylinder head and gasket.
- ✤ Remove, inspect, and install oil pump.
- * Remove, inspect, and install vibration dampener and flywheel.

Air Intake and Exhaust Systems

- ✤ Inspect and repair or replace air induction system components.
- ✤ Inspect and repair or replace exhaust system and components.
- ✤ Inspect and replace charge air coolers and after coolers.
- ✤ Inspect and repair or replace turbocharger.

Cooling Systems

- ✤ Inspect and replace belts and pulleys.
- ✤ Inspect and replace hoses and clamps.
- ✤ Test and replace thermostat.
- ✤ Drain, flush, refill, and bleed cooling system.
- ✤ Test anti-freeze and supplemental coolant additives.
- ✤ Inspect and replace water pump.
- ✤ Test, inspect and repair fan drives.
- ✤ Inspect and pressure test cooling system components.

Fuel System

- ✤ Replace fuel filters and strainers.
- ✤ Inspect and replace fuel lines, tank, cap, and fittings.
- Prime and bleed fuel system.
- Perform fuel supply and return system tests.
- Remove and install injector/nozzle.

Electrical/Electronic System

- ✤ Test and service battery.
- Test, replace and adjust bulbs and lamps.
- Diagnose and repair or replace electrical circuits and components.
- ✤ Test starting system and replace component assemblies.
- Test charging system output and replace component assemblies.
- ✤ Analyze and interpret wiring diagrams.
- ✤ Perform computer systems tests and analyze codes.

Drive Line

- ✤ Diagnose, replace, and adjust drive-line components.
- Perform clutch/clutch brake maintenance and adjustment.
- ✤ Remove and install clutch assembly.
- ✤ Remove and install transmission.

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on	
	measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	
2.1.8.E.1	Distinguish between rational and irrational numbers using their properties.	Yes
2.1.7.D.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers.	Yes
3.6.A.1	Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.	Yes
1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems.	Yes
	Measurement and Data, and Probability	Foundational
2.4.7.B.2	Draw informal comparative inferences about two populations.	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system.	Yes
	Geometry	Foundational
2.3.HS.A.1	Geometry Use geometric figures and their properties to represent transformation in the plane	Foundational
2.3.HS.A.1 2.3.HS.A.3	Geometry Use geometric figures and their properties to represent transformation in the plane Verify and apply geometric theorems as they relate to geometric figures.	Foundational
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5	Geometry Use geometric figures and their properties to represent transformation in the plane Verify and apply geometric theorems as they relate to geometric figures. Create justifications based on transformations to establish similarity of plane figures.	Foundational
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13	Geometry Use geometric figures and their properties to represent transformation in the plane Verify and apply geometric theorems as they relate to geometric figures. Create justifications based on transformations to establish similarity of plane figures. Analyze relationships between two dimensional and three dimensional objects.	Foundational
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problems	Foundational
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.	Foundational Image: Constraint of the second seco
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2 2.3.7.A.1	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Foundational Image: Constraint of the second seco
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2 2.3.7.A.1	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volumeAlgebraic Concepts	Foundational Image: Constraint of the second seco
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2 2.3.7.A.1 2.2.7.B.2	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volumeModel and solve real-world and mathematical problems by using	Foundational Image: Constraint of the second seco
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2 2.3.7.A.1 2.2.7.B.2	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volumeAlgebraic ConceptsModel and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical	Foundational Image: Constraint of the second state of the sec
2.3.HS.A.1 2.3.HS.A.3 2.3.HS.A.5 2.3.HS.A.13 2.3.HS.A.14 2.3.7.A.2 2.3.7.A.1 2.2.7.B.2	GeometryUse geometric figures and their properties to represent transformation in the planeVerify and apply geometric theorems as they relate to geometric figures.Create justifications based on transformations to establish similarity of plane figures.Analyze relationships between two dimensional and three dimensional objects.Apply geometric concepts to model and solve real world problemsVisualize and represent geometric figures and describe the relationships between them.Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volumeAlgebraic ConceptsModel and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.	Foundational Image: Constraint of the second seco

Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
	Craft & Structure	
3.5.9 -10.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.9 -10.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.9 -10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
	Integrate Knowledge/ Ideas	
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range Of Reading		
3.5.11-12.J	Read and comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical	
	processes, etc.	
Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing,	
	rewriting, or trying a new approach, focusing on addressing what is most	
	significant for a specific purpose and audience	
Range of Writing Grades		
3.5.11- 12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc	
109

Examples of Course Material

Example #1 Diesel Truck Course Material

1. True or False? Low resistance to fuel flow is not an important consideration in the design of primary fuel filters.

A True		
B False		
QUESTION 2		/1
2	should be bled from the fuel lines whenever fuel filters are	
changed.		
5		
QUESTION 3		1
		/1
3. A turbine centrifuge		
A O removes excess air from the diesel fuel B O	separates dirt and contaminates from the diesel fuel	
C is a type of fuel transfer pump D	None of the above.	
		7
QUESTION 4		/1
4. True or False? Engine idling is a practical method of ke	eeping fuel warm in cold conditions.	

THERMOSTAT INFORMATION SHEET

The thermostat acts to direct coolant back to the water pump inlet while the engine is cold, thus bypassing the radiator. As the engine warms, the thermostat opens the passage to the radiator and closes the one to the bypass.

The thermostat operates over a 15°F range. That is, a thermostat marked to be fully open at 180°F will start to open at 165°F.

The restriction of the thermostat causes pressure on the coolant in the block. This pressure can be as high as 40 psi and bears on all coolant from the water pump to the thermostat. Because water under pressure conducts heat faster than it can without pressure, heat transfer is improved.

Coolant under pressure will not boil readily, and corrosion is reduced by pressure. Thus, the thermostat must be left in, even though one may consider it useless in hot weather. In fact, some makers offer optional orifice plates to use if the thermostat is left out.

THERMOSTAT TEST

Used thermostats wear; they may be tested by hanging in a bucket of water with a good thermometer. The water heat should be increased until the thermostat starts to open. The temperature should be read and recorded.

The water should be heated until the thermostat is fully open. This temperature should be recorded. If the thermostat valve sticks or shows any hesitation, the thermostat should be discarded for a new one. (Figure 1)

- If a seal is used in the thermostat housing, remove the old seal and clean the bore; then install a new seal.
- Assemble the new thermostat into the cleaned housing, operating element to the engine.
- Use new housing gaskets, and position the thermostat and housing onto the pad on the end of the water manifold. Start the capscrews.
- 4. Tighten the capscrews evenly to the specified torque.
- 5. Install the top hose to the radiator, and use new clamps.
- 6. Attach vent and bypass connections, if used.
- Fill system with coolant and check for leaks. Mix proportion of antifreeze and water to suit the climate. Note: A 50-50 mixture is maximum



Medium/Heavy Duty Truck Engines, Fuel & Computerized Management Systems ISBN 978-111-64569-4

Sample Textbook Reading:

"The main shaft passes through the center of the transmission and provides the primary path for transmitting torque through the transmission. The P2 and P3 sun gears are integral with the main shaft, enabling it to transmit torque to both the P2 and P3 planetary gear-sets. The main shaft is also splined to the rotating clutch module. Input torque can be provided by the rotating clutch module via either C1 or C2."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Diesel Truck			
Item	Vendor	Cost	R or O
T-shirt - navy	YC	\$7.00	R
Short sleeve button down shirt	ML	\$18.50	R
Long sleeve button down shirt	ML	\$21.00	R
Industrial work pants	ML	\$22.50	R
Leather rubber sole work boots - oil resistant sole	YC	\$100.00	R
Safety glasses ANSI Z87	YC	\$3.00	R
Binder 3" 3-ring	YC	\$5.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Johnson College

IET 101	Introduction to Automotive and Diesel Electronics	2.0
VMR 151	Introduction to Vehicle Maintenance & Repair Technology	1.0
VMR 153	Brake Systems	2.0
VMR 154	Brake Systems Lab	1.0
VMR 155	Steering and Suspension Systems	2.0
VMR 156	Steering and Suspension Systems Lab	1.0
====		

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned with Johnson College's CIP 47.0605 - Diesel Preventative Maintenance, Certificate program and CIP 47.0605 - Diesel Truck Technology, AAS degree program.

Career Pathways

Engine Specialist Heavy Equipment Mechanic Preventive Maintenance Mecha Repair Shop Owner	Diesel M Line Mea Inic Shop For Shift Lea	Diesel Mechanic Line Mechanic Shop Foreman Shift Lead Mechanic		Fleet Manager Service Manager Fuel Injection Specialist	
Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary	
Bus & Truck Mechanic	13%	\$31,870	\$44,680	\$51,080	
Heavy Equipment Mechanic	5%	\$38,580	\$50,670	\$56,710	
Farm Equipment Mechanic	8%	\$25,560	\$37,840	\$43,980	

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Certified Safety Inspector, Cat1&2	
Automotive Service Excellence (ASE)	Certified Emissions Inspector	

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed for safety in and around vehicles, moving equipment, hand tools, power tools, and other equipment found in the industry
- Ability to learn and work in environments including various chemicals, dust, dirt and debris, small spaces, interior or exterior work factors/environmental factors
- Coordination ability to adjust actions in relation to other actions
- Physical strength and stamina with the ability to lift 50 pounds
- Ability to work in tight spaces
- Ability to diagnose the source of a problem quickly and accurately

Aptitudes for Success

- Finger and manual dexterity
- Eye/hand/foot coordination
- Color discrimination
- Forms perception
- Spatial acuity

Standardized Testing Requirement

$NOCTI - 12^{th}$ Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Electrical Technology

Electrical Technology students design and install the electrical systems in the school's construction projects and work on numerous projects within the community. They learn technical skills including AC/DC Foundationals, residential, commercial, and industrial wiring, AC/DC motors and generators, industrial motor control, troubleshooting and the operation of programmable logic controllers. Technical careers range from an electrician to a systems engineer and may begin in high school with a Co-Op position providing job experience and a salary. The 500 employers in the Lebanon County Builders Association sponsor this program, provide student scholarships, and employ graduates. Completion of this program with the College-in-the-High School option may also provide students with eight HACC college transferrable credits.

Task List

Basic Safety

- Inspect and use personal protective equipment.
- Identify causes of job site accidents.
- Properly don fall protection.
- ✤ Identify four classes of fire extinguishers.
- ✤ Confirm circuits are de-energized before working on them.
- Perform lockout/tagout.
- ✤ Inspect and use ladders.
- ✤ Complete jobsite hazard analysis form.
- ✤ Identify arc-flash hazards and protection (NFPA70E).

Hand Tools

- ✤ Use screwdrivers.
- ✤ Use pliers.
- ✤ Use a keyhole/drywall saw.
- ✤ Use a hydraulic knockout/punch tool.
- ✤ Use a tape measure.
- ✤ Use wire strippers.
- ✤ Use wire cutters.
- ✤ Use a utility knife.
- ✤ Use a torpedo level.
- ✤ Use a hammer.
- ✤ Use a conduit reamer.
- ✤ Use a hacksaw.
- ✤ Use an MC Cable splitter (roto-split).
- ✤ Use an adjustable or non-adjustable wrenches.
- ✤ Use a ratchet and sockets.
- ✤ Use nut drivers.

Power Tools

- ✤ Use a hammer drill.
- ✤ Use a reciprocating saw.
- ✤ Use a portable hand-held band saw.
- ✤ Use a drill.
- ✤ Use an oscillating multipurpose tool.
- ✤ Use impact driver.

Blueprint Reading

- Identify types of blueprint plans.
- ✤ Identify blueprint symbols.
- Interpret blueprint plans.
- ✤ Develop electrical details on a blueprint.
- ✤ Use a measuring tool to scale.

Anchors and Supports

✤ Identify, select, and install various types of anchors and supports.

Residential Cabling Technology

- ✤ Install non-metallic (NM) Cable.
- ✤ Install metal-clad cable (MC).
- ✤ Terminate a coaxial cable.
- ✤ Identify telecommunications cable types.
- ✤ Terminate a RJ45 connector.
- ✤ Install SE cable.
- ✤ Terminate and splice conductors.

Switches and Receptacles Circuits

- ✤ Install a duplex receptacle.
- ✤ Install a single pole switch.
- ✤ Install a 3-way switch.
- ✤ Install a 4-way switch.
- ✤ Install a split-wired duplex receptacle.
- ✤ Install a Ground Fault Circuit Interrupter (GFCI) receptacle.
- ✤ Install an Arc-Fault Circuit Interrupter (AFCI).
- ✤ Install a time control switch.
- ✤ Install a range receptacle.
- ✤ Install a dryer receptacle.
- ✤ Install various branch circuits.
- ✤ Install connected/ smart devices.

Fixtures

- ✤ Install surface-mounted lighting fixture.
- ✤ Install recessed lighting fixtures.
- ✤ Install a ceiling fan.
- ✤ Install special purpose lighting.
- ✤ Identify IC and non-IC recessed lighting fixtures.

Raceways

- ✤ Install Electrical Metallic Tubing (EMT).
- ✤ Design a surface raceways system (wire mold).
- ✤ Install flexible raceway.
- Bend a stub 90° .
- ✤ Bend an offset.
- ✤ Bend a back-to-back 90°.
- ✤ Cut, ream, and deburr raceway systems.
- ✤ Install conductors in a raceway system.

Wired Devices

- ✤ Install a hard-wired smoke detector.
- ✤ Install door-bell system.
- ✤ Trim out electrical devices.
- ✤ Install an occupancy sensor.
- ✤ Install a photocell.

Testing Equipment

- ✤ Use a multimeter to test a circuit.
- ✤ Use a plug-in circuit tester.
- ✤ Use a clamp-on ammeter.
- ✤ Use a circuit tracer.
- ✤ Use a network cable tester.
- ✤ Apply Ohm's/Watt's law calculations to electrical applications.

Electrical Service

- ✤ Install an overhead service.
- ✤ Identify parts of an underground service.
- ✤ Identify types of safety disconnect switches.
- ✤ Terminate a service panel/load center/sub-panel.

National Electrical Code (NEC)

- ✤ Identify the purpose of the NEC.
- ✤ Use Chapter 9 Tables.
- Use the NEC as a reference to questions and competencies that students perform for all electrical installations.
- ✤ Identify the publisher of the NEC.
- ✤ Identify the code cycle of the NEC.

Green Technology

- ✤ Identify renewable energy sources.
- ✤ Identify procedures for installing a wind turbine system.
- ✤ Identify procedures for installing a solar energy system.
- Evaluate the demand and consumption of electrical energy.

Pennsylvania Academic Standards

Mathematics

Numbers and	d Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problem	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers	Yes
2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals	Yes
Measuremen	t and Data, and Probability	Foundational
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system.	Yes
Geometry		Foundational
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures.	
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects.	
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
Algebraic Co	oncepts	Foundational
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric ratios.	
2.2.8.B.3	Analyze and solve linear equations and pairs of simultaneous linear equation	Yes
2.2.8.B.1	Apply concepts of radicals and integer exponents to generate equivalent expressions	Yes
2.2.7.B.2	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations	Yes

Reading	
Key Ideas/De	etails
3.5.11-12 A	Cite specific textual evidence, etc.
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.
Craft & Stru	cture
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &
	analyze the structure of the relationships among concepts in a text
Integrate Kn	owledge & Ideas
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form
	(e.g. a table or chart)
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical
	problem
3.5.9 -10.I	Compare and contrast findings presented in a text to those from other sources, etc.
3.5.11-12. G	Integrate and evaluate multiple sources of information presented in diverse
	formatsto solve a problem
3.5.11-12. H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying
	the data when possible
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding
Range of Rea	nding
3.5.11-12.J	Comprehend technical texts independently and proficiently

Writing

Text Types a	and Purpose
3.6.11-12.A	Write arguments focused on discipline specific content
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical
	processes, etc.
Production &	& Distribution of Writing
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing,
	rewriting, or trying a new approach, focusing on addressing what is most
	significant for a specific purpose and audience
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual
	or shared writing products
Research	
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a
	problem
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,
	following a standard format for citation
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and
	research
Range of Wi	riting

3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of
	tasks, purposes, and audiencesetc.

Examples of Course Material

Example #1 Electrical Technology Course Material

Conduit Raceways

• Complete each calculation using the appropriate angles for the bend. Do this on a separate piece of paper and submit through Schoology.

• Write the angle(s) you selected. For the offset bend, three point saddle, and four point saddle you must use 2 angles.

• <u>All Calculations</u> are to be written showing all work.



Example #2 Electrical Technology Course Material

Series and Parallel Circuits

<u>Two-terminal</u> components and <u>electrical networks</u> can be connected in series or parallel. The resulting electrical network will have two terminals, and itself can participate in a series or parallel <u>topology</u>. Whether a two-terminal "object" is an electrical component (e.g. a <u>resistor</u>) or an electrical network (e.g. resistors in series) is a matter of perspective. This article will use "component" to refer to a two-terminal "object" that participate in the series/parallel networks.

Components connected in series are connected along a single "electrical path", and each component has the same <u>current</u> through it, equal to the current through the network. The voltage across the network is equal to the sum of the voltages across each component.^{[1][2]}

Components connected in parallel are connected along multiple paths, and each component has the same <u>voltage</u> across it, equal to the voltage across the network. The current through the network is equal to the sum of the currents through each component.

The two preceding statements are equivalent, except for <u>exchanging the role of voltage and</u> <u>current</u>.

A circuit composed solely of components connected in series is known as a **series circuit**; likewise, one connected completely in parallel is known as a **parallel circuit**. Many circuits can be analyzed as combination of series and parallel circuits, along with <u>other configurations</u>.

In a series circuit, the current that flows through each of the components is the same, and the <u>voltage</u> across the circuit is the sum of the individual <u>voltage drops</u> across each component.^[11] In a parallel circuit, the voltage across each of the components is the same, and the total current is the sum of the currents flowing through each component.^[11]

Consider a very simple circuit consisting of four light bulbs and a 12-volt <u>automotive battery</u>. If a wire joins the battery to one bulb, to the next bulb, to the next bulb, to the next bulb, then back to the battery in one continuous loop, the bulbs are said to be in series. If each bulb is wired to the battery in a separate loop, the bulbs are said to be in parallel. If the four light bulbs are connected in series, the same current flows through all of them and the <u>voltage drop</u> is 3-volts across each bulb, which may not be sufficient to make them glow. If the light bulbs are connected in parallel, the currents through the light bulbs combine to form the current in the battery, while the voltage drop is 12-volts across each bulb and they all glow.

In a series circuit, every device must function for the circuit to be complete. If one bulb burns out in a series circuit, the entire circuit is broken. In parallel circuits, each light bulb has its own circuit, so all but one light could be burned out, and the last one will still function.



A series circuit with a voltage source (such as a battery, or in this case a cell) and 3 resistance units

Textbook

Mike Holt's Illustrated Guide to Basic Electrical Theory ISBN 978-1-932685-39-8

Sample Textbook Reading:

"Lightening protection systems consist of a strike termination device, called an "air terminal" or lightning rod," placed on the top of the structure to be protected. These strike termination devices are connected by large wires, and the wires are then connected to the Earth."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt short sleeve	ML	\$12.00	R
T-shirt long sleeve	ML	\$14.00	0
Hooded sweatshirt	ML	\$25.00	0
Safety toe boots (Composite, not steel toe)	YC	\$100.00	R
Jeans	YC	\$20.00	R
Texas Instruments calculator TI-36X Pro	YC	\$20.00	R
Binder 3" 3-ring	YC	\$15.00	R
Black ink pens	YC	\$5.00	R
Pencils	YC	\$5.00	R
Colored pencils	YC	\$5.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Rosedale 1	echnical College	Credits
ED 206	AC/DC Power	3.0
ED 203	Motor Repair	3.0
ED 207	Estimating	3.0
====		
Total Cred	its Awarded: 9.0	

Notes: Nine (9) credits are aligned to the following Rosedale Technical College POS: CIP 46.0399 Electrical Technology. Associate in Applied Specialized Technology (A.S.T.) Degree.

Harrisburg Area Community College		Credits
CUL 101	Culinary Foundationals I	5.0
PAS 111	Foundations for Pastry	4.0

Total Credits Awarded: 9.0

Career Pathways

Residential Electrician	Commercial Electrician	Electrical Contractor
Industrial Electrical Equipment Repairer	Equipment Installer	Cost Estimator
Electrical Power-Line Installer/Repairer		

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Electrician Helper	17%	\$24,130	\$31,390	\$35,010
Electrician	14%	\$38,680	\$62,070	\$73,770
Industrial Electrical Equipment Repairer	3%	\$40,850	\$53,970	\$60,530
Electrical Power-Line Installer/Repairer	21%	\$57,510	\$77,350	\$87,280

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Pennsylvania Builders	
	Association Skills Certificate	

Program Safety & Physical Considerations

- Ability of a high degree of self-discipline and focus needed for safety around moving equipment, hand tools, power tools, and other equipment found in the industry
- Due to the risk of electrical shock and fire hazards, using equipment requires self-discipline and strict adherence to rules to ensure safety of self and others
- Ability to work in all weather conditions
- Physical strength and stamina with the ability to lift 50 pounds overhead
- No fear of heights or working in closed spaces
- Ability to work in dust, dirt, and debris, loud and sometimes startling noises, ongoing background noise, moving people and equipment
- Ability to work in small spaces, interior or exterior work factors/environmental factors, scaffolding, and ladders

Aptitudes for Success

- Eye/hand/foot coordination
- Finger dexterity
- Manual dexterity, multi-limb coordination while standing, sitting, or lying down
- Arm and hand steadiness
- Visual color discrimination
- Spatial relations

Standardized Testing Requirement

NOCTI - 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

124

Electromechanical Technology

The Electromechanical Technology program is designed to provide students with the knowledge and skills necessary to apply current methods and technology to the development, design, operation, and management of electromechanical systems. Electromechanical covers multiple disciplines including Electrical, Electronics, Fluid Power (Hydraulics and Pneumatics), Mechanical Drives, Programmable Logic Controllers (PLC's), and Robotics. Students are trained in both the electrical and mechanical disciplines, and then exposed to a wide spectrum of instrumentation and industrial controls concepts. Students can use what they learn in Electromechanical Technology to pursue a career directly out of high school or continue their education into a degree program. The course is designed to introduce engineering principles of electromechanical systems and disciplines. Some of the potential jobs include Electronics Technicians/Engineer, Electrician, Biomedical Technician/Engineer, Industrial Maintenance Technician, Mechanical Engineer, Programmer, and many more!

Task List

Safety

- ✤ Follow OSHA safety regulations.
- ✤ Identify, select, and demonstrate proper hand tool use for electronics work.
- * Recognize the types and usages of fire extinguishers.
- Interpret Safety Data Sheets (SDS).
- Explain the chemical and environmental hazards for disposal of electronics equipment.
- Describe electrical shock and list the effects of electric current on the human body.

Electrical Quantities and Components

- Describe electronic measurements and their applications.
- ✤ Identify the Foundational SI units.
- ✤ Apply proper scientific and engineering notation.
- ✤ Identify resistor values by color code and numerical markings.
- ✤ Identify component symbols used in electronic schematic diagrams.
- ✤ Identify schematic symbols for various types of electrical and electronic components.

Instrumentation

- Utilize multimeters, function generators, and frequency counters.
- ✤ Utilize a variable output power supply.

Ohm's Law/Power

- ✤ Apply the concept of Ohm's law to determine current, voltage, or resistance.
- Identify the relationship between voltage, current, resistance, and power in DC using the 12 basic common formulas derived from Ohm's law and Watt's pie chart.

Series Circuits

- ✤ Apply Kirchhoff's voltage law in a series circuit.
- Design/build a series circuit and solve for its equivalent resistance.
- ♦ Analyze power consumption, dissipation, and energy units in a series circuit.
- ✤ Analyze the effects of open circuits and short circuits in series circuits.

Parallel Circuits

- Design/build a parallel circuit and solve for its equivalent resistance.
- Explain voltage in a parallel circuit.
- ✤ Apply Kirchhoff's current law in a parallel circuit.
- Analyze power consumption, dissipation, and energy units in a parallel circuit.
- Analyze the effects of open circuit and short circuit conditions in parallel circuits.

Series-Parallel Circuits

- Design/build a series-parallel combination circuit and solve for its equivalent resistance.
- Apply Kirchhoff's current and voltage law to a series-parallel circuit.
- Analyze and troubleshoot DC combination/complex circuits.
- Use network theorem to the solutions of series-parallel circuits.
- ✤ Measure and calculate maximum power transfer.

Alternating Current

- ✤ Calculate the period and frequency of the waveform.
- ◆ Determine the peak-to-peak, average and RMS values of a sinewave.
- ✤ Identify various waveforms (sine wave, square wave, triangle wave, sawtooth wave).

Oscilloscope

- Describe the basic sections of an oscilloscope.
- ✤ Measure voltage using an oscilloscope.
- ✤ Measure frequency using an oscilloscope.
- ✤ Measure phase relationships using an oscilloscope.

Inductance

- ✤ Calculate the value of the inductor based on physical properties.
- Calculate and measure the total inductance of inductors connected in series or parallel circuits.
- ✤ Calculate and measure RL time constant.

Inductive Reactance

- ✤ Measure and calculate the effect of inductive reactance on current.
- ✤ Measure and calculate the effect of change in frequency on current.
- Identify the phase (lead-lag) relationship between current and applied voltage in a series RL circuit.
- ✤ Calculate the total inductive reactance in series and parallel circuits.

Resistor Inductor (Rl) Circuits in Alternating Current (AC)

- Use vectors to describe magnitude and direction of voltages.
- Use vectors in determining total current or voltage in series and parallel RL circuits.
- Measure and calculate the effect of a series resistive-inductive (RI) circuit on AC voltage and current.

Transformers

- ✤ Identify transformer windings, types, and usages.
- ✤ Calculate and measure voltage-turns ratio.
- Measure the effect of secondary load on primary current.
- * Troubleshoot transformers for open and short circuit conditions.

Capacitance

- ✤ Identify the effect of capacitance in AC and DC circuits.
- ✤ Calculate and measure for equivalent capacitance in series and parallel circuits.
- ✤ Calculate and measure RC time constants.

Capacitive Reactance

- Measure and calculate the effect of capacitive reactance on current.
- ✤ Measure and calculate the effect of change in frequency on circuit current.
- Identify phase (lead-lag) relationship between current and applied voltage in a series RC circuit.
- ◆ Calculate the total capacitive reactance in series and parallel circuits.

Resistance Capacitance (RC) Circuits

- ✤ Describe magnitude and direction of voltages using vectors.
- Determining total current or voltage in series and parallel RC circuits using vectors.
- Measure and calculate the effect of a series capacitive-resistive circuit on AC voltage and current.

Resistance Inductance Capacitance (RLC) Circuits

- ✤ Analyze and construct series RLC circuits.
- ✤ Analyze and construct parallel RLC circuits.

Resonance

- ♦ Calculate and measure the resonant frequency of a series RLC circuit.
- ✤ Calculate the Q of a series resonant circuit.
- ✤ Calculate and measure the resonant frequency of a parallel RLC circuit.
- ✤ Graph a response curve on a series RLC circuit.
- ✤ Graph a response curve on a parallel RLC circuit.

Soldering/De-soldering

- Demonstrate types and usage of soldering/de-soldering equipment.
- ✤ De-solder components from a circuit board.
- Solder components to a circuit board.
- Demonstrate soldering and de-soldering surface mount device (SMD) methods.

Diodes

- ✤ Test diodes and identify the cathode and anode.
- ♦ Analyze the voltage-current relationship of diodes by plotting the characteristic curve.
- Distinguish the correct bias for the operation of a LED.
- Compare the forward and reverse characteristics of a Zener diode.

Power Supplies

- ✤ Identify common rectifier circuits (half-wave and full wave).
- Construct and analyze the operation of a rectifier circuit.
- ✤ Investigate the cause and effect of power supply filtering, hum, and common filter types.
- Measure and calculate power supply ripple percentage and voltage regulation.
- ♦ Measure and identify the regulation properties of a shunt-type Zener regulator.
- Select switch mode power supply for different applications.

Transistor Characteristics

- ✤ Identify base, emitter, and collector terminals of PNP and NPN transistors.
- Locate the ratings, characteristics and operating parameters listed on a typical transistor specification/data sheet.
- Determine the type of transistor, PNP or NPN, and operating condition.
- ✤ Identify schematic symbols and uses for various types of transistors.
- ✤ Compare FET and BJT devices.

Small Signal Amplifiers

- Use biasing polarity of NPN or PNP transistors.
- ✤ Calculate and measure gain.
- Distinguish between basic amplifier configurations.

Operational Amplifiers

- Construct and analyze the phase shift between input and output of an inverting IC Op-Amp.
- Construct and analyze the phase shift between input and output of a non-inverting IC Op-Amp.

Basic Digital Electronics

- Convert between numbering systems (decimal, binary, octal and hexadecimal).
- ✤ Identify the operation and develop the truth tables for the seven basic logic gates.
- Connect combinational logic (multiplexer, demultiplexer, half-adder, full adder).
- Apply Boolean reduction and construct Karnaugh mapping for complex logic circuits.

Troubleshooting

- Utilize the order of the troubleshooting process to detect failures in electrical and electronic circuits.
- ✤ Analyze and troubleshoot failures in electrical and electronic circuits.

Electronic Communications

- ✤ Identify and explain the major components of a basic communication system.
- ✤ Measure and calculate maximum power transfer.

Motors

- Describe the characteristics of AC and DC motors.
- Describe characteristics of induction and Stepper motors.
- Explain the difference between brushed and brushless motors.
- Explain the use and function of a servomechanism.
- Explain and use motor controllers and speed controllers.

History of Electronics – Past, Present, and Future

✤ Examine the cause and effect of past, present, and future technologies.

Microcontrollers

Program and use a microcontroller to read an input and control an output (digital, analog, PWM, and display).

Pennsylvania Academic Standards

Mathematics

(Successful Completion of Algebra 1 Recommended)			
	Numbers and Operations		
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems		
2.1.HS.F.3	Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays. areas of sectors of circles.		
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.		
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.		
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.		
Measurement and Data, and Probability			
2.4.HS.B.5	Make inferences and justify conclusions based on sample surveys, experiments, and		
	observational studies.		
	Geometry		
2.3.HS.A.1	Use geometric figures and their properties to represent transformations in the plane.		
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles.		
2.3.HS.A.12	Explain volume formulas and use them to solve problems		
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects.		
2.3.HS.A.14	Apply geometric concepts to model and solve real world problems		
Algebraic Concepts			
2.2.HS.D.3	Extend the knowledge of arithmetic operations and apply to polynomials.		
2.2.HS.D.8	Apply inverse operations to solve equations or formulas for a given variable.		
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.		

	Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.		
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.		
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.		
	Craft & Structure		
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &		
	analyze the structure of the relationships among concepts in a text		
Integrate Knowledge & Ideas			
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a		
	table or chart)		
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9-10. I	Compare and contrast findings presented in a text to those from other sources, etc.		
3.5.11-12. G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem		
3.5.11-12. Н	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the		
	data when possible		
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding		
Range of Reading			
3.5.11-12.J	Comprehend technical texts independently and proficiently		

Writing

Text Types and Purpose			
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
	Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or		
	trying a new approach, focusing on addressing what is most significant for a specific		
	purpose and audience		
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or		
	shared writing products		
	Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,		
	following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range of Writing			
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of		
	tasks, purposes, and audiencesetc.		

Examples of Course Material

Example #1 Electromechanical Technology Course Material

Objective: Understand engineering symbology and schematics.

Examples of Electronic Schematic Diagrams

Electronic schematics use symbols for each component found in an electrical circuit, no matter how small. The schematics do not show placement or scale, merely function and flow. From this, the actual workings of a piece of electronic equipment can be determined. Figure 3 is an example of an electronic schematic diagram.



Figure 3 Example of an Electronic Schematic Diagram

A second type of electronic schematic diagram, the pictorial layout diagram, is actually not so much an electronic schematic as a pictorial of how the electronic circuit actually looks. These drawings show the actual layout of the components on the circuit board. This provides a two-dimensional drawing, usually looking down from the top, detailing the components in their location. Shown in Figure 4 is the schematic for a circuit and the same circuit drawn in pictorial or layout format for comparison. Normally the pictorial layout would be accompanied by a parts list. A multimeter is a measurement tool absolutely necessary in electronics. It combines three essential features: a voltmeter, ohmmeter, and ammeter, and in some cases continuity.



A multimeter allows you to understand what is going on in your circuits. Whenever something in your circuit isn't working, the multimeter will help you troubleshooting. Here's some situations in electronics projects that you'll find the multimeter useful:

- is the switch on?
- is this wire conducting the electricity or is it broken?
- how much current is flowing through this led?
- how much power do you have left on your batteries?

These and other questions can be answered with the help of a multimeter.

Textbook

Industrial Maintenance and Mechatronics ISBN 978-1-63563-427-3

Sample Textbook Reading:

"Alternating current (AC) changes direction at a periodic rate, as opposed to direct current (DC), which always flows in the same direction. AC includes reactive components – reactance and impedance- that are similar to resistance. Resistance applies in both AC and DC circuits, but reactance and impedance are important considerations when dealing with AC circuits only. Building on what you have already learned, this chapter introduces additional principles related to AC."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt short sleeve	ML	\$8.50	R
T-shirt long sleeve	ML	\$11.00	Ο
Long sleeve button down shirt	ML	\$23.00	Ο
Hooded sweatshirt	ML	\$18.50	R
Jeans	YC	\$20.00	R
Safety toe boots	YC	\$100.00	R
Texas Instruments calculator TI-36X Pro	YC	\$20.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Harrisburg A	rea Community College-Harrisburg	Credits
ELOC 153	Foundationals of Electricity	4.0
IMT 110	Fluid Power	4.0
ELEC 144	Semiconductor Principles and Applications	3.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to the Harrisburg Area Community College CIP 14.4201 Mechatronics, Associate of Applied Science Degree Program.

Delaware C	Credits	
TEL 200	Electro and Mechanical Systems	3.0
TEL 101	DC Analysis	4.0
TEL 102	AC Analysis	4.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to the Delaware County Community College CIP 15.0403 Electro-Mechanical Technologies, Certificate of Competency program.

Northampton County Area Community College Credits

EMEC 105	Introduction to Fluid Power	3.0
ELTC 101	Electrical Foundationals	3.0
EMEC 110	Mechanical Components	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to CIP 15.0403 Electromechanical Technology Automated Systems A.A.S. Associate Applied Science Degree.

Pittsburgh	Technical College	(formerly Pittsburgh Technical Institute)	Credits
ELT 115	Electricity	7.00)
ELT 125	Electronics 1	7.00)
====			
Total Credi	ts Awarded: 14.0		

Notes: Fourteen (14) credits are aligned to the Pittsburgh Technical College - Programs of Study, CIP 15.0303, Electronics Engineering Technology, Associate of Science (AS) Degree Program.

Lehigh Carbon Community College		Credits
BGT 110	Foundationals of Technology	3.0
ELE 165	A.C. Circuits	4.0
ELE 235	Programmable Controllers	2.0
ELE 120	D.C. Circuits	4.0

Total Credits Awarded: 13.0

Notes: Thirteen (13) credits are aligned to the Lehigh Carbon Community College program: CIP 47.0105 Electrical Technology, Associate of Applied Science (A.A.S.) Degree.

Lehigh Carbon Community College		Credits
BGT 240	Industrial Automation	3.0
MET 115	Computer-Aided Manufacturing	3.0
BGT 103	Fluid Power	3.0
MET 104	Manufacturing	3.0
MTD 201	Basic Mechanisms	4.0
====		

Total Credits Awarded: 16.0

Notes: Sixteen (16) credits are aligned to the following Lehigh Carbon Community College program: CIP 15.0805 Mechanical Technology, Associate in Applied Science (A.A.S.) Degree.

Lehigh Carbon Community College		Credits
BGT 110	Foundationals of Technology	3.0
BGT 240	Industrial Automation	3.0
ELE 165	A.C. Circuits	4.0
ELE 235	Programmable Controllers	2.0
ELE 120	D.C. Circuits	4.0

Total Credits Awarded: 16.0

Notes: Sixteen (16) credits are aligned to the Lehigh Carbon Community College program: CIP 15.0303 Electronics Technology, Associates of Applied Science (A.A.S.) Degree.

Lehigh Carb	Credits	
MET 104	Manufacturing	3.0
MTD 201	Basic Mechanisms	4.0
MET 101	Mechanical Print Reading	3.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the Lehigh Carbon Community College program: CIP 15.0805 Mechanical Engineering Technology Associate of Applied Science (A.A.S.) Degree.

Lehigh Carbon Community College		Credits
BGT 110	Foundationals of Technology	3.0
ELE 165	A.C. Circuits	4.0
ELE 235	Programmable Controllers	2.0
ELE 120	D.C. Circuits	4.0

Total Credits Awarded: 13.0

Notes: Thirteen (13) credits are aligned to the Lehigh Carbon Community College programs: CIP 47.0105 Electronics Certificate, and CIP 46.0302 Electrical Technology Certificate.

Lehigh Carbon Community College		Credits
ELE 165	A.C. Circuits	4.0
ELE 235	Programmable Controllers	2.0
ELE 120	D.C. Circuits	4.0
====		
Total Cradita	Awardade 100	

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the Lehigh Carbon Community College program: CIP 15.0303 Electrical Engineering Technology Associate of Applied Science (A.A.S.) Degree.

Lehigh Carbo	n Community College	Credits
BGT 110	Foundationals of Technology	3.0
BGT 240	Industrial Automation	3.0
BGT 103	Fluid Power	3.0
ELE 165	A.C. Circuits	4.0
ELE 120	D.C. Circuits	4.0
====		

Total Credits Awarded: 17.0

Notes: Seventeen (17) credits are aligned to the following Lehigh Carbon Community College Programs: CIP 15.0613 Industrial Automation Associate in Applied Science (A.A.S.) Degree and CIP 15.0613 Industrial Automation Certificate.

Lehigh Carbo	n Community College	Credits
BGT 110	Foundationals of Technology	3.0
ELE 165	A.C. Circuits	4.0
ELE 120	D.C. Circuits 4.00	
====		
Total Credits Awarded: 11.00		

Notes: Eleven (11) credits are aligned to the following Lehigh Carbon Community College program: CIP 15.1601 Nanofabrication Technology, Associate of Applied Science (A.A.S.) Degree.

Harrisburg Area Community College		Credits
ELOC 153	Foundational of Electricity	4.0
ELOC 157	Electrical Wiring	4.0
ELOC 172	National Electric Code	2.0
Total Credits	Awarded: 10.0	

Career Pathways

Engineering TechnicianIndustrial Automation TechnicianElectromechanical TechnicianIndustrial Engineering TechnicianIndustrial Maintenance Technician

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Electromechanical Technician	4%	\$33,650	\$46,960	\$53,620
Industrial Maintenance Technician	11%	\$35,210	\$47,760	\$54,040
Electrical and Electronics Engineering Technician	-1%	\$37,700	\$56,350	\$65,680
Industrial Engineering Technician	1%	\$38,480	\$61,130	\$72,460

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications	
OSHA Certification	Advanced Manufacturing
	Technician I (AM/IST)

Program Safety & Physical Considerations

- Ability of a high degree of self-discipline and focus needed for safety around moving equipment, hand tools, power tools, and other equipment found in the industry
- Due to the risk of electrical shock and fire hazards, using equipment requires self-discipline and strict adherence to rules to ensure safety of self and others
- Physical strength and stamina with the ability to lift 50 pounds overhead
- No fear of heights or working in closed spaces
- Ability to work in dust, dirt, and debris, loud and sometimes startling noises, ongoing background noise, moving people and equipment
- Ability to work in small spaces, interior or exterior work factors/environmental factors, scaffolding, and ladders
- Stamina to focus at workstation for long periods of time including standing or sitting
- Ability to work independently, read, and follow directions

Aptitudes for Success

- Eye/hand coordination
- Visual acuity
- Finger and manual dexterity
- Ability to discriminate between objects of similar size, shape, color, spatial relationships
- Arm/hand steadiness
- Fine motor skills
- Quick reaction time
- Multi-limb coordination

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Health Careers Technology

Health Careers Technology students who are interested in a career as a patient care technician (PCT) can complete the requirements to successfully receive a PCT certification. Students also earn certification in adult, child, and infant CPR and AED as well as first aid skills through the American Red Cross. Completion of this course will provide students with the opportunity for immediate employment. These opportunities include local nursing care facilities such as acute care hospitals, home health agencies, physician office, as well the ability to continue classes to become a certified nursing assistant in a long-term care facility upon graduation. This is a two-year course that includes lessons in patient care skills, anatomy and physiology, medical terminology and ethics, nutrition, environmental cleanliness, record keeping, and safety. Students interested in getting a head start on a Licensed Practical Nursing (LPN) career may qualify for advanced placement in our adult CTC LPN program. They will complete a portion of the curriculum for Level 1 of the LPN program, which allows them to enroll in the LPN program at a reduced cost. There is also a reduction in the number of hours required to attend Level 1.

Task List

Orientation and Safety

- ✤ Identify course objectives.
- Follow clinical skill area rules and regulations.
- ✤ Follow professional Uniform & Materials.
- Differentiate between hospitals, long-term care agencies, and home health agencies as to their history, purpose, and their expectations of the health care professional.
- ✤ Follow clinical experience guidelines and procedures.
- ✤ Follow OSHA standards and Centers for Disease Control (CDC) standard precautions.
- Follow the Right to Know law and the importance of maintaining Safety Data Sheets (SDS) for all chemicals.
- ◆ Identify and follow the chain of command in an organizational structure.
- ✤ Follow safety and emergency procedures.
- Report nonfunctioning equipment.

Legal and Ethical Issues

- Identify client's advanced directives.
- Uphold confidentiality of records and information as required by HIPAA.
- Promote the client's right to make personal choices to accommodate individual needs.
- Practice professional standards for health care professionals.
- ♦ Apply legal responsibilities of the health care professional.
- Discuss ethical dilemmas as related to the health care professional.

Communication

- ✤ Practice effective communication.
- ✤ Document objective and subjective observations using appropriate terms.
- Communicate in a professional manner, according to the client's stage of development and cultural background.
- ✤ Practice effective conflict management skills.

Infection Control

- ✤ Identify diseases, their mode of transmission, and use of transmission-based precautions.
- Follow hand hygiene protocols.
- Prepare a sterile field and apply sterile gloves.
- Follow standard precautions and infection control in the health care facility.
- Explain blood borne pathogens, sharps disposal, and biohazards.
- Follow correct isolation and safety techniques in care of infectious clients, including use of proper personal protective equipment (PPE).
- Perform basic cleaning and disinfecting of objects to prevent disease transmission.
- Explain how the immune system protects the body from infectious diseases.
- Don and doff non-sterile gloves.
- Sterilize contaminated objects.

Emergency Care and Disaster Preparedness

- Perform cardiopulmonary resuscitation (CPR) and first aid.
- Follow emergency response/crisis plan procedures in the facility.
- Identify potential fire hazards and safety procedures, including rescue, alarm, contain, and extinguish (RACE) and pull, aim, squeeze, and sweep (PASS).

Human Needs and Human Development

- ✤ Discuss human growth and development through the lifespan.
- ✤ Discuss cultural diversity.
- ✤ Identify psychosocial changes in the client.
- * Assist clients in expressing their personal faith and religious beliefs.
- Provide care for sensory deprived (blind or deaf) clients.

Body Mechanics, Moving, Lifting, and Positioning

- ♦ Assist the client with dangling, standing, and walking.
- ◆ Transfer client from bed to chair and wheelchair and from stretcher to bed.
- \clubsuit Turn and position a client both in bed and in a chair.
- Discuss safety hazards, including slips, trips, and the risks of falls.
- Practice transferring, positioning, and transporting of a client with special needs, including bariatric clients.
- ✤ Operate a mechanical lift in a laboratory setting.
- Discuss use of restraints and alternative measures of restraints.
- Utilize proper body mechanics.
- ✤ Demonstrate proper use of a gait belt.

Personal Care Skills

- Provide privacy when delivering personal care.
- ✤ Assist the client to dress and undress.
- Assist the client with bathing and personal grooming, including the principles of hand and foot care.
- ✤ Observe and report condition of the skin.
- ✤ Administer oral hygiene for the conscious/unconscious client.
- ✤ Identify and discuss treatment of decubitus ulcers (bed or pressure sores).

Urinary Elimination/Bowel Elimination

- ✤ Assist the client in toileting and bladder training.
- Provide catheter care.
- Provide perineal care.
- ✤ Apply briefs.
- Provide standard bedpan and fracture pan assistance.
- ✤ Document patients fecal and urinary output.

Nutrition and Hydration

- ✤ List principles of nutrition.
- ✤ Investigate therapeutic diets.
- ✤ Assist a client with eating meals.
- ✤ Feed a neurological or sensory deprived client.
- ✤ Measure and record intake and output.

Basic Clinical Skills

- ✤ Measure and record a client's oral, axillary, rectal, and electronic temperature.
- ♦ Measure and record a client's radial and apical pulse.
- ✤ Measure and record a client's respirations.
- ✤ Measure and record a client's blood pressure.
- ✤ Measure and record a client's pulse oximetry.
- ✤ Apply elastic stockings.
- ✤ Make an unoccupied bed.
- ✤ Make an occupied bed.
- ✤ Measure and record height and weight.
- Demonstrate proper handling of soiled linen.
- Provide for the client's safe, clean, and comfortable environment.
- Demonstrate care of a patient with a chest tube
- describe and or demonstrate removal of an I.V.
- Describe care of a patient with feeding tubes
- Describe reasons for performing bladder scans and demonstrate bladder scanning
- Demonstrate removal of a foley catheter
- Demonstrate EKG performance and identify varying arrhythmias
- Describe methods of blood collection and processing
- Demonstrate incontinence care
- Demonstrate ostomy care

Mental Health and Mental Illness

- ✤ Discuss the various types of mental health disorders.
- ♦ Use reality orientation techniques with the confused client.
- ♦ Use communication skills and techniques with easily agitated or frightened clients.
- ♦ Use skills/techniques with clients exhibiting repetitive behaviors.

Rehabilitation and Restorative Care

- ✤ Assist the client with ambulatory and transfer devices, e.g., cane, quad cane, walker, crutches, wheelchair.
- Perform range of motion exercises.
- * Recognize various assistive devices when assisting the client.

Death and Dying

- Discuss personal feelings and attitude about death.
- Explain how culture and religion influence a person's attitude toward death and the bereavement process.
- Discuss the goals of hospice care.
- Discuss the stages of dying.
- ✤ Report the common signs of a client's approaching death.
- Discuss the postmortem care of a client while maintaining the client's right to dignity and respect.

Medical Terminology

- Differentiate roots, prefixes, and suffixes in medical terms.
- Define abbreviations used in medical documents.
- ✤ Differentiate medical specialties.
- ✤ Use medical language.
- ♦ Use anatomical medical terms when discussing health and illness of the body.

Allied Health Skills

- ✤ Maintain client records.
- Complete manual filing skills and discuss use of electronic medical records (EMR).
- Position client for specific examinations as indicated by physician.
- Perform visual acuity test.
- Demonstrate methods of collection, special handling, and labeling of specimens.
- Demonstrate the principles of an electrocardiogram (EKG).
- Demonstrate blood glucose measurement using a glucometer, proper strips, and manufacturer glucose controls or standards.
- Identify the importance of maintaining the client record.
- Demonstrate the principles of admitting, discharging, and transferring a client.

Anatomy, Physiology, and Pathophysiology

- ✤ Identify the basic structure of the human body.
- ✤ Label body planes, directions, and cavities.
- ✤ Identify the organs and explain the function of the respiratory system.
- ✤ Identify disease processes of the respiratory system.
- ✤ Identify the organs and explain the function of the circulatory system.
- ✤ Identify disease processes of the circulatory system.
- ✤ Identify the organs and explain the function of the integumentary system.
- ✤ Identify disease processes of the integumentary system.
- ✤ Identify the organs and explain the function of the muscular system.
- ✤ Identify disease processes of the muscular system.
- ✤ Identify the organs and explain the function of the nervous system.
- ✤ Identify disease processes of the nervous system.
- ✤ Identify the organs and explain the function of the digestive system.
- ✤ Identify disease processes of the digestive system.
- ✤ Identify the organs and explain the function of the urinary system.
- ✤ Identify disease processes of the urinary system.
- ✤ Identify the organs and explain the function of the reproductive system.
- ✤ Identify the disease processes of the reproductive system.
- ◆ Identify the organs and explain the function of the lymphatic system.
- ✤ Identify disease processes of the lymphatic system.
- ✤ Identify the organs and explain the function of the endocrine system.
- ✤ Identify the disease processes of the endocrine system.
- ✤ Identify the organs and explain the function of the special senses.
- ✤ Identify the disease processes of the special senses.
- ✤ Identify the organs and explain the function of the skeletal system.
- ✤ Identify the disease processes of the skeletal system.

Mathematics in Allied Health

- ✤ Use mathematics applications in healthcare.
- ✤ Identify systems of measurements used in a clinical setting.
- ✤ Identify and convert between measurement systems, including the metric system.

21st Century Interpersonal Skills

- Develop relationships with a range of stakeholders, clients, co-workers, external counterparts) who may represent a wide variety of cultural diversities.
- Practice active listening skills to obtain and clarify information.
- Exhibit ethical characteristics and behaviors.
- Differentiate between productive and questionable ethical practices.
- Describe and recognize discrimination and harassment/bullying behaviors.
- Describe and recognize positive leadership qualities.
- Display effective communication skills, including eye contact, handshake, professional attire, and positive professional body language.
- ✤ Investigate stress management.
- Exhibit ethical behaviors in telehealth medicine.

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents.	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers	Yes
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
	Measurement and Data, and Probability	Foundational
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system.	Yes
	Geometry	Foundational
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
	Algebraic Concepts	Foundational
2.2.7.B.2	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations	Yes

	Key Ideas/Details		
3.5.11-12 A	Cite specific textual evidence, etc.		
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.		
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.		
	Craft & Structure		
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure & analyze the structure of the relationships among concepts in a text		
Integrate Knowledge & Ideas			
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a		
2501011			
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9 -10.I	Compare and contrast findings presented in a text to those from other sources, etc.		
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem		
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible		
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding		
Range of Reading			
3.5.11-12.J	Comprehend technical texts independently and proficiently		

Writing

Text Types and Purpose	
3.6.11-12.A	Write arguments focused on discipline specific content
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes, etc.
Production & Distribution of Writing	
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products
Research	
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research
Range of Writing	
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc.

Examples of Course Material

Example #1 Health Careers Technology Course Material

Medical Terminology

TRACE YOUR ROOTS. Define each combining form listed below; then build a term from it.

- 1. lingua
- 2. lobo
- 3. emesis
- 4. contra

TEST YOUR MEMORY

- 5. the meaning of trans
- 6. iasis can mean
- 7. the better meaning for cele is
- 8. in as a word terminal means
- 9. meaning for "ics"
- 10. the terminal for "organic compounds"
- 10. plural ending for words ending in"a"
- 11. now build a term meaning " pertaining to the muscle and its blood vessel"

BUILD A TERM. Use past and present elements to construct new medical terms.

- 12. a small vessel
- 13. narrowing of the mouth
- 14. looking at the eardrum
- 15. a condition of pain and redness
- 16. constriction of a passage
- 17. pertaining to muscles and blood vessels
- 18. white blood cell
- 19. a cell of muscle tissue
- 20. inflammation of the abdomen
- 21. planting across
- 22. slow heartbeat

REMEMBER THIS.

23. When are the suffixes -ics and -ology used
Anatomy and Physiology Study Guide

Chapter 6 Bones and Bone Tissue

206 Bones in the adult human body

Bone is filled with blood vessels, nerves, and living cells

Bone Function

- Shape give the body it's structure
- Support legs, pelvis, vertebrae support and hold the body upright
- Protection protect organs such as heart, lungs, brain, and spinal cord
- Movement movement of arms and legs and ability to breathe
- Electrolyte balance store and release calcium and phosphorus for chemical reactions
- Blood production bones encase bone marrow, a major site for blood cell formation
- Acid base balance absorbs and releases alkaline salts to keep pH stable

Classification of Bones

- Long bones
 - Femur of thigh and humerus of arm
 - long axis and are longer than they are wider
 - Work levers to move limbs
- Short bones -
 - Carpal bones of wrist and tarsal bones of ankle
 - Broad as they are long, resemble a cube
- Flat bones
 - o Skull, ribs, sternum (breastbone), scapulae (shoulder bone)
 - Thin, flat, curve shaped
 - Protect organs and provide a large area for attachment of muscles
- Irregular bones -
 - Vertebrae and facial bones
 - Clustered in groups
 - Various shapes and sizes
 - o Sesamoid bone kneecap; small bone embedded in tendons

Parts of a Long bone

- Epiphysis
 - head of each end of a long bone
 - o Attach tendons and ligaments
 - Made of spongy bone
- Diaphysis -
 - Central shaft of a bone
 - o Thick compact bone

Parts of a Long bone continued

- Articular cartilage -
 - Covers surface of epiphysis
 - o Eases movement of the bone within a joint
- Medullary cavity -
 - Hollow center of diaphysis
 - o Contains an epithelial membrane called endosteum
 - In children, cavity contains red bone marrow

145

Release 1.2

- In adults, cavity contains yellow marrow rich in fat
- Periosteum -
 - Covers the diaphysis
 - Contain fibers that anchor bones
 - Some fibers weave together with tendons attaching muscle to bone
 - Contain blood vessels
- Epiphyseal plate (growth plate) -
 - Separates the epiphysis from the diaphysis at each end of a long bone

Bone (Osseous) Tissue

- Osteology study of bone
- Type of connective tissue that contains cells, fibers, and extracellular material
- Bone cells include:
 - o Osteoblasts -
 - Help form bone by secreting substances that make up the bone's matrix or material
 - o Osteoclasts -
 - Dissolve unwanted or unhealthy bone
 - o Osteocytes -
 - Are mature osteoblasts
 - Help maintain bone density by regulating blood calcium and phosphate levels
- Bone Matrix -
 - Consists of collagen fibers and crystalline salts (calcium and phosphate)
 - Hard and calcified
 - Tensile strength resistant to stretching
 - Compressional strength calcium salts help bone resist squeezing forces
 - Torsional strength lack the ability to endure twisting
 - Most fractures occur from torsional force exerted on an arm or leg

Types of Bone Tissue

- Spongy (cancellous)-
 - Found in ends of long bones and middle of most other bones
 - Surrounded by compact bone
 - Consists of latticework trabeculae; adds strength without adding weight
 - Cavities between trabeculae are filled with red bone marrow which supplies spongy bone with blood and produces blood cells
- Compact -
 - \circ Dense and solid = strength
 - Forms shafts of long bones and outer surfaces of other bones
 - o Contain canals and passageways for nerves and blood vessels
 - Matrix is arranged in concentric, onion-like rings called **lamellae** around a central canal called **haversian** or **osteonic canal**.
 - Tiny gaps between rings of lamellae, called **lacunae**, contain osteocytes
 - o Microscopic passageways called canaliculi, connect the lamellae to each other
 - Transverse passageways, called **Volkmann's canals**, connect the haversian canals which transport blood and nutrients from outside of bone to the osteocytes inside bone.

Bone Marrow

- Type of soft tissue that fills the medullary cavity of long bones and spaces of spongy bone
- Two types:
 - Red bone marrow -
 - Produces red blood cells vertebrae, skull, pelvis and upper parts of the humerus and femur
 - In an adult; only found in the ribs, sternum,
 - Yellow bone marrow -
 - Rich in fat
 - Takes over once red bone marrow stops producing
 - Does not produce blood cells

Bone Development

Ossification - Creation of new bone

- Developing fetus contains cartilage and fibrous connective tissue and goes through ossification during gestation.
- Two types of ossification:
 - Intramembranous ossification -
 - Skull and facial bones start out as fibrous connective tissue
 - Fontanels or "soft spots"
 - Allow compression through the birth canal
 - Close by age 2
 - Endochondral ossification -
 - Evolve from cartilage
 - Begin in long bones after approximately 3 months gestation
- Bone growth
 - Lengthening
 - occurs at the epiphyseal plate, a layer of hyaline cartilage at ends of bone which contain chondrocytes. Chondrocytes elongate the bone
 - Between 16 25 yrs. Cartilage s replaced with spongy bone at epiphyseal plate, bone lengthening stops and becomes epiphyseal line
- Bone growth continued
 - Widening and thickening -
 - Continue throughout the lifespan

Bone Remodeling

- Resorption cells destroy old bone
- Ossification cells deposit new bone
- Osteoclasts remove matrix and reduce the mass of little-used bones. Heavily used bones, osteoblasts deposit new bone tissue on bone's surface, thickening the bone.
- Repair of minor trauma's
- Contributes to homeostasis by releasing calcium in the blood.
- Bone density
 - o Maintained by balance of osteoclasts and osteoblasts
 - Childhood creation of bone occurs faster than resorption
 - Early adulthood ossification and resorption are in balance
 - After age 40 bone loss increases while bone formation slows causing bones to weaken
- Factors that affect bone growth and maintenance
 - o Heredity
 - Nutrition calcium, phosphorus, and vitamins D, C, and A
 - Hormones growth hormone, thyroxine, parathyroid, insulin, and sex hormones estrogen and testosterone
 - o Exercise

Bone Fractures

- **Fracture** break in a bone
- **Pathologic fracture** break in a diseased or weakened bone
- Types of repair -
 - \circ Closed reduction manipulate the bone without surgery
 - Open reduction use of pins, screws, or plates to stabilize bone through surgery
- Types of fractures:
 - \circ Simple bone remains aligned and tissue is intact
 - Compound bone pierces the skin. Damages tissue, nerves, and blood. Increased risk of infection
 - Greenstick incomplete break, typically occurs in young children because bones are soft causing bone to splint
 - o Comminuted bone breaks into pieces, most often occurs in a car accident
 - Spiral fracture line spirals around the bone, resulting in twisting force. Creates jagged edges making it difficult to reposition

Fracture repair

- Typically takes 8-12 weeks for fracture to heal
- 4 steps in healing process:
 - Formation of clot (hematoma)
 - Collagen and fibrocartilage create a callus
 - Bone-forming cells form a callus around the fracture splinting the two ends together
 - Remodeling replaces the callus tissue with bone

Textbook

Foundational Concepts and Skills for the Patient Care Technician ISBN 978-0-323-43013-5

Sample Textbook Reading:

"Other trends that affect the economics of healthcare include the development of multisystem healthcare chains or networks that may include several hospitals, clinics, nursing homes, and pharmacies. The systems share expenses and generally achieve an overall reduction in operating expenses. Health maintenance organizations (HMOs) or group healthcare practices provide healthcare to members for a fixed, prepaid rate. The services include medical care, nursing care, diagnostic tests, hospitalization, and various inpatient and outpatient treatments."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
V-neck scrub women OR	ML	\$12.00	R
V-neck scrub print women	ML	\$15.00	R
Cargo pants women	ML	\$12.50	R
V-neck scrub men	ML	\$13.75	R
Utility pants men	ML	\$16.00	R
Jewel neck warm-up jacket	ML	\$17.50	R
Full zip fleece	ML	\$24.50	R
Criminal Background Check Clearance	PA State		R
Covid-19 Vaccine	PA State		R
Physical	Physician	\$30.00	R
2-step Mantoux (tb test)	Physician	\$30.00	R
Hepatitis b vaccine	Physician		О
Flu vaccine	Physician		R
Watch with second hand	YC	\$10.00	R
Shoes	YC	\$40.00	R
Personal Care Technician (end of school year)	PA State	\$109.00	Ο
HOSA: Future Health Professionals Dues		\$20.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Commonwealth Technical Institute		
BE 20	Medical Office Procedures	3.0
BE 23	Records Management	3.0
BE 13	Medical Terminology/Anatomy & Physiology I	3.0
====		
Total Crac	lite Awardad: 0.0	

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to Commonwealth Technical Institute's CIP 51.0706 Medical Office Assistant Associate in Specialized Business (ASB) program.

Career Pathways

Certified Nurse Aide Medical Secretary	ified Nurse AideOffice AssistantIlical SecretaryPersonal Care AssistantI		Home Health Aide Patient Care Technician	
Position	Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Certified Nurse Aide	12%	\$24,310	\$30,010	\$32,860
Medical Secretary	13%	\$26,460	\$34,920	\$39,150
Home Health Aide	26%	\$20,360	\$25,170	\$27,580
Office Assistant	4%	\$19,220	\$34,100	\$41,540

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
AED Essentials	OSHA Certification	
Bloodborne and Airborne	Patient Care Technician	
Pathogens		
Community First Aid and Safety		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Good personal hygiene
- Stamina for prolonged standing, bending, and stooping
- Ability to lift 50 pounds to waist level without restrictions
- Must be able to work independently and with teams
- Physical strength and trunk strength required to lift patients for transfer
- Must follow HIPPA with patient confidentiality
- Emotional and mental stability
- Empathy towards others
- Not disturbed by incidences such as bodily fluids, surgeries, injections, traumatic situations, and willingness to safely handle various bodily fluids and medical waste

Aptitudes for Success

- Manual and finger dexterity
- Eye/hand coordination
- Color discrimination
- Clerical perception
- Arm-hand steadiness
- Multi-limb coordination
- Ability to multitask
- Ability to use the various tools in the Healthcare industry

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Landscape Technology

In Landscape Technology, you will work with the tools, equipment, and techniques needed to design, install, and maintain beautiful landscapes for private residences as well as commercial properties. You will use hand tools and power equipment including rototillers, string trimmers, leaf blowers, and commercial mowers. You will also receive training on a state-of-the-art piece of excavation equipment, a skid-steer loader. You will practice building paver patios, walkways, retaining walls, and other hardscape projects. You will participate in volunteer work experience trips all around the county. Qualified students in Landscape Technology may also be chosen for the co-op program, an opportunity to work for area landscape contractors and earn while you learn. If you enjoy working outside year-round shaping and creating landscapes, then the landscape technology program will be a great fit and learning experience for you.

Task List

Safety

- Follow all general safety, laboratory safety and field-site safety practices and procedures in horticulture.
- Follow all OSHA safety standards for the horticulture services industry.
- Follow procedures written in the Safety Data Sheet (SDS) information system.
- ✤ Operate horticulture equipment.
- Select the proper protective clothing and equipment.

Safe and Proper Plant Health Care Practices

- Control weeds, insects, and plant diseases.
- Interpret horticulture product labels.
- Formulate quantities of horticultural products used in plant health care.
- Investigate the concept of plant health care, e.g., disease, nutrients.
- Distinguish the components of an integrated pest management program including the effects of chemicals and pesticides on the environment.
- Analyze various horticultural pests including their signs and symptoms.
- Prepare for PA Pesticide Certification.

Basic Botany

- Describe the process of photosynthesis, respiration, translocation, and transpiration.
- Compare plant cell structure, organization, and function.
- ✤ Compare plant structures and explain their functions.
- ✤ Analyze conditions essential for seed germination.
- Explain the environmental factors that affect the growth and development of a plant.
- ◆ Distinguish between sexual and asexual plant reproduction.
- ✤ Analyze plant nutrient requirements.
- ✤ Describe the nutrient cycles.
- ✤ Classify plants and use appropriate binomial taxonomic terminology.
- Describe techniques used to control environmental factors.
- Describe how weather and climate impact growing conditions and plant selection.

Horticulture Business Operations

- Develop a horticultural business plan.
- ✤ Analyze pricing and mark-up techniques.
- ✤ Research vendors to obtain product information.
- Perform appropriate customer and client relationship attributes.
- ✤ Analyze record keeping system to determine best management practices.

Soils and Fertilizer

- ✤ Compare soil/media characteristics.
- ✤ Analyze soil and/or plant nutrients.
- Describe soil management techniques.
- Conduct proper soil sampling techniques.
- * Test soil for pH, texture, macronutrients, and soluble salts.
- Interpret commercial soil test reports.
- Describe criteria for selecting fertilizers and soil amendments.
- ✤ Describe factors influencing fertilizer application.
- Compare current issues regarding plant and soil management that impacts agronomic and horticultural practices.
- ✤ Analyze microbial life and its effects on soil.

Sustainable Horticulture

- ✤ Investigate different methods of sustainable horticulture.
- Compare sustainable watering and fertilizing techniques to conventional techniques.
- Compare sustainable plant material selection to conventional plant material.
- ✤ Recycle horticultural waste.

Horticulture Technology

- Explain the uses of technologically altered plants.
- * Research advanced and emerging technologies in horticulture.
- ✤ Perform a point of sale (POS) transaction.

History and Current Status of Horticulture

- Describe major historical developments in the field of horticulture.
- Compare/contrast the effect human beings have had on various plant species.
- Determine how development of certain plant species has affected cultural development.
- Describe the role horticulture plays in the economy of the state and nation.
- Critique the impact of botanical gardens, public parks, and plants have on people in a society.

Plant Identification

- Outline the proper use of plant material in various segments of the horticulture industry.
- Determine the impact of environmental factors on plant materials.
- Analyze characteristics of various plant categories including woody and herbaceous plants in the horticulture industry.
- Identify 100 plants used in the horticulture industry by horticultural reference/botanical reference (70 to be deciduous, evergreen, annuals, perennials, and house plants)

Horticultural Careers and Opportunities

- Describe careers and working conditions in the horticulture industry.
- Perform job readiness skills needed in the horticulture industry.
- ✤ Research horticulture industry certifications.
- Explore postsecondary opportunities.

Horticultural Pathways

- ✤ Apply concepts of landscape, hardscape, or floral design.
- Create various horticulture designs.
- ✤ Calculate measurements, areas, and volumes of horticulture designs.
- ✤ Interpret landscape design, symbols, and abbreviations.
- ✤ Transplant various types of plant material.
- Prune various types of plant material.
- Describe the characteristics of lawn/turfgrass installation and maintenance.
- Describe the characteristics and features of various types of growing structures.
- Prepare plant material for marketing or sales.
- Recognize non-traditional growth and propagation of various plant materials. (Examples may include but are not limited to hydroponics, aquaponics, aeroponics, and tissue culture.)

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents.	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.3	Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays. areas of sectors of circles.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.HS.F.7	Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real- world and mathematical problems	Yes
2.1.6.E.2	Identify and choose appropriate processes to compute fluently with multidigit numbers	Yes
2.1.5.C.1	Use the understanding of equivalency to add and subtract fractions	Yes
2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals	Yes

	Measurement and Data, and Probability	Foundational		
2.4.HS.B.1	Summarize, represent, and interpret data on a single count or measurement variable.			
2.4.HS.B.2	Summarize, represent, and interpret data on two categorical and quantitative variables.			
2.4.HS.B.3	Analyze linear models to make interpretations based on the data.			
2.4.HS.B.4	Recognize and evaluate random processes underlying statistical experiments.			
2.4.HS.B.5	Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.			
2.4.HS.B.6	Use the concepts of independence and conditional probability to interpret data.			
2.4.HS.B.7	Apply the rules of probability to compute probabilities of compound events in a uniform probability model.			
Geometry				
2.3.8.A.3	Understand and apply the Pythagorean Theorem to solve problems	Yes		
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	Yes		
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes		
2.3.6.A.1	Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume	Yes		
	Algebraic Concepts			
2.2.5.A.1	Interpret and evaluate numerical expressions using order of operations	Yes		

Reading

	Key Ideas/Details			
3.5.11-12.A	Cite specific textual evidence, etc.			
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.			
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.			
	Craft & Structure			
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words			
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.			
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &			
	analyze the structure of the relationships among concepts in a text			
Integrate Knowledge & Ideas				
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a			
	table or chart)			
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical			
	problem			
3.5.9-10.I	Compare and contrast findings presented in a text to those from other sources, etc.			
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto			
solve a problem				
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the			
	data when possible			
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding			
Range of Reading				
3.5.11-12.J	Comprehend technical texts independently and proficiently			

Writing

	Text Types and Purpose			
3.6.11-12.A	Write arguments focused on discipline specific content			
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes, etc.			
	Production & Distribution of Writing			
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience			
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience			
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products			
	Research			
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem			
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation			
3.6.11-12.H	5.11-12.H Draw evidence from informational texts to support analysis, reflection, and research			
Range of Writing				
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc.			

Examples of Course Material

Example #1 Landscape Course Material

Major Topic: Safety Competency: POS 104: Operate horticulture equipment.

Performance Standards:

1. Student will identify power equipment use and safety with 100% accuracy on a written test.

2. Student will demonstrate the steps of the pre-start safety check per the criteria on the Performance Evaluation sheet with 80% accuracy.

3. Student will demonstrate how to operate a piece of horticulture equipment per the criteria on the Performance Evaluation sheet with 80% accuracy.

Competency Procedures:

1. Student will recall the steps of the pre-start safety check for power equipment.

2. Student will understand how to read/locate use and safety information in an equipment operator's manual.

3. Student will demonstrate how to safely operate a piece of horticulture equipment.

Learning Steps:

1. Participate in a teacher-led discussion/demonstration on personal protection equipment; usage and how to wear the equipment to maintain proper protection.

2. View a video on equipment use and safety procedures and complete the video quiz as a class assignment.

3. Given a copy of an operator's manual, the student will participate in a teacher-led discussion on how to use a manual to locate key information regarding equipment use and safety.

4. Using the operator's manuals supplied by the instructor, the student will define power equipment terminology.

5. View a demonstration identifying the steps of the pre-start safety check on a piece of power equipment.

6. View a demonstration on how to properly operate a piece of horticulture equipment.

7. Student will practice operating a piece of horticulture equipment under the observation of the instructor.

RUBRIC

<u>Performance Evaluation – Operate horticulture equipment.</u> <u>POS-104</u>

Criteria:2 points for each stepPASSFAIL

1.	Performed pre-start safety check prior to operation		
2.	Wore PPE- (safety glasses, ear muffs, boots)		
3.	Started the equipment correctly		
4.	Operated equipment in a safe manner		
5.	Manipulated/handled the equipment confidently		
6.	Shut-off the equipment correctly		
7.	Equipment clean and free of debris/grass etc.		
	POINTS EARNED = TASK GRADE =%		
	0 1 2 3 4 5 6 7 8 9 10		

Textbook

This program uses MyCAERT agriculture software.

Sample Textbook Reading:

"The horticulture industry is the combination of scientific, technological, and production activities that ensure the satisfaction of the consumer. The horticulture industry can be divided into three areas: pomology, olericulture, and ornamental horticulture. Each area is unique and includes many career opportunities."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt	ML	\$11.50	R
Hooded sweatshirt	ML	\$21.50	R
Work pants or jeans - trim fit	YC	\$20.00	R
Leather work boots 6"- 8" to cover and support ankle	YC	\$100.00	R
Tape measure 25' without fractions	YC	\$15.00	0
Basic calculator	YC	\$15.00	0
Binder 3" 3-ring	YC	\$5.00	R
Outerwear for various weather conditions			R

Articulation/College Credit

You may receive credit for:

Pennsylvania Highlands Community College

BUS 110 - Introduction to Business 3.00 AGR 105 - Botany Lecture 3.00 AGR 115 - Botany Lab 1.00 AGR 211 - Horticulture Lab 1.00 AGR 210 - Horticulture Lecture 3.00 =====

Total Credits Awarded: 11.00

Notes: Eleven (11) credits aligned to 01.0000 Sustainable: Hydroponics, agriculture, and rural entrepreneurship Certificate and 01.0601 Sustainable Agriculture AAS

Career Pathways

Lawn and garden center specialist Landscape maintenance	Lawn care Nursery/greenhouse operator		Landscape architect Groundskeeper	
Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Groundskeeper	6%	\$20,840	\$29,400	\$33,680
Landscape Maintenance	-1%	\$42,090	\$55,790	\$62,640
Nursery/Greenhouse Laborer	-1%	\$17,760	\$27,080	\$31,370
Landscape Architect	4%	\$43,010	\$67,020	\$79,020

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Pennsylvania Certified	
	Horticulturist Associate	
Pennsylvania Pesticide		
Applicator Certification		

Program Safety & Physical Considerations

- Learning and work environment includes use of various chemical, plant, and landscape materials where students will be exposed to smells, dust, dirt and debris, loud and sometimes startling noises, ongoing background noises, moving people and equipment, working inside and outside/ environmental factors
- Stamina and strength needed for lifting and prolonged standing, stooping, and bending
- Ability to lift 50 pounds overhead
- Ability to work in all weather conditions with no fear of heights or working in closed spaces
- Self-discipline a must due to safety issues

Aptitudes for Success

- Able to distinguish between colors
- Eye/hand/foot coordination
- Finger and manual dexterity
- Spatial Acuity
- Arm-hand steadiness
- Fine motor skills
- Ability to discriminate between objects of similar size, shape, and color
- Form perception
- Mechanical aptitude
- Multi-limb coordination while standing, sitting, or lying down

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Law Enforcement & Security

Law Enforcement and Security students develop investigation skills essential to careers in Criminal Justice (Police, Courts, and Corrections) and the ever-growing Private Security fields. They also have the opportunity to experience parts of the Criminal Justice System through job shadowing experiences in the real world. The program emphasizes curriculum that covers topics such as: criminal procedures, crime photography, criminal investigations, criminal law, Bill of Rights/US Constitution, vehicle law, private security, report writing, and first aid/CPR. Career opportunities range from private security to local, state, and federal officers and federal police officers. Students who successfully complete the Pennsylvania Department of Education approved program and the NOCTI exam (end of the year assessment) on the criminal justice system may receive college credits from HACC and other area colleges.

Task List

Crime Scene Management

- ✤ Collect hair, blood, and other items for evidence.
- Collect, preserve, and catalog physical evidence while maintaining a chain of custody.
- ✤ Secure a crime scene with officer safety in mind.
- ✤ Lift and preserve fingerprints for analysis.
- ✤ Make a casting of an impression.
- ✤ Make a digital composite sketch of a suspect.
- ✤ Identify DNA and how it is applied to the crime scene.
- Demonstrate processing evidence with different materials, e.g., luminal, ninhydrin, powder, cyanoacrylate.
- ✤ Measure and sketch a crime scene.
- Explain Locard's principle of transference of trace materials at a crime scene.

Use of Force

- Define the progression of the use of force in a continuum and the force response matrix.
- Demonstrate procedures for handcuffing.
- Demonstrate procedures for less lethal weapons.
- Demonstrate procedures for lethal weapons.
- Demonstrate de-escalation techniques.
- Perform basic moves of unarmed self-defense.
- ✤ Perform basic moves of tactical self-defense.

Criminal Law and Procedures

- Describe the history of drug abuse and anti-drug legislation in America.
- ✤ Identify different types of controlled substances and their schedules.
- Identify high-tech crime, including cyber stalking, identity theft, hacking, cyber-bullying, child pornography.
- Explain criminal procedure, e.g., reasonable suspicion, probable cause, investigatory detention, search incident to arrest.
- Describe the authority, jurisdiction, structure and purpose of the PA Crimes Code and PA Vehicle Code.
- Explain Constitutional Law.
- ✤ Define crimes against persons and property.
 - Explain applicable constitutional amendments for law enforcement, e.g., 1st, 2nd, 4th, 5th, 6th, 8th, and 14th.

Health Issues

- ✤ Identify hazardous materials and Safety Data Sheets (SDS).
- ◆ Perform the steps for patient assessment, e.g., trauma/medical.
- ◆ Perform emergency and non-emergency moves for transport.
- Perform cardio-pulmonary resuscitation (CPR) on an infant, a child, and an adult.
- Demonstrate the steps to rescue a choking victim.
- ✤ List signs and symptoms of shock and its treatment.
- Apply direct pressure as a method of emergency medical care of external bleeding.
- ♦ Describe the use of a tourniquet for emergency medical care of external bleeding.
- ✤ Apply a splint.
- Use the chin lift to open the airway of a victim with suspected spinal cord injury.
- Describe the indicators of suspected child abuse or neglect.
- Describe the special circumstances for the operating of an emergency vehicle.
- Describe the criteria that makes an incident a multiple-casualty situation.
- ♦ Describe the content of a Mass Casualty Incident Plan.
- Perform health and wellness activities that should be followed by police officers.
- ✤ Describe physical and mental stress and how it occurs.
- List and explain ways to reduce physical and mental stress.
- Define implementation of personal protective equipment (PPE) when dealing with exposure to communicable diseases.
- Describe and practice the physical fitness standards in accordance with Municipal Police Officers' Education and Training Commission (MPOETC) standards.
- ✤ Define OSHA.
- ✤ Identify communicable disease and its impact on law enforcement.
- ◆ Demonstrate the administration of Narcan and the recovery position.

Police Concepts and Skills

- Explain the historical development of American law enforcement, e.g., colonial, urban, southern, and frontier.
- ✤ Describe police organization and administration.
- Explain corruption and integrity in law enforcement.
- Describe the code of ethics in law enforcement as indicated by the MPOETC.
- Define the legal aspects of policing and the potential for abuse of police power.
- Perform a search of a motor vehicle.
- Explain the use of intelligence gathering in police work.
- ♦ Describe procedures that police officers use to interview suspects, witnesses, and victims.
- Explain the triggers for the invocation of Miranda rights and recite the Miranda warnings.
- Describe how informants and confidential informants assist police.
- Explain the link between substance abuse and criminal activity.
- Explain the role of evolving technology in law enforcement, e.g., drones, body cameras, thermal imaging, GPS, plate scanner, and others.
- Prepare an affidavit of probable cause and a criminal complaint.
- Prepare an affidavit of probable cause for a search warrant and arrest warrant.
- ✤ Identify the characteristics of a fingerprint.
- ✤ Take a set of classifiable fingerprints on a standard FBI card.
- Use Pennsylvania vehicle codes to determine appropriate traffic infractions.
- Simulate how to stop and arrest a driver who is suspected of driving under the influence of alcohol and/or a controlled substance.
- ✤ Administer a standard field sobriety test (SFST).
- Perform techniques for vehicle stops.
- Prepare and issue a traffic warning and a traffic citation.
- Complete a simulated crash report.
- ✤ Use proper techniques for traffic control.
- Use effective techniques for handling domestic disputes.
- Define community policing and crime prevention, e.g., neighborhood watch, DARE.
- Prepare and issue a non-traffic summary offense.
- Search and pat down a suspect.
- ✤ Book a defendant.
- Research opportunities for postsecondary education and employment in criminal justice and police science.
- Search an area for evidence of criminal and/or non-criminal activity.
- ✤ Plan a response to an active shooter situation.
- Explain multiculturalism, diversity, and racial profiling.

Corrections Concepts and Skills

- Explain corruption and integrity in corrections.
- Explain probation and the conditions for probation.
- ✤ Explain parole and the conditions for parole.
- ◆ Describe intermediate sanctions, e.g., home confinement and electronic monitoring.
- Describe the history of corrections.
- Describe security levels, classifications, and the use of a security matrix in prisons.
- Explain how jails are similar and different from prisons.
- Describe prison life for male and female inmates.
- Describe disciplinary procedures in jails and prisons, including solitary confinement.
- Explain what causes prison riots and define the stages in riots and riot control.
- Describe the role of private corrections today.
- ◆ Prepare prisoners for transport, e.g., belts, shackles, black box, shock belts.

Court Systems

- Explain the individual rights of citizens and due process requirements.
- Explain search and seizure and the exclusionary rule.
- ✤ Describe pre-trial activities.
- ✤ Describe sentencing procedures.
- ✤ Explain civil law.
- Explain administrative law.
- Explain all applicable case law, e.g., Terry v. Ohio, Tennessee v. Garner, Miranda v.
 Arizona, Mapp v. Ohio, Gagnon v. Scarpelli, Gideon v. Wainwright, Chimel v. California.
- Explain procedural law.
- Define categories of crime, e.g., murders, felonies, misdemeanors, summaries.
- Explain various defenses to criminal charges, e.g., alibi, justifications, excuses, procedural defenses, innovative defenses, and M'Naghten Rule.
- Describe the roles and responsibilities of the courtroom personnel.
- Explain grand jury proceedings and indictments.
- Describe the steps of a preliminary hearing.
- ✤ Describe the steps of an arraignment and plea.
- ✤ Describe the steps of a criminal trial process.
- ✤ Describe the steps of a civil trial process.
- Explain the history of the juvenile justice system in America, e.g., in re Gault.
- Describe categories of children in today's juvenile justice system.
- * Explain the difference between the juvenile justice system and the adult system of justice.
- Research the modern theory of child development.
- Describe police officer testimony during court proceedings.

Communications

- Describe a police officer's role and responsibilities when using wireless devices.
- ✤ Use proper radio communication terminology.
- ◆ Use the international phonetic alphabet to communicate.
- Describe the communication skills used to interact with stakeholders and active listeners, e.g., death notifications, National Incident Management System (NIMS).
- Provide proper directions to a scene.
- Use a personal computer, peripheral equipment, and accessories.
- ✤ Write an effective police report.

Security: National, International, and Local

- Describe the responsibilities of homeland security.
- Explain how the Patriot Act has impacted homeland security.
- Research domestic and international terrorism as it has evolved in the 21st century, e.g., ALICE training.
- Formulate a response plan for a terroristic incident.

Special Populations

- Describe procedures for voluntary and involuntary commitments for mental health issues.
- ✤ Identify signs of substance abuse and demonstrate how to handle subjects.
- Handle emotionally disturbed persons (EDP) or persons experiencing excited delirium or diabetic shock.

Private Security: National, International, and Local

- Describe the growth and development of private security.
- ✤ Handle incidents of retail theft and loss prevention.
- ✤ Conduct a security survey.
- Describe the duties of a private security officer, e.g., patrol techniques, report writing, access control, video and alarm, monitoring.
- ✤ Create an incident report.
- ♦ Explain the legal aspects of private policing as it relates to ACT 235.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents.	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.3	Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays. areas of sectors of circles.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.HS.F.7	Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
2.1.6.E.2	Identify and choose appropriate processes to compute fluently with multidigit numbers	Yes
2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals	Yes
	Measurement and Data, and Probability	Foundational
2.4.HS.B. 1	Summarize, represent, and interpret data on a single count or measurement variable.	
2.4.HS.B. 2	Summarize, represent, and interpret data on two categorical and quantitative variables.	
2.4.HS.B. 3	Analyze linear models to make interpretations based on the data.	
2.4.HS.B. 4	Recognize and evaluate random processes underlying statistical experiments.	
2.4.HS.B. 5	Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.	
2.4.HS.B. 6	Use the concepts of independence and conditional probability to interpret data.	
2.4.HS.B. 7	Apply the rules of probability to compute probabilities of compound events in a uniform probability model.	

Reading

Key Ideas/Details		
3.5.11-12A	Cite specific textual evidence, etc.	
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.	
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.	
	Craft & Structure	
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure &	
	analyze the structure of the relationships among concepts in a text	
Integrate Knowledge & Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)	
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.	
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes, etc.	
	Production & Distribution of Writing	
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or	
	shared writing products	
	Research	
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing		
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks,	
	purposes, and audiencesetc.	

Examples of Course Material

Example #1 Law Enforcement and Security Course Material

STUDY GUIDE

- 1. List the amendments we consider the Bill of Rights. Next to each amendment describe the right it protects.
- 2. Define the following:
 - a. Double jeopardy -
 - b. Probable cause -
 - c. Reasonable suspicion –
 - d. Exclusionary rule -
 - e. Circumstantial evidence -
 - f. Fruit of the poisonous tree -
 - g. Search incident to arrest -
 - h. Behavioral conditioning -
 - i. Psychopath -
 - j. Sociopath -
 - k. Deviance -
 - l. Schizophrenia -
 - m. Psychological profiling -
 - n. Broken windows theory -
 - o. Social learning theory -
 - p. Dependent child –
 - q. Adjudicated delinquent -
 - r. Diversion -
- 3. Identify the search patterns. When would you use each?
- 4. Identify the 7 steps of a crime scene and put them in the correct order.
- 5. Know all letters using the phonetic alphabet
- 6. Know the key points of the following cases:
 - a. Mapp v. Ohio
 - b. Terry v. Ohio
 - c. Chimel v. California
 - d. Silverthorne Lumber Co. v. US
 - e. Sampson v. California
 - f. Roper v. Simmons
 - g. Graham v. Florida
 - h. Miller v. Alabama

Example #2 Law Enforcement and Security Course Material

Use of Force Project

You will be assigned a case that you will research and complete a PowerPoint presentation to be presented in class. Make sure to answer the following questions on separate slides for full credit:

1. Fully describe the incident in this case. What happened, who was involved, what were the circumstances behind the original incident, and what happened to the suspect in this case.

2. What was the police response? Here you will identify the different levels of force used in the incident. Make sure you provide clear examples on how it was demonstrated.

3. What happened following the incident? Were police held accountable? What was the outcome?

4. Do you believe that the officers acted with objective reasonableness in the incident? Why or why not? This is your chance to argue for or against the police actions, so your argument must be convincing.

Textbook

Criminal Justice Today ISBN 978-0-13-414561

<u>Criminal Investigation</u> ISBN 978-1-4496-5054-4

Sample Textbook Reading:

"Rubber fingerprint lifters may also be used to recover fingerprints. They are useful for removing prints from surfaces that are curved or difficult to photograph. The rubber lifter usually consists of a thin black or white flexible material coated on one side with an adhesive. To take a latent print, the officer must first apply print powder to the area. Then, after removing the protective covering from the adhesive, the officer places the adhesive side of the lifter against the print and slowly pulls it away. The covering is replaced on the adhesive, protecting the lifted print."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Law Enforcement - Rutter			
Item	Vendor	Cost	R or O
T-shirt	ML	\$10.00	R
Polo	ML	\$15.00	Ο
Hooded sweatshirt	ML	\$20.00	Ο
Crewneck sweatshirt	ML	\$14.00	Ο
Pants - casual	YC	\$20.00	R
Boots or sneakers appropriate for indoor or outdoor use	YC	\$50.00	R

(Continued)

Law Enforcement – Mays/Lagonis			
Item	Vendor	Cost	R or O
T-shirt short sleeve	ML	\$12.50	R
T-shirt long sleeve	ML	\$14.50	Ο
Hooded sweatshirt	ML	\$18.50	Ο
Crewneck sweatshirt	ML	\$12.50	Ο
Pants - casual khaki or black	YC	\$20.00	R
Boots or sneakers appropriate for indoor or outdoor use	YC	\$50.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Westmoreland County Community College		Credits
CRJ 162	Police Administration I	3.0
CRJ 155	Introduction to Criminal Justice	3.0
CRJ 163	Criminal Procedure	3.0

Total Credits Awarded: 9.0

Notes: Nine (09) credits are aligned to Westmoreland County Community College Programs of Study CIP 43.0104 Criminal Justice, Associate of Applied Science (AAS) Degree Program.

Community	College of Philadelphia	Credits
JUS 261	Crim Evid Prcd	3.0
JUS 101	Survey of Criminal Justice	3.0
JUS 235	Amer Correctional Inst	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Community College of Philadelphia POS: CIP 43.0199 Criminal Justice, Associate in Applied in Science (A.A.S.) Degree.

Community College of Beaver County		Credits
CRIM 125	Corrections	3.0
CRIM 100	Introduction to Criminal Justice	3.0
CRIM 133	Domestic Terrorism & Home Security	3.0

Total Credits Awarded: 9.0

Notes: Nine credits are aligned to the following Community College of Beaver County POS: CIP 43.0107 Criminal Justice , Associate in Applied Science (A.A.S) Degree.

Harcum Co	llege	Credits
CJ 101	Introduction to Criminal Justice	3.0
CJ 195	Dom Vio & Just System	3.0
CJ 240	Critical Issues in Criminal Justice	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Harcum College POS: CIP 43.0103 Criminal Justice, Associate of Science (A.S.) Degree.

Lackawanna College		Credits
CJS 105	Intro to Criminal Justice	3.0
CJS 110	Correctional Community	3.0
CJS 120	Criminal Law	3.0
CJS 125	Intro Search & Seizure	3.0
CJS 205	Police Operations	3.0

Total Credits Awarded: 15.0

Notes: Fifteen (15) credits are aligned to the following Lackawanna College POS: CIP 43.0107 Criminal Justice, Associate in Science (A.S.) Degree.

Pennsylvania Highlands Community College		Credits
CRJ 110	Intro to Criminal Justice	3.0
CRJ 150	Juvenile Justice	3.0
CRJ 215	Criminal Law and Procedure	3.0

CRJ 235	Criminal Investigation and Policing	3.0
CRJ 105	Institutional and Community Correct	3.0
CRJ 120	Crim Just Report Writing and Interv	3.0
CRJ 175	Constitutional Law	3.00

Total Credits Awarded: 21.0

Notes: Twenty-one (21) credits aligned to 43.0102 Criminal Justice - AAS degree.

Law Enforce	Credits	
CJ 1009	Intro to Criminal Justice	3.0
====		

Total Credits Awarded: 3.0

Career Pathways

Local Police Officer	State Police Officer	Federal Police Officer
Attorney	Paralegal	Sheriff Deputy
Corrections Officer	Parole Officer	Private Investigator
Security Officer	Military Police Officer	Military Security Officer
Military Criminal Investigator	-	

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Correctional Officer	1%	\$36,930	\$51,140	\$58,240
Paralegal	9%	\$34,280	\$54,080	\$63,970
Police Officer	0%	\$40,170	\$66,460	\$79,610
Private Investigator	2%	\$30,540	\$44,430	\$51,380

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Hazardous Materials Response-	
	Awareness	
OCAT - Oleoresin Capsicum		
Aerosol Training		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and profession
- Must have strength and physical stamina and have the ability to participate in physical training
- Must have trunk strength (ability to use abdominal and lower back to support part of the body repeatedly or continuously over time without fatigue)
- Ability to diagnose the source of a problem quickly and accurately and apply problem solving skills
- Requires long periods of intense concentration
- Must have good conflict resolution skills and an even temperament (not prone to aggressive behavior)
- Ability to work under pressure/in adverse conditions/ within time constraints
- Clean criminal background check
- Good physical health and neat appearance
- Ability to lift 50 pounds

Aptitudes for Success

- Fine motor skills
- Finger and manual dexterity
- Motor/hand/eye/foot coordination
- Multi-level coordination while standing, sitting, or lying down
- Clerical perception
- Visual acuity
- Ability to discriminate between objects of similar size, shape, and color
- Self-control
- Depth perception

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Masonry

Masonry students work on construction projects that include concrete block, brick, and other similar materials. Most of the training is within the school; however, community service projects add additional learning opportunities. Students develop a highly skilled craft which includes the ability to lay a multitude of contemporary concrete building products as well as traditional brick. Additional topics include blueprint reading, site layout, estimating, building codes, and the use of hand and power tools. Career opportunities range from a mason's helper to block layer, bricklayer, estimator, or construction supervisor and may begin in high school with a Co-op position providing job experience and a salary. The 500 members in the Lebanon County Builders Association as well as the Pennsylvania Concrete Masonry Association sponsor this program, provide student scholarships, and employ graduates. A student who successfully completes this program may earn three college credits from HACC.

Task List

Safety Practices

- ✤ Use personal protection equipment.
- ✤ Use and care for masonry hand tools.
- ✤ Use and care for a mortar mixer.
- Erect and dismantle steel tubular scaffolding within OSHA guidelines.
- ✤ Place material and stock scaffolding properly.
- ✤ Interpret safety data sheets (SDS) information.

Blueprints

- ✤ Identify types of blueprint plans.
- Read and Interpret blueprint plans.

Masonry Hand Tools

- ✤ Read and use a modular and spacing ruler.
- ✤ Mark and use a masonry guide or corner pole.
- Secure mason's line to line blocks, pins, and line stretchers.
- Set a trig properly.
- Use a hammer and chisel to cut block and brick.
- ✤ Use masonry jointers to finish mortar joints.
- ✤ Identify the various cutting blades for a masonry saw.

Building Site

- ✤ Lay a building out using a transit.
- Square a building using the 3-4-5 Pythagorean Theorem.

Power Tools

- ✤ Operate a portable masonry gas cut-off saw.
- Operate a mortar mixer.
- ✤ Operate a stationary or portable masonry saw.
- ✤ Operate a hammer drill.

Masonry Fasteners

• Use different types of masonry fasteners and reinforcements.

Bricklaying Techniques

- Identify brick types and bonds.
- ✤ Lay out proper dry bond of a brick wall.
- ✤ Lay brick to the line.
- ✤ Install window and door openings (jambs) in brick walls.
- ✤ Install flashing for windows and doors.
- ✤ Install weep holes/vents.
- ✤ Install a soldier course.
- ✤ Lay a brick and block composite wall.
- Build brick columns.
- ✤ Construct a brick veneer wall.
- ✤ Discuss a brick cavity wall.
- ✤ Corbel a brick wall.
- ✤ Clean a brick wall.
- ✤ Lay a course of rowlocks.
- ✤ Lay a course of headers.
- ✤ Construct a brick jamb lead.
- ✤ Construct a 4" brick inside corner.
- Construct a 4" brick outside corner.
- Perform trowel techniques for brick.

Block Laying Techniques

- Discuss various block types and bonds.
- ✤ Lay block to the line.
- Construct a brick ledge using various size block.
- ✤ Discuss a control joint.
- ✤ Install window and door openings in block walls.
- ✤ Set lintels.
- ✤ Construct block piers.
- ✤ Clean a block wall.
- ✤ Parget a block wall.
- Construct a jamb block lead.
- Construct a corner block lead.
- Perform trowel techniques for block.

Mortar

- Describe various types of mortars and their characteristics.
- ✤ Discuss and mix mortar by hand.
- ✤ Temper mortar.

Chimneys and Fireplaces

- ✤ Identify parts of a chimney and fireplace.
- ✤ Discuss fireplace construction.
- Construct a brick chimney.
- ✤ Construct a block chimney.
- ✤ Discuss flashing methods where the chimney meets the roof.

Arch Construction

- Discuss arch terminology.
- ✤ Identify types of arches.
- ✤ Construct an arch.

Masonry Estimation

- Estimate mortar, number of units, and material costs for brick work.
- Estimate mortar, number of units, and material costs for block work.
- ✤ Estimate the area, volume, and cost of concrete.

Mathematics

Numbers and Operations F		
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.3	Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers	Yes
2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals	Yes
	Geometry	Foundational
2.3.HS.A.1	Use geometric figures and their properties to represent transformations in the plane.	
2.3.HS.A.2	Apply rigid transformations to determine and explain congruence	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures.	
2.3.HS.A.4	Apply the concept of congruence to create geometric constructions.	
2.3.HS.A.5	Create justifications based on transformations to establish similarity of plane figures.	
2.3.HS.A.6	Verify and apply theorems involving similarity as they relate to plane figures.	
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles.	
2.3.HS.A.8	Apply geometric theorems to verify properties of circles.	
2.3.HS.A.9	Extend the concept of similarity to determine arc lengths and areas of sectors of circles.	
2.3.HS.A.10	Translate between the geometric description and the equation for a conic section.	
2.3.HS.A.11	Apply coordinate geometry to prove simple geometric theorems algebraically.	
2.3.HS.A.12	Explain volume formulas and use them to solve problems	
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects.	
2.3.HS.A.14	Apply geometric concepts to model and solve real world problems.	
2.3.8.A.3	Understand and apply the Pythagorean Theorem to solve problems	Yes
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	Yes
2.2.6.B.2	Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems	Yes

	Algebraic Concepts	Foundational
2.2.HS.D.3	Extend the knowledge of arithmetic operations and apply to	
	polynomials	
2.2.HS.D.5	Use polynomial identities to solve problems	
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.	
2.2.5.A.1	Interpret and evaluate numerical expressions using order of	Yes
	operations	
Measurement, Data, & Probability Foundational		
2.4.5.A.1	Solve problems using conversions within a given measurement	Yes
	system	
2.4.7.B.2	Draw informal comparative inferences about two populations	Yes

Reading

Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
Craft & Structure		
3.5.9 -10.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.9 -10.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.9 -10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
Integrate Knowledge/ Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form	
	(e.g. a table or chart).	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9 -10.I	Integrate and evaluate multiple sources of information presented in diverse	
	formatsto solve a problem	
3.5.1 -12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying	
	the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Read and comprehend technical texts independently and proficiently	

Text Types and Purpose		
CC.3.6.11-12.A	Write arguments focused on discipline specific content	
CC.3.6.11-12.B	Write informative or explanatory texts, including the narration of technical	
	processes, etc.	
Production & Distribution of Writing		
CC.3.6.11 -12 C	Produce clear and coherent writingappropriate to task, purpose, and audience	
CC.3.6.11 -12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience	
CC.3.6.11 - 12.E	Use technology, including the Internet, to produce, publish, and update individual or shared writing products.	
Research		
CC.3.6.11 -12.F	Conduct short and more sustained research to answer a question or solve a problem	
CC.3.6.11 - 12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation	
СС.3.6.11 -12.Н	Draw evidence from informational texts to support analysis, reflection, and	
	research	
Range of Writing Grades		
CC.3.5.11- 12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc	

Examples of Course Material

Example #1 Masonry Course Material

Chapter 9 Review

Hollow CMU	More than 25% of the cross-sectional area is cells
Solid CMU	No cells OR Less than 25% of the cross-
Structural load	The weight or pressure everted on a structure
Lightweight CMU	1. Contains expended shale, alay, and slate or
	1. Contains expanded shale, clay, and state of
	2 A sta sa a thormal insulator
In any set of the start in the start is the	2. Acts as a thermal insulator
Increased productivity	when using lightweight CMU's
Autoclaved CMU	Harder and less affected by changes in weather
Architectural CMU	1. Structural CMU with one or more finished
	faces
	2. May be used for foundation walls, interior
	or exterior walls
Split face CMU	Has one or more rough, exposed aggregate, 3-
	dimensional faces
Fluted CMU	Ribbed or scored-block, with vertical,
	machine-molded grooves on one or more faces
Exposed aggregate CMU	Has a face of natural texture from crushed
	stone
Ground face CMU	Has a surface that has been ground and
	polished
Glazed CMU	The glazing on the face can add as much as
	1/8" to the dimension
Stone veneer masonry units	Give the appearance of natural stone
Sound-absorbing CMU	Reduces sound transmission
12" CMU's must be used	For foundation walls exceeding 5' below grade
4" CMU's	May be used for composite walls
The width of a CMU	Is also its "size"
The actual size of a CMU	Is 3/8" less than its nominal size
The block size to be used	Is dictated by the project specs and local
	building codes
Use a CMU one size larger than what is	For added strength
required	C
The running bond pattern	How CMU walls are almost always laid
Anchored veneer wall	A single-wythe masonry wall, requiring
	vertical support and anchored to either a load-
	bearing or nonbearing wall, with an air space
	between it and the backup wall
Textbook

Masonry Brick and Block Construction ISBN 978-1-4180-5284-3

Sample Textbook Reading:

"Laying brick on the line is one of the first wall-building tasks that an apprentice mason has the opportunity to perform. The feelings of success and pride from such an accomplishment are gratifying to both the apprentice and experienced mason. It should become a top priority for every apprentice mason to master the skills of laying brick on the line."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt	ML	\$11.50	R
Hooded sweatshirt (choose one) OR	ML	\$21.50	R
Crewneck sweatshirt (choose one)	ML	\$15.50	R
Jeans or work pants	YC	\$20.00	R
Boots (steel toe or regular)	YC	\$100.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Thaddeus Stevens College of Technology		Credits
MASN 101	Intro to Tools, Safety and Equipment	3.0
MASN 105	Introduction to Masonry Construction	3.0
MASN 155	Block Construction, Bearings, and Anchoring Systems	4.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 46.0101 Masonry Construction Technology, Associate in Applied Science Degree (A.A.S).

Career Pathways

Journeyman Mason Foreman Quality Control Technician Mason Contractor

Bricklayer Estimator Superintendent Masonry Instructor Stone Mason Job-site Supervisor Construction Manager Business Owner

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Brick Mason	18%	\$35,290	\$53,850	\$63,120
Stone Mason	18%	\$38,070	\$55,490	\$64,210
Construction Manager	5%	\$57,670	\$98,220	\$118,500
Cost Laborer	15%	\$25,460	\$39,180	\$46,040

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification Pennsylvania Builders			
Association Skills Certificate			

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed for safety around moving equipment, hand tools, power tools, and other equipment found in the industry
- Physical strength and stamina with the ability to lift 50 pounds overhead
- Ability to work in all weather conditions and have no fear of heights or working in closed spaces
- Learning and working environment with dust, dirt, and debris found in masonry industry, loud and sometimes startling noises, on-going background noise, moving people and construction equipment, small spaces, interior, or exterior work factors (all weather conditions), high spaces using scaffolding and ladders

183

Aptitudes for Success

- Eye/hand/foot coordination
- Manual and finger dexterity
- Multi-limb coordination while standing, sitting, or lying down
- Arm-hand steadiness
- General body coordination and stamina that requires considerable use of arms, legs, and whole body
- Ability to visualize
- Spatial acuity
- Form perception

Standardized Testing Requirement

$NOCTI-12^{th}\ Grade$

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Media Communications Technology

Students enrolled in the Media Communications Technology program develop the necessary skills to be successful in the workplace or post-secondary education. Using state of the art technology, students create a wide array of media projects while gaining necessary job skills.

Media Communications Technology students develop a portfolio emphasizing their creative talents and technical skills including mastery of computer systems, software, cameras, and lighting. Students create photographic and video projects for the school, civic groups, and business clients.

The program emphasizes a "hands on" curriculum which covers topics such as: digital imaging, portraiture, photo composition, lighting, animation, web page design, digital audio, video scripting/storyboarding, videography, EFP video, studio production, digital nonlinear editing, 3D animation, and multimedia CD ROM production. Career opportunities include photographers, radio announcers, and videographers.

Task List

Introduction to Cinematography, Film and Video Production

- Demonstrate general lab safety procedures.
- ♦ Investigate careers in cinematography and film/video fields.
- Follow copyright law as it applies to cinematography and film/video fields.
- Explore professional industry organizations.
- Follow digital citizenship ethics and guidelines.

Computer Technology

- Demonstrate the use of the computer operating system.
- ✤ Identify media production industry software titles.
- ✤ Demonstrate the use of storage and peripheral devices.

Camera Foundationals

- Set up and use various camera-support systems, e.g., tripods, jibs, pedestals, gimbals, sliders.
- Operate basic digital camera including white balance, color temperature, exposure, and focus.
- Demonstrate proper digital camera workflows.
- Demonstrate a basic knowledge of imaging sensors.
- ♦ Adjust camera settings for proper frame rate, resolution, and aspect ratio.
- ✤ Apply the basic guidelines of composition, camera movement, and angles.
- ✤ Control depth of field.
- ✤ Identify common cables, connectors, and adapters.
- ✤ Demonstrate knowledge of lens characteristics.
- ✤ Lay, wrap, and store cables.

Graphic Design for Media Production

- ✤ Apply elements of design.
- ✤ Apply Foundationals of type and its uses.
- ✤ Apply type alignment techniques.
- ✤ Apply font parts/elements.
- ✤ Utilize type sizing, leading, and kerning.
- Illustrate complementary and primary diagram.
- Illustrate the basic psychology of color (cool and warm).
- ♦ Differentiate between RGB vs. CMYK color modes.
- ✤ Differentiate vector vs. bitmap images.

Audio Production

- Select microphones by type, transducer, pickup patterns, and placement.
- Explore Foley sound and ADR.
- Engineer audio equipment/mixing.
- Record audio in studio and field environments.
- ✤ Mix audio production.

Studio/Live Production/Operations

- Explain studio operations and responsibilities.
- ✤ Operate teleprompter system.
- ✤ Operate studio graphics/CG.
- ✤ Operate switcher/technical direct show.
- ✤ Set up and operate audio for studio production.
- Produce a studio production.
- Direct a studio production.
- ✤ Operate studio camera.
- ◆ Perform duties of floor manager during a studio production.

Pre-Production/Creative Development

- ✤ Determine target audience using demographics.
- ✤ Determine client objective and desired outcome.
- Develop creative treatment and outline.
- Determine technical requirement/site survey.
- Create and prepare a production budget and timeline.
- Develop and present a proposal/contract.
- ✤ Conceptualize and design a set.
- Create and manage a production schedule.
- Develop a shot list and storyboard.

Post-Production

- Demonstrate knowledge of production terminology.
- ✤ Ingest, import, and organize files.
- Utilize basic editing tools and techniques.
- ✤ Apply transitions.
- ✤ Apply video and audio effects, including key framing.
- Export project.

Script Writing

- ✤ Write a two-column AV script.
- ✤ Write a news program script.
- ✤ Write a radio commercial.
- ✤ Write a screenplay script.

Lighting

- ✤ Identify types of lighting instruments and modifiers.
- ✤ Apply three point and four-point lighting for video.
- ✤ Cast shadows and determine falloffs.
- Demonstrate lighting safety practices.

Industry Software

- Utilize video editing software.
- ✤ Utilize audio editing software.
- Utilize bitmap and/or vector editing software.
- ✤ Utilize animation and/or motion graphics software.

Media Distribution and Output

- Publish audio and/or video content to the internet.
- ✤ Identify different file types and codecs.
- ✤ Output audio for appropriate media.
- Determine media outlets, streaming, and distribution platforms.
- ✤ Differentiate between interlaced and progressive scanning and usage.

Emerging Media Technologies

- Explore Virtual Reality (VR) Video/360-degree concepts.
- Explore drone technology.
- Explore use of mobile devices for production.

Production Projects

- Produce, edit, and mix a narrative audio production.
- Produce a news story.
- Create a 30 second audio commercial.
- ✤ Create a 60 second television commercial.
- Produce an audio or video podcast.
- Produce a promotional video.
- Produce a how-to-video.
- Produce a short film or short documentary.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
	Algebraic Concepts	Foundational
2.2.6.B.3	Represent and analyze quantitative relationships between dependent and independent variables	Yes
2.2.5.A.4	Analyze patterns and relationships using two rules	Yes
2.2.4.A.1	Represent and solve problems involving the four operations	Yes
	Geometry	Foundational
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional object	
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
2.3.8.A.2	Understand and apply congruence, similarity, and geometric transformations using various tools	Yes
2.3.5.A.1	Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems	Yes
	Measurement, Data, & Probability	Foundational
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.4.A.2	Translate information from one type of data display to another	Yes
2.4.7.B.2	Draw informal comparative inferences about two populations	Yes

Reading

Key Ideas/Details			
3.5.9-10.A	Cite specific textual evidence, etc		
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc		
3.5.9-10.C	Follow precisely a complex multistep procedure, etc		
	Craft & Structure		
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure		
Integrate Knowledge/ Ideas			
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form		
	(e.g. a table or chart).		
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in diverse formats, to solve a problem		
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying		
	the data when possible		
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding		
Range of Reading			
3.5.11-12.J	Read and comprehend technical texts independently and proficiently		

Writing

Text Types and Purpose			
3.6.11-12.A	Write arguments focused on discipline specific content		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
	Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or		
	trying a new approach, focusing on addressing what is most significant for a specific purpose and audience		
3.6.11-2.E	Use technology, including the Internet, to produce, publish, and update individual or		
shared writing products.			
	Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,		
	following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range Of Writing Grades			
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of		
	tasks, purposes, and audiencesetc		

Examples of Course Material

Example #1 Media Communications Technology Course Material

EVALUATION FORM RADIO COMMERCIAL ANALYSIS

Student's Name				
Explain why you chose the COMMERCIAL on your CD to				
represent your best work in radio.	15pts			
Analyze your voice quality.	15pts			
Analyze your script writing.	15pts			
Analyze your sense of audience.	15pts			
Analyze your style.	15pts			
Analyze your special effects.	15pts			
Place a picture representing your RADIO COMMERCIAL on your analysis sheet.	10pts			
Deductions:				
Portfolio analysis must be word-processed, error free, and sleeved in plastic when handed in (if this requirement is not met there will be a deduction of 15 points).	15pts			
If the due date is not met there will be a deduction of 15 points. Due date:	15 pts			
5 points will be deducted for each omission of information or error	5pts			
TOTAL POINTS				
Instructor's Comments:				

		Unsatisfactory	High School	Approaching	Industry Standard
		5 Points	Production Level	Industry Standard	10 Points
			8 Points	9 Points	
1.	Print Media	No print media	Print media is not	Print media from	Print media is
		referenced or	from authentic	authentic	used to create
		present with	company	company but not	script, needs to be
		project.		referenced	from an authentic
				effectively	company, follow
					required format
2.	Audio	Inaudible	Sound guality	Some distortion	Clear and no
	Quality		issues exist, but	detected, volume	distortion:
			speech, music,	levels imbalanced	recording volume
			and sound effects	between loud and	level appropriate,
			are audible	soft	recording
					equipment used
					effectively
3.	Mix	Sound elements	Frequency of	At least two of the	Hear all three
		are not	sound elements	three sound	elements clearly:
		distinguishable	cancel each other	elements are	sound effects,
			out or at least two	present and of	music, and
			sound elements	clear audible	voiceover
			are missing	quality	
4.	Voice Over	Voice over is not	Voiceover is	Clear	Clear
		clear and lacks	complete but	pronunciation and	pronunciation and
		quality	performance isn't	articulation, but	articulation,
		pronunciation and	true to the script	speed or volume	audible volume,
		articulation, is not		of script is outside	words/speech is
		discernable to the		of industry	discernible, speed
		listener's ear.		parameters	of pacing is easily
					processed by
					listeners about
					100-150 words
					per minute.
5.	Screen	No base or	Base and overlay	Base and overlay	Base and overlay
	Evolution	overlay applied	applied	applied several	technique applied
			sporadically, once	times throughout;	consistently
			or twice	photos and icons	throughout
				complement	editing process;
				overlay and	one element
				base/voiceover	appears at a time;
					photos or icons
					evolve with base
					and overlay
6.	Readability	Uses long	Information is	Information is	Information is
	-	sentences or	brief, meaningful,	brief, meaningful,	brief, meaningful,
		paragraphs.	and easy to read.	and easy to read.	and easy to read.

HOW TO PRESENTATION RUBRIC

		Jargon or difficult language is used.	Omits jargon or other difficult language.	Omits jargon or other difficult language. Content is appropriate for the target audience.	Omits jargon or other difficult language. Content is appropriate for the target audience. An active voice is used to speak to the audience, as opposed to at the audience.
7.	Script	No reference to print media.	References print media but lacks logical progression, does not follow formatting requirements	Script flows logically and references print media but does not follow formatting requirements	Script must flow logically, mirrors information on the print media, and follows formatting requirements
8.	Layout and Design	Lacks required layout and design principles from checklist	At least 3 layout and design principles applied from checklist.	At least 5 layout and design principles applied from checklist.	All 7 layout and design principles included and demonstrate competency- balanced, use of white space, etc. *See checklist.
9.	Export File Format for Delivery	No sound or video with file on computer.	Video file for project included but not in required format	One computer file on computer in either .wav or .mp4 format	EXPORT AND Deliver a H.264 X 1080, .mp4, movie to Schoology

Software Applications

Adobe: Photoshop, After Effects, Premier, and Dreamweaver ProTools Logic Pro Wix Developer

Textbook

<u>Television Production Handbook</u> ISBN 978-0-495-89884-9

Sample Textbook Reading:

"The DP (director of photography) is sometimes listed as part of the nontechnical personnel and sometimes as part of the technical team. The term, borrowed from film production, has found its way into television. In standard motion picture production, the DP is mainly responsible for lighting rather than for running the camera. In smaller digital cinema productions and EFP (electronic field production), the DP operates the camera as well as does the lighting. So when you hear that an independent television producer/director is looking for a reliable and creative DP, he or she is primarily referring to an experience EFP camera operator."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost
Polo shirt	ML	\$15.00
Hooded sweatshirt	ML	\$21.50
Pants - casual	YC	\$20.00
Single subject notebook	YC	\$5.00
Academic monthly planner (July-June)	YC	\$9.00
Binder 3", 3-ring	YC	\$5.00
8 to 64 gig SD-HC memory card	YC	\$15.00

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Butler Count	y Community College	Credits
COMM 105	Creative Thinking	3.0
ARTS 102	Drawing	3.0
ARTS 101	Introduction to Art	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Butler County Community College POS 11E CIP 11.0801 Graphic Design, Associate of Applied Science (A.A.S.) Degree.

Harcum College		Credits
ART 110	Basic Drawing	3.0
DDN 151	Digital Imaging Production	3.0
DDN 152	Layout and Design	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Harcum College POS: CIP 50.0409 Graphic Design, Associate of Science (A.S.) Degree.

Lehigh Carb	Credits	
ART 108	Two-Dimensional Design	3.0
ART 107	Digital Design	3.0
ART 111	Color Theory	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Lehigh Carbon Community College POS: 10.0304 - Computer Generated Animation and Digital Arts Associate in Applied Science (A.A.S.) Degree; 50.0409 - Graphic Design Associate of Arts (A.A.); 50.0701 - Fine Arts/Studio Arts Associate of Arts (A.A.).

Career Pathways

Photographer	Videographer	Audio/Visual
Technician	Graphic Artist	
Multimedia Artists & Animators		

Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Photographer	-2%	\$18,510	\$34,260	\$42,130
Videographer	5%	\$22,500	\$44,800	\$55,950
Multimedia Artists and Animators	2%	\$38,420	\$66,800	\$80,990
Audio/Visual Technician	12%	\$27,610	\$43,260	\$51,090

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
Adobe Photoshop	Adobe Premier	
Adobe After Effects		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Must be able to work independently and with teams
- Must have social skills for interaction with co-workers and customers
- Self-discipline to focus for long periods of time
- Ability to multitask
- Ability to operate technical equipment
- Ability to sit or stand for long periods of time/ physical stamina

Aptitudes for Success

- Finger and manual dexterity
- Eye/hand coordination
- Fine motor skills
- Mechanical aptitude
- Clerical perception
- Mechanical aptitude
- Strong depth and color perception

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Medical Assistant

Medical assistants are professional, multi-skilled individuals who perform administrative and clinical duties in health care settings. The program includes studies in anatomy and physiology, health insurance coding and billing, medical terminology, medical law and ethics, pharmacology, clinical and administrative skills, phlebotomy, laboratory tests, and performing and interpreting electrocardiograms.

Task List

Introduction to Health Care

- Identify the roles and educational/credentialing requirements of various health care practitioners.
- Describe the professional qualities of a Medical/Clinical Assistant.
- ♦ Discuss health care law and ethics including HIPAA and Act 13 of 2012.
- ✤ Identify cost containment and perform an inventory of supplies.
- ✤ List alternative/complementary health care practices.
- Discuss how psychosocial and socioeconomic factors can impact a client's health.

Medical Assistant Administrative Skills

- Complete administrative responsibilities of the medical assistant, including client scheduling.
- Compose and format all forms of written correspondence, e.g., emails, letters, memos.
- Establish and maintain hard copy and electronic medical records (EMR) for a client.
- ✤ Complete a demographic form for a client.
- Perform basic office accounting procedures.
- Complete appropriate medical office forms, including Notice of Privacy Practices (NPP), medical release and others.
- Demonstrate effective telephone techniques used in a healthcare facility.
- ◆ Perform basic computer applications, including spreadsheet, PowerPoint, and publishing.

Pharmacology

- Verbalize correct technique to administer medications using the prescribed route, e.g., vaginal, rectal, transdermal, inhalation.
- Utilize a Physician's Desk Reference (PDR) and online resources.
- Perform patient education on prescribed medications and document in patient record.
- ✤ Interpret and use written medication orders and abbreviations.
- ✤ Identify the major drug classifications.
- ♦ Utilize dosage forms, doses, and dosing calculations.
- Simulate the administration of oral medications.
- Simulate the administration of eye medications.
- ✤ Simulate the administration of ear medications.
- Simulate the administration of intradermal injections.
- Simulate the administration of subcutaneous injections.
- Simulate the administration of intramuscular injections using ampules and vials.
- ✤ Discuss the usage of an aerosol treatment.

Infection Control

- Complete a unit of instruction on blood borne pathogens and list the standard precautions that meet the current requirements of the OSHA Bloodborne Pathogens Standard.
- ✤ Identify the chain of infection.
- Perform a sterile dressing on a wound.
- Perform medical asepsis and hand hygiene techniques.
- Perform universal precautions.
- ✤ Apply and remove sterile gloves.
- Utilize the correct techniques in dealing with patients requiring isolation when applying and removing personal protective equipment (PPE).
- Demonstrate techniques in sanitizing, disinfecting and sterilizing instruments.
- ✤ Prepare instruments for the autoclave and operate appropriately.
- Prepare a sterile field.
- Describe the inflammation process and signs and symptoms of infection.

Laboratory Procedures

- Apply principles of quality assurance and laboratory safety in all aspects of laboratory testing.
- Obtain a routine urine specimen and perform a urinalysis using a reagent strip.
- Obtain a clean catch urine and process for lab analysis.
- ✤ Perform a capillary puncture for testing.
- Utilize and describe the standard blood collection tube order of draw and additives.
- Perform venipuncture using a straight needle and process.
- Perform venipuncture using a butterfly needle and process.
- ✤ Collect a throat culture using sterile supplies and process.
- Perform a fecal occult blood specimen, educate the client, and process.
- ✤ Complete a laboratory requisition form.

Healthcare Law and Ethics

- Identify how the Americans with Disabilities Act (ADA) applies to the medical assisting profession.
- Describe the implications of HIPAA and client confidentiality in various health settings.
- Identify where and how to report illegal and unsafe activities and behaviors that affect health, safety, and welfare of others.
- Discuss major legal principles and practices that apply to health care situations.
- ✤ Discuss client rights and advance directives.
- Discuss the appropriate scope of practice for a medical assistant.

Introduction to Medical Insurance and Managed Care

- Explain a third-party reimbursement system, including deductibles and co-payments.
- ✤ Identify state and federal mandates of insurance programs.
- Define basic and specific terminologies common to all insurance programs.
- ✤ Identify various types of insurance plans.
- Discuss utilization review principles.
- Discuss referral process for clients.
- Process an insurance claim.
- Use the most recent medical codes in the International Classification of Diseases (ICD) and Current Procedural Terminology (CPT).

Concepts of Effective Communication

- ◆ Use effective means of therapeutic communication.
- Combine prefixes, suffixes, and word roots to form and define complex medical terms.
- ✤ Identify global standard medical, diagnostic, and laboratory abbreviations.
- Demonstrate education to a patient and their family for a specific condition or health concern.
- Produce a patient education tool.
- Discuss communication alternatives for patients with various communication barriers.
- Demonstrate cultural diversity when communicating with clients and families.

Introduction to Basic Anatomy and Physiology

- ✤ Identify body planes and cavities and directional terms of the human body.
- Describe the structural parts and the basic chemistry of the cell.
- ◆ Describe how heredity and genetics influence a client's medical condition.
- ✤ List the basic structure and functions of the body systems.
- Explain the anatomy and physiology of specific disorders of the body.
- Describe how the aging process physically effects the client over their lifespan.
- ✤ Identify nutritional needs of patients with various diseases and conditions.

Medical Assistant Clinical Laboratory Procedures

- Follow procedures that prepare a client for examinations and treatments.
- Perform electrocardiograms (ECG) using an electrocardiograph (EKG) and abnormal tracing.
- Document a client's condition, along with the chief complaint and progress note.
- Perform a vision screening test using a Snellen chart.
- Obtain a client's medical history.
- ✤ Perform pulse oximeter readings on a client.
- Perform a peak flow measurement on a client.
- ✤ Perform a vision screening test using Ishihara test.
- Perform a vision screening test using a near vision screening.
- Perform an auditory screening test.
- Perform and record measurements on a client for height.
- Perform and record measurements on a client for weight.
- Perform and record measurements on a client for blood pressure.
- Perform and record measurements on a client for pulse using radial pulse.
- Perform and record measurements on a client for pulse using apical pulse.
- Perform and record measurements on a client for respirations.
- Perform and record measurements on a client for temperature using oral.
- Perform and record measurements on a client for temperature using tympanic.
- Perform and record measurements on a client for temperature using temporal.
- Perform and record measurements on an infant for weight.
- Perform and record measurements on an infant for length.
- Perform and record measurements on an infant for head circumference.
- Discuss eye irrigation.
- Discuss ear irrigation.
- Perform positions and draping for medical examinations.
- Perform wheelchair transfer using proper body mechanics.
- Discuss usage of assistive devices such as canes, crutches, and walkers.
- Perform suture and/or staple removal.

- ✤ Obtain basic principles of basic first aid.
- Simulate evacuation of a health care center.
- Discuss fire safety issues and prevention methods in a health care facility.
- Identify emergency preparedness plans in your community and research available resources.
- ✤ Identify safety signs, symbols and labels used in a health care facility.
- Evaluate the work environment and distinguish between safe versus unsafe working conditions.
- ✤ Develop a personal safety plan to follow in case of various emergencies.
- Develop an evacuation plan for a physician's office.
- Obtain and maintain CPR and AED certification.
- * Recognize allergic reactions and signs and symptoms of anaphylaxis.
- Discuss the proper response to a fire, including the use of a fire extinguisher.

Psychology

- Discuss the developmental stages of the life span.
- Discuss effective strategies for dealing with stress in the workplace and emergency situations.
- Discuss the dying process and stages of grief.
- ✤ Use defense mechanisms and conflict resolution methods.

Complete a Medical Assistant Externship

Complete a medical assistant externship prior to taking and passing the examination to receive a medical assistant credential.

Pennsylvania Academic Standards

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with	
	rational exponents.	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world	
	or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of	
	multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement	
	when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex	
	numbers.	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions	Yes
	to operations with rational numbers	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve	Yes
	real-world and mathematical problems	
Measurement and Data, and Probability Foundational		
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes

2.4.5.A.1	Solve problems using conversions within a given measurement system	
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement	Yes
	system.	
	Foundational	
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure,	Yes
	area, surface area, circumference, and volume	
	Foundational	
2.2.7.B.2	Model and solve real-world and mathematical problems by using and	Yes
	connecting numerical, algebraic, and/or graphical representations	

Reading

Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
	Craft & Structure	
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
Integrate Knowledge/ Ideas		
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11- 12 H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-12.J	Read and comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
Production & Distribution of Writing		
3.6.11-12.C	Produce clear and coherent writingappropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	

3.6.11- 2.E	Use technology, including the Internet, to produce, publish, and update individual or shared writing products		
	Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range of Writing Grades			
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc		

Examples of Course Material

Example #1 Medical Assisting Course Material

Vocabulary

Directions: Complete each section as directed.

Part 1: Completion – Write the meaning of the elements

1.	phob	 7.	chir, c
2.	digit	 8.	labi-
3.	mamm-	 9.	dys-
4.	pleur-	 10.	later-
5.	peri-	 11.	phot-
6.	grad-	 12.	pro-

7.	chir, cheir-	
8.	labi-	
9.	dys-	
10.	later-	
11.	phot-	
12.	pro-	

Part 2: Matching

- _____ calcemia 13. _____ gangliocytoma 14.
- b. _____ peridontal 15. c. d.
- _____ phobia 16.
- _____ proptosis 17.
- _____ granulocyte 18.
- _____ lateral 19.
- _____ mammectomy 20.
- _____ microadenitis 21.
- ______ subcutaneous 22. 23.
- _____ dyspnea 24. _____ enostosis

- tumor of knot like cells
- under the skin
- removal of the breast
- condition of abnormal bony growth
- within the cavity of the bone
- inflammation of small glands e.
- f. forward displacement
- toward a side g.
- occurring around a tooth h.
- difficult or labored breathing i.
- j. condition of calcium in the blood
- small cell k.
- 1. an abnormal fear

a.

Part 3: Build a term

25.	pain within the brain
26.	inflammation of the joints of the hands
27.	abnormal smallness of the brain
28.	pertaining to the lips and teeth
29.	treatment of disease through exercise
30.	pertaining to the side and back
31.	slow digestion
32.	inflammation of the pleura and gall bladder
33.	twins
34.	sac around the heart (a structure)

Part 4: Definitions – Break the words apart and give the definition

35.	granulopenia
36.	dysphagia
37.	periglossitis
38.	periosteoma
39.	prootic
40.	colloid
41.	tarsitis
42.	cineangiography
43.	photophobia
44.	digital

Example #2 Medical Assisting Course Material

- The physician ordered Duricef tabs, 1500 mg. Available are Duricef tabs, 1 gram. How many tablets will you give?
- 6. The physician ordered Diuril tabs, 250 mg. Available are Diuril tabs, 0.25 g. How many tablets will you give?
- The physician ordered amoxicillin caps, 500 mg. Available are amoxicillin caps, 250 mg. How many capsules will you give?
- The physician ordered Lasix oral solution, 30 mg to be given as a single dose. Available is Lasix oral solution, 60 mL bottle that contains 10 mg/mL. How many milliliters will you give?

Textbook

Today's Medical Assistant: Clinical & Administrative Procedures ISBN 978-1-0-323-58127-1

Sample Textbook Reading:

"The sense of pain is initiated by nociceptors, which are free nerve endings that are stimulated by tissue damage. They are widely distributed throughout the skin and in the tissues of the internal organs. The nervous tissue of the brain has no pain receptors; however, other tissues in the head, including the meninges and blood vessels, have an abundant supply. Pain receptors have a protective function because pain is usually perceived as unpleasant and is a signal to locate and remove the source of tissue damage. Nociceptors usually do not adapt and may continue to send signals after the stimulus has been removed."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Novelty V-neck scrub women OR	ML	\$14.75	R
Round neck scrub top women OR	ML	\$14.75	
Flexibles V-neck scrub top women	ML	\$19.75	
Flare leg drawstring pant OR	ML	\$13.50	
Drawstring pant women OR	ML	\$16.00	
Midrise straight leg pull-on pant OR	ML	\$26.00	
Midrise tapered leg drawstring pant OR	ML	\$26.00	
Jewel neck warm-up jacket	ML	\$17.50	R
Full-zip fleece	ML	\$24.50	
Core soft shell jacket women	ML	\$40.00	
V-neck scrub top men	ML	\$13.75	R
Unisex drawstring pant	ML	\$11.00	R
Snap front jacket men	ML	\$21.50	R
White all leather sneakers, nursing shoes	YC	\$50.00	R
Stethoscope	YC	\$20.00	R
Watch with second hand	YC	\$15.00	R
Pens/pencils	YC	\$3.00	R
Notebook	YC	\$3.00	R
Index cards	YC	\$3.00	R
Physical	Physician	\$30.00	R
2-step Mantoux (tb test)	Physician	\$30.00	R
Hepatitis b vaccine	Physician		R
Flu vaccine	Physician		0
Criminal Background Check Clearance	PA State	\$22.00	R
HOSA Membership		\$16.00	0
CCMA certification	NHA	\$155.00	0

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Delaware County Community College		Credits
AHA 207	Ethical/Legal Aspects of Health Care Management	3.0
AHM 104	Body Structure and Function I	3.0
AHM 140	Professional and Communication Issues in Health Care	3.0
====		

Total Credits Awarded: 9.0

Notes: Nine (9) credits align to CIP 51.0801 Medical Assistant, Associate of Applied Science (AAS) Degree Program.

Commonwealth Technical Institute		Credits
BE 20	Medical Office Procedures	3.0
BE 23	Records Management	3.0
BE 13	Medical Terminology/Anatomy & Physiology I	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to Commonwealth Technical Institute's CIP 51.0706 Medical Office Assistant Associate in Specialized Business (ASB) program.

Harrisburg Area Community College		Credits
MA 140	Introduction to Medical Assisting	3.0
MA 141	Introduction to Medial Lab Techniques	1.0
AH 105	Medical Terminology	3.0
AH 150	Introduction to Human Illness & Disease	3.0

Total Credits Awarded: 10.0

Career Pathways

Administrative Medical Assistant	Cardiovascular Technologist	Phlebotomist
Clinical Medical Assistant	Medical Secretary	

Position	Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Medical Assistants	15%	\$25,240	\$31,980	\$35,360
Phlebotomist*	14%	\$27,260	\$34,180	\$37,640
Cardiovascular Technologist*	20%	\$33,900	\$56,970	\$68,510
Medical Secretary	13%	\$26,460	\$34,920	\$39,150

(* denotes additional educational or certification requirements)

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
BLS Healthcare Provider	Certified EKG/ECG Technician	
	(CET)	
Certified Clinical Medical	Certified Phlebotomy	
Assistant (CCMA)	Technician	

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Good personal hygiene
- Stamina for prolonged standing, bending, and stooping
- Ability to lift 50 pounds to waist level without restrictions
- Must be able to work independently and with teams
- Physical strength and trunk strength required to lift patients for transfer
- Must follow HIPPA with patient confidentiality
- Emotional and mental stability
- Empathy towards others
- Not disturbed by incidences such as bodily fluids, surgeries, injections, traumatic situations, and willingness to safely handle various bodily fluids and medical waste

Aptitudes for Success

- Manual and finger dexterity
- Eye/hand coordination
- Color discrimination
- Clerical perception
- Arm-hand steadiness
- Multi-limb coordination
- Ability to multitask
- Ability to use the various tools in the Healthcare industry

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Network Technology

Network Technology – In today's high-tech environment, everything is networked!!! Following the CompTIA Network + Certification model, students learn the features and functions of networking components including how to install, configure and troubleshoot basic networking hardware, protocols and services. Completion of this course will prepare students for entry-level jobs in computer networking or give them a boost as they continue their education while pursuing a career as a network administration, network support technician, network administrator or network analyst. Foundational topics to be covered include: The Foundations of Networking, the OSI/802 Model, Network Design, Network Cabling, Wireless Communication, TCP/IP, WAN Devices, Security Issues and Disaster Recovery Training. The goal is for students to seek Network+ certification after completion of the course. Students who successfully complete the program may receive up to four college credits awarded by accredited colleges or technical schools.

Students entering the Network Technology program should be proficient in keyboarding and Microsoft products such as One Note, Word, and Outlook.

Task List

Personal and Environmental Safety

- ✤ List common causes of accidents and injuries in a computer facility.
- ✤ Wear personal protective equipment.
- List and identify safety hazard symbols.
- Review Safety Data Sheets (SDS) and explain their requirements in handling hazardous materials.
- Describe types of fire extinguishers and explain which types to use for extinguishing various fires.
- ✤ Use safe procedures to follow when lifting and carrying heavy objects.
- Describe the importance of safety as it relates to environmental issues.
- ✤ Identify potential hazards when working with power supplies.
- Identify proper disposal procedures for batteries, display devices, and all other electronic equipment.
- ✤ Identify proper disposal procedures for chemical solvents and pressurized cans.
- Prevent electrostatic discharge conditions.
- Configure a computer's power management settings to maximize energy efficiency.
- Maintain safe work area to avoid common accidents and injuries.

Computer Hardware

- ✤ Categorize storage devices and backup media.
- ✤ Categorize the different types of computer cases.
- Explain motherboard components, types, and features.
- ✤ Categorize power supplies types and characteristics.
- Explain the purpose and characteristics of CPUs and their features.
- Explain cooling methods and devices.
- Compare and contrast memory types, characteristics, and their purpose.
- Distinguish between the different display devices and their characteristics.
- Summarize the function and types of adapter cards.
- Install and configure peripherals and input devices.
- Configure and optimize portable devices, such as laptops, tablets, and smart devices.
- ✤ Install and configure printers.
- ◆ Install configure and maintain personal computer components.
- Repair/replace desktop and laptop computer components.
- Implement RAID solutions.

Troubleshooting, Repair and Maintenance

- ✤ Apply industry standard troubleshooting methods.
- ✤ Troubleshoot common hardware and operating system symptoms and their causes.
- Identify common laptop issues and determine the appropriate basic troubleshooting method.
- ✤ Integrate common preventative maintenance techniques.
- ✤ Diagnose and repair common printer issues.

Operating Systems and Software

- ✤ Identify different operating systems by their features.
- ✤ Use various user interfaces.
- ✤ Install and configure an operating system.
- Explain boot sequences, methods, and startup utilities for various operating systems.
- Select the appropriate commands and options to troubleshoot and resolve problems.
- Differentiate between various operating system directory structures.
- ✤ Use system utilities/tools and evaluate the results.
- ✤ Troubleshoot common OS and software issues.
- ♦ Manage local users, groups, and institute local security policies.
- ◆ Install and configure a network and workstation operating system.

Network Technologies

- Explain the function of common networking protocols, such as FTP, TCP/IP suite, DHCP, DNS.
- ✤ Identify commonly used TCP and UDP default ports, including TCP ports: FTP 20, 21, SSH – 22, TELNET – 23, HTTP – 80.
- ✤ Identify address formats, including IPv6, IPv4, MAC.
- Evaluate the proper use of addressing technologies and addressing schemes, including: subnetting: classful vs. classless, NAT, PAT, SNAT, public vs. private, DHCP, addressing schemes (unicast, multicast, broadcast).
- Identify common IPv4 and IPv6 routing protocols, including link state, distance vector, and hybrid protocols.
- Explain the purpose and properties of routing, including IGP vs. EGP, static vs. dynamic, next hop, interpret routing tables and how they pertain to path selection, convergence (steady state).
- Identify the characteristics of wireless communication, including 802.11 and 802.15 standards: speeds, distance, channels, frequency, authentication, and encryption.
- Identify the basic elements of unified communication technology, such as VoIP, video, real time services, POS, and UC devices
- Implement technologies that support cloud computing.
- Implement virtualization technologies.

Network Media and Topologies

- Categorize standard cable types and their properties, e.g., UTP, STP, coaxial, fiber; plenum vs. non-plenum properties: transmission speeds, distance, duplex, noise immunity, frequency.
- ✤ Identify common connector types, including UTP, STP, coaxial, and fiber.
- Identify common physical network topologies.
- Differentiate and fabricate cables according to TIA/EIA 568A and 568B standards, including patch, crossover, and rollover cables.
- Categorize common WAN technology types and properties.
- Categorize common LAN technology types and ethernet properties, e.g., CSMA/CD, broadcast, collision, bonding, speed, distance.
- Explain common logical network topologies and their characteristics, including peer to peer and client/server.
- Install components of wiring distribution, including vertical and horizontal cross connects, verify installation and termination and environmental requirements.

Network Devices

- ✤ Install, configure, and differentiate between common network connectivity devices.
- Identify the functions of specialized network devices, such as multilayer switch, content switch, IDS/IPS, load balancer, multifunction network devices, DNS server, bandwidth shaper, proxy server, CSU/DSU.
- Explain the advanced features of a switch, such as PoE, spanning tree, VLAN, trunking, port mirroring, port authentication.
- Install a basic wireless network, including client configuration, access point placement and installation.
- Configure appropriate encryption, configure channels and frequencies, set ESSID and beacon, and verify installation.

Network Management

- Explain, compare, and contrast the layers of the TCP/IP and OSI models.
- Prepare physical and logical network diagrams, baselines, policies, procedures, and configurations and regulations.
- Evaluate the network based on configuration management documentation, such as wiring schematics; physical and logical network diagrams; baselines; policies, procedures, and configurations to network devices and infrastructure; wiring schematics; physical and logical network diagrams; and configurations and job logs.
- Conduct network monitoring to identify performance and connectivity issues, such as packet sniffers, connectivity software, load testing, throughput testers, system logs, history logs, and event logs.
- ✤ Implement remote management technologies.

Network Tools and Troubleshooting

- Utilize command line/graphical tools and interpret the output to verify functionality including, Traceroute, Ipconfig, Ifconfig, and Ping.
- Use network scanners, such as packet sniffers, intrusion detection software, Intrusion prevention software, and port scanners.
- Utilize the appropriate hardware tools for cable fabrication and troubleshooting.
- Implement network troubleshooting methodologies, including information gathering identify symptoms and problems, identify the affected areas of the network.
- Develop an action plan and solution identifying potential effects, implement and test the solution, identify the results and effects of the solution, document the solution, and the entire process.
- Troubleshoot common wired and wireless connectivity issues and select an appropriate solution to include physical and logical issues.
- Troubleshoot and resolve common WAN issues, such as loss of connectivity, DNS, router configurations, and default gateways.

Security Foundationals

- Configure hardware and software security devices, such as network-based firewall, hostbased firewall, DMZ, IDS, IPS, VPN concentrator.
- Implement features of a network firewall, such as application layer vs. network layer, stateful vs. stateless, scanning services, content filtering, signature identification, zones.
- Configure network access security, such as ACL: MAC filtering, IP filtering tunneling and encryption: SSL VPN, VPN, L2TP, PPTP and related others.
- Differentiate the principals of user authentication, such as PKI, Kerberos, AAA: RADIUS, TACACS+, network access control: 802.1x, CHAP, MS-CHAP, EAP.
- Evaluate issues that affect device security, such as physical security and network access.
- ✤ Identify and mitigate common security threats.
- Demonstrate security features, including BIOS security, password management, locking workstations, and biometrics.
- Demonstrate basic forensic concepts, such as incident response, chain of custody, evidence preservation, and documentation.

Communication and Professionalism

- Use effective communication with customers, such as proper etiquette, active listening, and cultural sensitivity.
- Solve customer problems.
- Implement and adhere to acceptable use policies.
- ✤ Maintain customer confidentiality.
- ✤ Maintain asset inventory.

Pennsylvania Academic Standards

Mathematics

Numbers and	d Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world	
	or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of	
	multistep problems	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers	Yes
2.1.6.E.2	Identify and choose appropriate processes to compute fluently with multidigit numbers	Yes
Algebraic Co	oncepts	Foundational
2.2.6.B.3	Represent and analyze quantitative relationships between dependent and independent variables	Yes
2.2.5.A.4	Analyze patterns and relationships using two rules	Yes
2.2.4.A.1	Represent and solve problems involving the four operations	Yes
Geometry		Foundational
		roundational
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional object	roundational
2.3.HS.A.13 2.3.7.A.2	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them	Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools	Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems	Yes Yes Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1 Measuremen	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems it, Data, & Probability	Yes Yes Yes Foundational
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1 Measuremen 2.4.5.A.2	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems t, Data, & Probability Represent and interpret data using appropriate scale	Yes Yes Yes Foundational Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1 Measuremen 2.4.5.A.2 2.4.4.A.2	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems t, Data, & Probability Represent and interpret data using appropriate scale Translate information from one type of data display to another	Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1 Measuremen 2.4.5.A.2 2.4.4.A.2 2.4.7.B.2	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems it, Data, & Probability Represent and interpret data using appropriate scale Translate information from one type of data display to another Draw informal comparative inferences about two populations	Foundational Yes Yes Foundational Yes Yes
2.3.HS.A.13 2.3.7.A.2 2.3.8.A.2 2.3.5.A.1 Measuremen 2.4.5.A.2 2.4.4.A.2 2.4.7.B.2 2.4.7.B.1	Analyze relationships between two dimensional and three dimensional object Visualize and represent geometric figures and describe the relationships between them Understand and apply congruence, similarity, and geometric transformations using various tools Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems t, Data, & Probability Represent and interpret data using appropriate scale Translate information from one type of data display to another Draw informal comparative inferences about two populations Draw inferences about populations based on random sampling concepts	Yes

Reading	Reading		
Key Ideas/Details			
3.5.11-12 A	Cite specific textual evidence, etc.		
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.		
3.5.11-12.C	Follow precisely a complex multistep procedure, etc.		
Craft & Strue	cture		
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words		
3.5.11 -12.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.11 -12.F	Analyze the author's purpose in providing an explanation, describing a procedure & analyze the structure of the relationships among concepts in a text		
Integrate Kno	Integrate Knowledge & Ideas		
3.5.9 -10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)		
3.5.9 -10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem		
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.		
3.5.11 -12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem		
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible		
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding		
Range of Rea	ding		
3.5.11-12.J	Comprehend technical texts independently and proficiently		

Writing

Text Types a	Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
Production	& Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or		
	trying a new approach, focusing on addressing what is most significant for a specific		
	purpose and audience		
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or		
	shared writing products		
Research			
3.6.11 -	Conduct short and more sustained research to answer a question or solve a problem		
12.F			
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,		
	following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range of Writing			
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of		
	tasks, purposes, and audiencesetc.		

Examples of Course Material

Example #1 Network Technology Course Material

Diagnose PC keyboard Functionality

You will perform a keyboard diagnostics test, here's how:

- 1. Navigate to: https://www.keyboardtester.com/
- 2. Launch the tester.
- 3. TEST all KEYS. You may need to press and hold the "fn" key to test the top row function keys.
- 4. IF ANY KEYS DO NOT FUNCTION- double check with a neighbor, ask the teacher to verify if available, AND YOU MUST list bad keys in your submission.
- 5. Submit a screenshot of the results when complete.

Example #2 Network Technology Course Material

INSTRUCTIONS: Complete the practice questions.

	DN 1		/1			
Which of the following is the SHORTEST way to write 2001:0000:0d58:0000:0000:0095:7565:0001 in proper IPv6 shorthand?						
A ()	2001::d58::95:7565:1	в 🔘	2001:0:d58:0:0:95:7565:1			
с 🔾	2001:0:d58::95:7565:1	D ()	2001:0:0d58::95:7565:1			
QUESTIC	DN 2		/1			
A technician has replaced the Internet gateway router, and now no users can reach the Internet. The technician can ping the router Ethernet port but not the ISP's router IP address. Which of the following is the MOST likely problem?						
A ()	Faulty crossover cable	в 🔘	DNS server is down			
с 🔾	Switching loop	D ()	Outside interface shutdown			
QUESTIC	DN 3		/1			
A firewall administrator is implementing a rule that directs HTTP traffic to an internal server listening on a non- standard socket. Which of the following types of rules is the administrator implementing?						
A ()	NAT	в 🔘	PAT			
с ()	STP	D ()	SNAT			
Е ()	ARP					

Textbook

Managing and Troubleshooting PCs, 6th Ed. ISBN 978-126-045-506-9

<u>Test Out PC Pro ver. 7</u> ISBN 978-1-935080-42-8

<u>Test Out Network Pro</u> ISBN 978-1-935080-43-5

Sample Textbook Readings:

Managing and Troubleshooting PCs, 6th Ed.

"Modern versions of Windows use subfolders of the C:\Users folder to organize files for each user on a PC. Figure 2.36 shows the default folders for a user named Mike. Let's quickly survey the ones you need to know for the Comp\TIAA A+ exams:

• C:\Users\Mike\Desktop This folder stores the files on the user's desktop. If you delete this folder, you delete all the files placed on the Desktop."

Test Out PC Pro ver. 7

"Screenshots and Screen Clippings

- Open at least one other application on your computer, such as File Explorer or Microsoft PowerPoint.
- Now return to an open Word document.
- On the Insert tab, in the Illustrations group, open the Screenshot dropdown.
- Select one of the Available Windows to insert into your document.
- Place your cursor somewhere else in the document.
- On the Insert tab, in the Illustrations group, open the Screenshot dropdown.
- Select Screen Clipping.
- Use the mouse or touchpad to select a portion of the screen.
- Notice that the screen clipping is automatically inserted into your document."

"You are a network technician for a small corporate network. The network is connected to the internet and uses DHCP for address assignment. The employee in Office 1 reports that his workstation can communicate with some computers on the network, but not the internet. You need to diagnose and fix the problem.

In this lab, your task is to complete the following:

- Use the following troubleshooting tools to diagnose the problem in the network:
 - The ping, ipconfig, or tracert command utility
 - The Network and Sharing Center in Windows or the Windows Server operating system."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Polo shirt	ML	\$13.50	R
Short sleeve button down shirt	ML	\$24.50	Ο
Long sleeve button down shirt	ML	\$24.50	Ο
Hooded sweatshirt (choose one) OR	ML	\$18.50	R
Zip hooded sweatshirt (choose one)	YC	\$20.50	R
Boots - non-marking, non-electrical conduction	YC	\$100.00	R
Pants - casual black, gray, brown	YC	\$20.00	R
Belt	YC	\$10.00	R
Certifications:			
-IC3		\$105.00	R
-OSHA		\$25.00	R
-Network +		\$125.00	R
Hauton (or other) screwdriver tool set	Amazon	\$20.00	R
Gloves	YC	\$20.00	R
Safety glasses	YC	\$6.00	R
Headset with microphone - Wired	YC	\$30.00	R
64 Gb USB thumb drives	YC	\$12.00	R
Notebook and paper	YC	\$5.00	R
Pens pencils	YC	\$5.00	R
101 Labs CompTIA A+ (ISBN 978-0992823993)	YC	\$40.00	R
101 Labs CompTIA Network+ (ISBN 978-8759221401)	YC	\$40.00	Ο

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Bucks County	Community College	Credits
CISC 128	Comparative Operating Systems	4.0
CISC 143	Essentials of Networking	4.0
CISC 201	Managing and Maintaining the PC	4.0

Total Credits Awarded: 12.0

Notes: Twelve (12) credits align to CIP 11.0901 Computer Networking Technology A.A.S., Associate Applied Science degree, and CIP 11.0901 Computer Networking Technology Certificate.

Reading Area	Community College	Credits
IFT 100	Introduction to Information Technology	3.0
IFT 110	Microcomputer Applications	3.0
NET 100	Computer Networking	3.0
WEB 100	Web Design I – HTML	3.0

Total Credits Awarded: 12.0

Notes: Twelve (12) credits are aligned to the following Reading Area Community College POS: CIP 11.0801 Web Site Development AAS. Course pre-requisites don't apply to SOAR credits being brought in by articulation.

Reading Area	Community College	Credits
IFT 100	Introduction to Information Technology	3.0
NET 100	Computer Networking	3.0
WEB 100	Web Design I – HTML	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Reading Area Community College POS: CIP 11.1003 Computer Information Systems AA. Course pre-requisites don't apply to SOAR credits being brought in by articulation.
Westmorela	Credits	
CPT 248	PC Hardware	3.0
CPT 145	Introduction to Computer Technology	3.0
CPT 182	Operating Systems	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to Westmoreland County Community College Programs of Study CIP 11.0901 Computer Technology, Networking, Associate of Applied Science (AAS) Degree Program and CIP 11.1006 Computer Technology, Technical Support, Associate of Applied Science (AAS) Degree Program.

Delaware C	Credits	
DPR 227	Introduction to PC Support	3.00
DPR 228	PC Repair and Maintenance	3.00
NET 110	Network Communications	3.00

Total Credits Awarded: 9.00

Notes: Nine (9) credits are aligned to the following Delaware County Community College POS: CIP 11.0901 Information technology, Network Engineering Associate in Applied Science (A.A.S.) Degree.

Luzerne County Community College

CST 215	Data Communications 3.0
CST 103	PC Operating Systems Technology 3.0
CST 105	Microcomputer Architecture & Multimedia Systems 3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Luzerne County Community College POS: CIP 15.1202 Computer Systems & Security Technology, Associate in Applied Science (A.A.S.) Degree

Northampton	Credits	
CISC 100	Information Technology Foundationals	4.0
CISC 136	PC Support and Troubleshooting	4.0
CISC 137	Introduction to Networking Hardware	2.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to CIP 11.0901 Networking Systems Technology A.A.S. Associate Applied Science Degree.

Community College of PhiladelphiaCreditsCIS 103Computer Apps & Concepts3.0CIS 105Computer Systems Maintenance4.0CIS 150Network Technology4.0

==== Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to the following Community College of Philadelphia POS: CIP 11.1001 Network Administration, Associate in Applied Science (A.A.S.) Degree.

Community	Credits	
CIS 103	Computer Apps & Concepts	3.0
CIS 105	Computer Systems Maintenance	4.0
CIS 150	Network Technology	4.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to the following Community College of Philadelphia POS: CIP 11.0101 Computer Information Systems - Information Technology, Associate in Applied Science (A.A.S.) Degree.

Thaddeus Stevens College of Technology		
CNSA 111	Introduction to Networking	3.00
CNSA 117	Analysis of TCP/IP and Local Area Networking	3.00
CNSA 107	PC Hardware and Support Foundationals	3.00

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 11.9999 Computer and Network Systems Administration, Associate in Applied Science Degree (A.A.S).

Community	Credits	
CISN 100	CISCO I-Network Foundationals	5.0
CISN 110	CISCO II-Routing Protocols and Conc	5.0

Total Credits Awarded: 10.0

Notes: Ten credits are aligned to the following Community College of Beaver County POS: CIP 11.1001 Networking, Associate in Applied Science (A.A.S) Degree.

ty Community College	Credits
Computer Information Systems	3.0
Networking I	3.0
PC Management Techniques I	4.0
	<i>ty Community College</i> Computer Information Systems Networking I PC Management Techniques I

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Butler County Community College POS 12E CIP 11. 1001 CIS Networking and Cybersecurity, Associate of Applied Science (A.A.S.) Degree.

Career Pathways

Network Support Specialist	Network Salesperson	Network Technician
Network Administrator	Network Engineer	Network Systems Analyst
Computer Repair Technician	Computer Service Technician	Computer Support
Specialists		

Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Network Administrator*	6%	\$51,600	\$76,400	\$88,800
Network Systems Analyst*	17%	\$96,640	\$145,590	\$170,060
Computer Support Specialist	12%	\$33,460	\$50,990	\$59,750
Network Support Specialist	6%	\$41,440	\$64,050	\$75,350

*Additional post-secondary education may be required.

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification	IC3		
Network +	A+ or TestOut		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Good personal hygiene
- Stamina for prolonged standing, bending, and stooping
- Ability to lift 50 pounds to waist level without restrictions
- Must be able to work independently and with teams
- Physical strength and trunk strength required to lift patients for transfer
- Must follow HIPPA with patient confidentiality
- Emotional and mental stability
- Empathy towards others
- Not disturbed by incidences such as bodily fluids, surgeries, injections, traumatic situations, and willingness to safely handle various bodily fluids and medical waste

Aptitudes for Success

- Manual and finger dexterity
- Eye/hand coordination
- Color discrimination
- Clerical perception
- Arm-hand steadiness
- Multi-limb coordination
- Ability to multitask
- Ability to keyboard
- Ability to problem solve

Standardized Testing Requirement

NOCTI - 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Pastry Arts

The Lebanon County Career & Technology Center Pastry Arts Program was the first nationally recognized and accredited secondary program by the American Culinary Federation Education Foundation (ACF) in the country.

Pastry Arts students produce and market high quality baked products for a contemporary sixty-seat restaurant within the school. They also market their products through their own pastry shop as well as supplying items for school banquets, dinner meetings, community service projects, and specialty events. Students develop artistic skills through the preparation of pastries, confections, and other specialty desserts. Students will create and present a professional portfolio and restaurant programs as an end of the year assessment. Local, state and national competitions enrich the curriculum which includes pastry bag skills, cornet skills, cake decorating and assembly, decorative pieces including a Gingerbread House and Pumpkin Carving competition, merchandising, record keeping, and sanitation. Career opportunities range from a baker's helper to a pastry chef and may begin in high school with a Co-Op position providing job experience and a salary. Students who successfully complete the program may receive college credits from Johnson & Wales, West Moreland Community College, PA College of Technology, Harrisburg Area Community College, Art Institutes, and The Restaurant School at Walnut Hill College.

Task List

Introduction to the Hospitality and Baking Industry

- Define hospitality and the importance of customer service within the baking and pastry industry.
- Discuss the growth and development of the baking and pastry industry.
- Describe cuisines and their relationship to history and cultural development.
- Outline the structure and functional areas in businesses, e.g., retail, wholesale, baking, and distribution.
- ✤ Identify career opportunities and personal traits for jobs in the baking industry.
- ✤ Identify professional organizations and certifications.
- ✤ Use multimedia resources to identify industry trends.

Sanitation and Safety

- Identify microorganisms which are related to food spoilage and food-borne illnesses and describe their requirements and methods for growth, symptoms, and prevention.
- Describe cross-contamination and procedures for preparing and storing potentially hazardous foods.
- Follow guidelines for hygiene, health habits, and industry-standard apparel.
- Identify the requirements for receiving and storing raw and prepared foods and the reasons for and signs of food spoilage and contamination, e.g., FIFO.
- Explain the difference between cleaning, sanitizing, and the use and storage of chemicals.
- Develop and follow a cleaning schedule.
- Practice methods of waste disposal, recycling, and sustainability.
- ✤ Identify measures for the control of insects, rodents, and pests.
- Identify sanitary, safety design, and construction features of food production equipment and facilities, e.g., NSF, UL, OSHA, ADA.
- ✤ Identify Safety Data Sheets (SDS) and the requirements for handling hazardous materials.
- Conduct a sanitation self-inspection and identify modifications necessary for standards compliance.
- Identify the hazard analysis and critical control points (HACCP) and the temperature danger zone during all food handling processes as a method for minimizing the risk of food-borne illness.
- List common accidents and injuries in the foodservice industry and outline a safety management program and emergency policies.
- ✤ Identify types, uses, and locations of fire extinguishers in the foodservice area.
- Describe the role of regulatory agencies governing sanitation and food safety.
- ✤ Acquire industry sanitation certifications, e.g., ServSafe.

Business and Math Skills

- ◆ Perform basic math functions using the baker's percentage (%) and friction factor.
- Discuss labor costs.
- Calculate the cost of recipes/formulas, including as purchased, edible portion, and factors affecting yield percentage.
- ✤ Calculate the selling price of bakery items.
- Complete a sales transaction using related industry standards, including cash handling and current technology, e.g., guest checks, computers, calculators.
- Perform basic math functions using decimal, percentages, fractions, conversions, and measurements as related to the baking and pastry industry.
- Perform equivalent measures associated with weight and volume and distance, including metric and English units.

Baking Preparation

- Identify ingredients used in baking, describe their properties, and list the functions of various ingredients, including but not limited to, flours, sugars, fats, egg products, dairy, chocolates, herbs, spices, and extracts.
- Perform knife skills and classic cuts while practicing safety techniques.
- ✤ Use and care for hand tools.
- Prepare and fill a pastry bag and utilize a variety of tips to demonstrate proper use, e.g., cake decorating and pastry products.
- Use and care for food processing, cooking, and baking equipment.
- ✤ Read and follow a standard recipe/formula.
- Perform a variety of cooking methods, e.g., baking, frying, deep frying, boiling, blanching, poaching, and steaming.
- Perform food presentation techniques, e.g., plated desserts.
- ♦ Write food requisitions for production requirements.

Baking Foundationals

- Demonstrate scaling and measurement techniques used in baking.
- Prepare yeast products, e.g., hard and soft breads and rolls.
- Prepare enriched yeast dough products including laminated dough and sweet dough.
- ✤ Prepare quick breads.
- Prepare pies and tarts.
- Prepare cookies.
- ✤ Prepare creams, mousses, custards, and related sauces.
- Prepare cakes.
- Prepare icings and glazes.
- Perform cake decorating techniques, e.g., icing writing, borders, flowers, leaves, and rosettes.
- Perform cake decorating techniques, including royal icing, rolled fondant, gum paste, air brush designs, and edible images.
- Discuss the applicability of convenience, value added, further processed, or par-baked food items.
- Prepare fillings and toppings for pastries and baked goods.
- Prepare pastry products from pate choux, phyllo, puff pastry and crepes.
- ✤ Prepare French, Italian, and Swiss meringues.
- Prepare doughnuts.
- Prepare frozen desserts.
- ✤ Prepare breakfast items and sandwiches.
- ★ Label and store bakery products to prevent or reduce spoilage and staling.
- Discuss showpieces, including gingerbread, chocolate, sugar, ice, and fruit carvings.
- ◆ Prepare a variety of petit fours, e.g., macarons, petit four glace, financiers.

Purchasing, Receiving, Inventory and Storage

- List factors that affect food prices and quality which may include market fluctuation and product cost.
- Describe purchasing methods, e.g., bids, purchase orders, phone, sales quotes, online.
- Identify regulations for the inspection and grading of bakery ingredients, e.g., flour, sugar, eggs, dairy products, and fruits.
- Identify inventory systems including perpetual and physical inventories and requisition systems for controlling costs, e.g., computerized systems.

Nutrition

- List food groups and recommended servings in USDA Food Guide Charts.
- Discuss dietary guidelines and recommended dietary allowances for a nutritious diet.
- Define energy nutrients and non-energy nutrients and how they are metabolized by the human body.
- Calculate individual dietary intakes by using the RDA dietary guidelines.
- Interpret food labels in terms of the portion size, ingredients, nutritional value, and nutritional claims.
- Describe the six classes of nutrients carbohydrates, fats/lipids, protein, vitamins, minerals, and water.
- Discuss the functions, sources, and effects of the six classes of nutrients on a healthy lifestyle.
- Discuss various diets and health concerns related to alternative dieting, vegetarianism, poor nutrition, and food allergies.
- Apply principles of nutrition and nutrient preservation while preparing bakery goods and menu items.

Baking Planning

- Determine basic production planning principles.
- Create menu item descriptions for bakery goods.
- Discuss baking facilities, planning, and layout principles.
- Discuss planning and time management as it relates to a baking facility.
- Identify methods of promoting baked goods, display techniques, and seasonal merchandising.

Human Relations Skills

- Work as a member of a diverse team as it relates to the baking industry.
- Identify the benefits of a positive work environment by motivating employees, reducing stress, and resolving conflict.
- Use professional communication, e.g., email, phone, and social media.
- ♦ Identify the baker's role in decision making, problem solving, and delegation of duties.
- Identify current federal and state employment laws, e.g., Equal Opportunity, Harassment, Affirmative Action, Wage and Hour.

Pennsylvania Academic Standards

Mathematics

	Foundational	
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.3	Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.HS.F.7	Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.	
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
2.1.6.D.1	Understand ratio concepts and use ratio reasoning to solve problems	Yes
	Geometry	Foundational
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them	Yes
	Algebraic Concepts	Foundational
2.2.HS.D.1	Interpret the structure of expressions to represent a quantity in terms of its context.	
2.2.HS.D.2	Write expressions in equivalent forms to solve problems.	
2.2.HS.D.3	Extend the knowledge of arithmetic operations and apply to polynomials.	
2.2.HS.D.4	Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.	
2.2.HS.D.5	Use polynomial identities to solve problems.	
2.2.HS.D.6	Extend the knowledge of rational functions to rewrite in equivalent forms.	
2.2.HS.D.7	Create and graph equations or inequalities to describe numbers or relationships.	
2.2.HS.D.8	Apply inverse operations to solve equations or formulas for a given variable	
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.	
2.2.HS.D.10	Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.	
	Measurement and Data, and Probability	Foundational
2.4.2.A.3	Solve problems and make change using coins and paper currency with appropriate symbols	Yes

Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
	Craft & Structure	
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
Integrate Knowledge/ Ideas		
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (a, a, a) table or short	
2.5.0.10.11		
3.5.9-10.H	problem	
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in diverse	
	formatsto solve a problem	
3.5.11-12.Н	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying	
	the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range Of Reading		
3.5.11-12.J	Read and comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose			
3.6.11-12.A	Write arguments focused on discipline specific content		
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,		
	etc.		
	Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience		
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or		
	trying a new approach, focusing on addressing what is most significant for a specific		
	purpose and audience		
3.6.11-12.E	Use technology, including the Internet, to produce, publish, and update individual or		
	shared writing products.		
Research			
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem		
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,		
	following a standard format for citation		
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research		
Range of Writing Grades			
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of		
	tasks, purposes, and audiencesetc		

Examples of Course Material

Example #1 Pastry Arts Course Material

Portfolio Rubric

STUDENT'S NAME:

TOTAL	SCC	ORE:
160-	ta 1	Domus

				Toopis. + Donus
CATEGORY	PROFESSIONAL	SATISFACTORY	NEEDS	INCOMPLETE
			WORK	
Culinary Code- Table of Contents- <u>Resume -</u> <u>Career Objective</u>	Included – 10pts. Included – 10pts. Perfect = 10 pts. Corrected clean copy = 10 pts.		Imperfect = 5 pts. $Imperfect = 5 pts.$ $Corrections$ $needed = 2 pts.$ $Corrections$ $needed = 2 pts.$	Not included = 0 pts. Not included = 0 pts. Not included = 0 pts. Not included = 0 pts.
<u>Task List</u>	Included & Used = 10 pts.		Included but not current=5pts.	Not included $= 0$ pts.
Equipment Certification Completed & Signed.	Included & Completed=10 pts		Included but not signed by Chef & Student=5pts.	Not included = 0 pts.
Awards	38 or more = 10 pts.	15 - 37 = 7 pts.	1 - 14 = 5 pts.	None $= 0$ pts.
Show Work Photos	15 or more $= 10$ pts.	4 or $5 = 7$ pts.	1 or $2 = 5$ pts.	None $= 0$ pts.
Menus	8 or more $= 10$ pts.	4 or $5 = 7$ pts.	1 or $2 = 5$ pts.	None $= 0$ pts.
Production Sheets	Chronological, complete (30 or more weeks) = 10 pts.	24 – 29 weeks, chronological = 7 pts.	19 – 23 weeks and/or disorganized = 5 pts.	10 - 19 weeks = 2pts. Less than $10 = 0$ pts.
Product Sheets	38 or more $= 10$ pts.	24 or more $=$ 7 pts.	18 or more $= 5$ pts.	12 or more = 3 pts. Less than $10 = 0$ pts.
<u>Skills USA</u>	Evidence of participation, program, award(s), photo(s) =10pts. 5 extra pts. For State info or pics	Evidence of participation = 7 pts.	Skills USA related material included = 4 pts.	Nothing included = 0
Pictures	50 or more, typed captions = 10 pts	25 – 49, typed captions = 7 pts.	12 - 24 and/or un-typed or no captions = 5 pts.	10 or more = 3 pts. Less than $10 = 0$
Virtual Learning	Evidence of participation- certificates 9 to 12=10pts.	6 to 8 certificates =7pts.	4 to 5 certificates =5pts.	Less than 4 =0pts.
Community Service or Other Added Section - 10pts.	10pts 4 or more community services	7pts. 3- community services	5pts. 2- community services	2pts. 1- community service
Overall Appearance	Typed tabs and section title sheets, plastic sleeves, individualized and decorative cover, neat, orderly = 10 pts.	Typed tabs and section title sheets, plastic sleeves, individualized cover, neat = 7	Tabs, section title sheets, cover sheet = 4	Sloppy, disorganized, no section title sheets and/or typed tabs, no plastic sleeves, no cover sheet = 0
TOTALS				

Example #2 Pastry Arts Course Material

Study Guide

When subtracting large numbers, **Borrowing** is the technique often used.

A <u>recipe</u> is a written record of the ingredients and preparation steps needed to make a particular dish.

If a recipe normally serving 16 needs to serve 20, $\underline{1}$ is the conversion factor.

Weight is the measurement of an item's resistance to gravity.

<u>32°F (0°C)</u> temperature is the freezing point for water.

<u>**16**</u> cups are in 1 gallon.

<u>**3**</u> teaspoons are in 1 tablespoon.

The same amount can be expressed in different ways by using different units of measure; this is called a **<u>equivalent.</u>**

 $\underline{2}$ cups are in one pint.

A restaurant is offering 15 percent off a customer's entire check. If the check total is \$45, <u>\$38.25</u> will the check total be after the discount.

A restaurant is offering 15 percent off beverages. The check total is \$90, with the beverage total being \$15. **<u>\$87.75</u>** is the check total after the discount.

A recipe with a set format that is clear to anyone who uses it is called a standardized recipe.

A gazpacho recipe serves 50 but a banquet order requires servings for 30. $\underline{0.6}$ is the conversion factor for this recipe.

To find the total cost of a recipe, a chef must know ingredient amounts and the price of each one.

Divide the desired yield by the original yield to get the conversion factor, and then multiply each ingredient by the conversion factor is the formula used to increase or decrease a recipe.

If 58 of 180 people in a restaurant have ordered the house special, then 32.2 percentage of customers have ordered the house special.

Of 280 breakfast customers, 65 percent order scrambled eggs and bacon. $\underline{182}$ people ordered this menu item.

The manager estimates that with the chef's new summer salad, next month's sales will increase 12 percent from last month's total of \$52,200. **\$58,464** are next month's sales if the manager is correct.

If a recipe calls for 4 cups of milk, <u>32</u> fluid ounces are used.

A chef keeps lunch entrées warm at 66°C. <u>151°F</u> is the approximate Fahrenheit equivalent.

Release 1.2

A chef keeps dinner entrées warm at 138°F. <u>59°C</u> is the approximate Celsius equivalent.

At <u>212°F (100°C)</u> temperature water boils.

If a recipe calling for 14 ounces of onions is tripled, <u>**2.63**</u> pounds of onions are needed.

A soup recipe serves 12, but you only need to serve 8. **<u>0.67</u>** is the conversion factor.

The amount of space an ingredient takes up is the volume.

Most professional bake shop recipes will ask for fat to be measured by weight.

If a recipe calls for 7 pounds of trimmed asparagus, and asparagus has a 55 percent yield, $\underline{12.73}$ pounds of untrimmed asparagus are needed.

If a recipe calls for 8 pounds of trimmed celery, and celery has a 75 percent yield, <u>10.67</u> pounds of untrimmed celery are needed.

Garlic has an 88 percent yield. After trimming 8 pounds of garlic, 7.04 pounds of garlic will be left as the edible portion (EP).

Green peas have a 40 percent yield. After trimming 12 pounds, <u>4.80</u> pounds of green peas are left as the edible portion (EP).

A banquet hall is preparing to serve a party of 432 guests. If each table seats 8 people, <u>54</u> tables are needed.

Of 8,910 lunch customers last month, 3,560 ordered salads. Approximately <u>40</u> percentage of customers ordered salads.

A manager received an invoice for \$86.40 for 30 gallons of ice cream. **<u>\$2.88</u>** is what each gallon cost.

One pint is the same as $\underline{2}$ cups.

One cup equals **<u>8</u>** fluid ounces.

Using the metric system, grams measure weight.

<u>32</u> degrees Fahrenheit equals 0°C.

The number of servings or the amount the recipe makes is the **<u>yield.</u>**

Ground beef is measured by weight.

 $\frac{1}{2}$ cups is the equivalent of 120 milliliters.

Professional Baking ISBN 978-0-471-78348-0

Sample Textbook Reading:

"Gluten and egg proteins are the proteins primarily responsible for the structure of most baked goods. They provide this structure only when they are heated enough to coagulate, or become firm. Recall that proteins consist of molecules in the form of long chains. This process begins slowly at 140° to 160°F (60°C to 70°C). Gradually these chains bond to each other to form a solid structure. To visualize this process, think of eggs, which are liquid when cold but become firmer as they are heated, until they are quite solid."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Chef coat	ML	\$35.00	R
Neckerchief	ML	\$4.50	R
Checked cook pant	ML	\$24.00	R
Black cook pant	ML	\$24.00	R
Dining room dress shirt or blouse	ML	\$22.50	R
White bib apron	ML	\$6.00	R
Chef hat 2 options for hair length	ML	\$0.50/\$7.00	R
Black leather work shoes (NO sneakers)	YC	\$75.00	R
Binder 3" or 4" D-ring	YC	\$3.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Westmoreland County Community College		
FSM 103	Introduction to The Hospitality Industry	3.0
FSM 235	Supervision and Training	3.0
CUL 104	Foundations of Cooking and Baking	3.0
====		

Total Credits Awarded: 9.0

Notes: Nine (09) credits are aligned to Westmoreland County Community College Programs of Study CIP 12.0501 Baking and Pastry, Apprenticeship and CIP 12.0501 Baking and Pastry, Non-Apprenticeship, Associate of Applied Science (AAS) Degree Program.

Delaware C	Credits	
CUL 150	Baking and Pastry Foundations I	3.0
CUL 151	Baking and Pastry Foundations II	3.0
CUL 220	Nutrition and the Hospitality Industry	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Delaware County Community College POS: CIP 12.0508 Culinary Arts, Associate in Applied Science (A.A.S) Degree.

Luzerne Cou	inty Community College	Credits
CUL 101	Culinary Foundationals I	5.0
PAS 111	Foundations for Pastry	4.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Luzerne County Community College POS: CIP 12.0501 Pastry Arts Management, Associate in Applied Science (A.A.S.) Degree

Harrisburg A	Credits	
BAKE 101	Baking I	4.0
CULI 107	Nutrition for Food Service	3.0
CULI 113	Sanitation and Safety	2.0
====		

Total Credits Awarded: 9.0

Lackawanna	College	Credits		
BAK 105	Baking Industry Knowledge	4.0		
HSP 105	Intro to Gastronomy and Hospitality	4.0		
ELOC 172	National Electric Code	2.0		
Total Credits Awarded: 6.0				

Career Pathways

Cook Pastry Cook	Baker Caterer		Cake Decora Bakery Man	ator ager
Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Baker	3%	\$19,240	\$27,650	\$31,850
Restaurant Cook	16%	\$18,390	\$25,540	\$29,120
Chef/Head Cook	11%	\$36,110	\$54,110	\$63,110
Sous Chef	11%	\$22,660	\$37,380	\$44,740

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification	ServSafe/Manager Food Safety		
	Certification		
Certified Culinarian	ServSafe Allergen Certification		
Certified Foundational Cook	ServSafe Food Handler		
	Certification		
Certified Pastry Culinarian	S/P2 Culinary		
Prostart National Certificate of	Heartsaver CPR		
Achievement			
ProStart National Certificate of	Heartsaver First Aid		
Achievement			

Program Safety & Physical Considerations

- High degree of self-discipline and focus on safety around kitchen equipment knives and other tools and equipment found in the industry
- Ability to work in a fast-paced environment
- Good personal hygiene
- Ability to lift and carry 50 pounds
- Ability to tolerate heat, handling and manipulating hot objects/items, and working in a hot environment
- Exposure to food allergens
- Stamina needed to stand for long periods of time

Aptitudes for Success

- Eye/hand/foot coordination
- Finger and manual dexterity
- Arm and hand steadiness
- Fine motor skills
- Size, shape, and color discrimination
- Ability to multi-task
- Ability to pay attention to detail
- Spatial acuity
- Ability to adjust actions in relation to other actions
- Selective attention (ability to concentrate on a task over a period of time without being distracted)
- Multi-limb coordination

Standardized Testing Requirement

 $NOCTI - 12^{th}$ Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Plumbing, Heating, & Air Conditioning

Students interested in the plumbing profession can begin their training at the CTC in the Plumbing, Heating, and Air Conditioning program which is a Pennsylvania Builders Association accredited program and tailored after the Pennsylvania College of Technology's first year HVAC skills list .They will begin their technical training learning safe work practices, materials and tools used in the trade, and applied mathematical and scientific concepts needed to build a strong foundation for more advanced topics. Our students "learn by doing" by working on a variety of skills trainers and equipment designed to simulate actual field installations. Students also have the opportunity to earn industry recognized certifications such as the OSHA 10 construction safety certification and the EPA Section 608 Refrigerant Transition and Handling certification. Dual enrollment opportunities with Thaddeus Stevens College of Technology are also available while enrolled in the program.

Post-secondary opportunities exist for those completing the CTC Plumbing, Heating, and Air Conditioning program such as craft apprenticeships where students "earn while they learn" graduating debt-free from industry recognized programs. Associate and bachelor's degree programs are available for those choosing careers as sales engineers, designers, and similar professions requiring advanced degrees.

Task List

Blueprints and Sketching of Pipe Systems

- Interpret types of drawings.
- Interpret various lines used on drawings.
- Interpret specifications and dimensions.
- Interpret piping systems according to color-coding.

Pipe Specifications and Systems

- Install pipe and connections according to manufacturer specifications.
- Follow plumbing standards, codes, and specifications.
- Explain the effects and corrective measures for thermal expansion in a piping system.
- Install various types of pipe insulation.

Hand and Power Tools

- ✤ Use and maintain hand tools.
- ✤ Use and maintain power tools and equipment.
- Explain laser or transit level for sitework.

Valves

- Use backflow prevention devices
- ✤ Use types of valves that start and stop flow.
- ✤ Use valves that regulate flow.
- ✤ Use valves that relieve pressure.
- Select valves.
- Disassemble and assemble various types of valves, e.g., gate valve, globe valve, flushometer.

Copper Piping Operations

Join, cut, and bend various types of copper pipe tube, e.g., solder, compression, flare, swage, press fit, brazing.

Plastic Pipe and Tubing

- ♦ Measure, cut and assemble PVC, CPVC, and ABS.
- ♦ Measure, cut and assemble PEX plastic tubing and PE and HDPE.

Pipe Hangers and Supports

- ♦ Use hangers to secure horizontal and vertical pipe to masonry, metal, and wood.
- ✤ Layout and explain, various fixture carriers.

Water Distribution Lines

 Rough-in water supply lines for residential and commercial fixtures according to manufacturer sheet.

Steel Pipe Operations

- * Thread steel pipe with an adjustable die, power threading machine, and non-adjustable die.
- ♦ Measure, cut, ream, and assemble various types of steel piping.
- ✤ Adapt steel pipe to other piping materials.

Cast Iron Pipe Operations

- ✤ Use tools for working with cast iron pipe.
- ✤ Measure and cut cast iron soil pipe with various cutting methods.
- Assemble cast iron with No Hub, Fernco, and rubber gasketed joints.

Drains, Stacks and Sewers

- ✤ Lay out and establish grade/slope for drain lines.
- Explain backwater prevention.
- Rough-in drain lines for residential and commercial fixtures according to manufacturer sheet.

Fixtures

- ✤ Install gravity, pressure assist, and flush valve type water closets.
- ✤ Install bathtubs.
- ✤ Install wall mounted fixtures.
- ✤ Install kitchen sinks.
- ✤ Install prefabricated shower base drains.
- ✤ Install lavatories.
- ✤ Install fixture traps.

Appliances

- ✤ Install a dishwasher.
- ✤ Install electric and gas water heater.
- ✤ Install clothes washing machine.
- ✤ Install water heaters, e.g., oil, tankless, indirect, heat pump.
- ✤ Install a water re-circulating pump.
- ✤ Install a garbage disposal unit.
- ✤ Install a sump pump.
- ✤ Install a sewerage pump.

Vents

- Explain principles and purposes of venting, e.g., common, individual, wet vent.
- Explain vent termination.
- Explain air admittance valves.

Plumbing Systems Maintenance

- Clear obstructions from lavatory drains.
- Clear obstructions from main drain lines.
- ✤ Clear obstructions from water closets.
- Repair/replace leaking water faucets or valves.
- Preform methods to thaw frozen pipes.
- Replace all components in a gravity and/or pressure assist tank.

Tests on Systems

Perform tests according to local plumbing and mechanical codes (air, hydrostatic, head pressure, etc.)

Advanced Pipe Fabrication

- ✤ Calculate simple piping offsets.
- ✤ Calculate three-line, 45° equal-spread offsets around a vessel.
- ♦ Calculate three-line, 45° unequal-spread offsets.
- ♦ Convert center, back throat, and/or face measurement to an end measurement.

Pressure Boilers

- Explain various near boiler fittings, controls, and accessories.
- Explain various types of boilers and fuel sources.
- Explain the operation of water and steam boilers and their various controls.
- Explain the operation of draft controls.

Hydronic Heating System

- ✤ Identify piping for a hydronic heating system.
- ✤ Identify a primary and secondary piping system.
- ✤ Identify a radiant system.

Ladders and Scaffolds

- Use different types of ladders and scaffolds.
- Set up and inspect, stepladders, extension ladders, and scaffolding.

Pennsylvania Academic Standards

Mathematics

(Pre-Algebra or Algebra I Recommended)		
	Numbers and Operations	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
	Measurement and Data, and Probability	
2.4.HS.B.5	Make inferences and justify conclusions based on sample surveys, experiments, and observational studies	
	Geometry	
2.3.HS.A.1	Use geometric figures and their properties to represent transformations in the plane.	
2.3.HS.A.2	Apply rigid transformations to determine and explain congruence	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures.	
2.3.HS.A.4	Apply the concept of congruence to create geometric constructions.	
2.3.HS.A.5	Create justifications based on transformations to establish similarity of plane figures.	
2.3.HS.A.6	Verify and apply theorems involving similarity as they relate to plane figures.	
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles.	
2.3.HS.A.8	Apply geometric theorems to verify properties of circles.	
2.3.HS.A.9	Extend the concept of similarity to determine arc lengths and areas of sectors of circles.	
2.3.HS.A.1 0	Translate between the geometric description and the equation for a conic section.	
2.3.HS.A.1 1	Apply coordinate geometry to prove simple geometric theorems algebraically.	
2.3.HS.A.1 2	Explain volume formulas and use them to solve problems	
2.3.HS.A.1 3	Analyze relationships between two dimensional and three dimensional objects.	
2.3.HS.A.1 4	Apply geometric concepts to model and solve real world problems.	
	Algebraic Concepts	
2.2.HS.D.3	Extend the knowledge of arithmetic operations and apply to polynomials.	
2.2.HS.D.8	Apply inverse operations to solve equations or formulas for a given variable.	
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.	

Reading

	Key Ideas/Details	
3.5.9-10.A	Cite specific textual evidence, etc	
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc	
3.5.9-10.C	Follow precisely a complex multistep procedure, etc	
	Craft & Structure	
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words	
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.	
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure	
Integrate Knowledge/ Ideas		
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g.	
	a table or chart).	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem	
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem	
3.5.11-2.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding	
Range of Reading		
3.5.11-2.J	Read and comprehend technical texts independently and proficiently	

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
	Production & Distribution of Writing	
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience	
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience	
3.6.11-12.E	Use technology, including the Internet, to produce, publish, and update individual or shared writing products.	
Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing Grades		

3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc	

Examples of Course Material

Example #1 Plumbing, Heating & Air Conditioning Course Material

INSTRUCTIONS: Answer the following 2 questions about fractions.

QUESTION 1

Order the fractions, smallest to largest.

 \equiv 1/4 \equiv 9/16 \equiv 1/8 \equiv 3/8 \equiv 11/16 \equiv 7/8 \equiv 1/16 \equiv 5/8 \equiv 3/16 \equiv 5/16 \equiv 1/2 \equiv 7/16 \equiv 3/4 \equiv 13/16 \equiv 15/16

QUESTION 2

Match the Fraction to its Decimal Equivalent



/1

/1

Example #2 Plumbing, Heating, & Air Conditioning Course Material

Copper Piping Operations Study Guide

- 1. Applications
 - Copper Tube Handbook Table 14.1
 - Copper Tube Handbook Selecting the Right Tube for the Job
 - Copper Piping Operations ppt. Applications
- 2. Material Specifications
 - Copper Tube Handbook Table 14.1
 - Copper Tube Handbook Understanding Copper Tube [Sections 1 and 2]
 - Copper Piping Operations ppt. [Material-Pipe Wall Thickness-Temper-Identification-Fittings]
 - NCCER etext Module 7.1 7.2
- 3. Joining Methods [Soldering-Brazing-Flaring-Compression-ProPress]
 - Copper Tube Handbook Chapters 4-5-6-7-8-9-11
 - Copper Tube Handbook Figure 14.7
 - NCCER etext Module 7.4
 - Lucas Milhaupt Brazing Foundationals
 - Lucas Milhaupt Brazing Foundationals Video
 - Copper Piping Operations ppt. Joining Methods
- 4. Fittings
 - NCCER etext Module 7.3
 - NIBCO Copper Fitting Catalog
 - Copper Tube Handbook Figure 14.4
- 5. Testing
 - NCCER etext Module 7.7

Textbook

Residential Construction Academy Plumbing ISBN 978-1-4018-4891-5

Residential Construction Academy HVAC ISBN 978-1-4018-4901-6

Sample Textbook Reading:

"Fittings are available with one of two basic connections. Some can either receive pipe (i.e., have a hub) or be inserted into a hub or socket of a pipe end. Others, such as no-hub, cast-iron (NHCI) fittings, are connected with a specially designed clamp. A street fitting has one end that receives pipe and one end with the same kind of connection as the pipe. It is used mostly with offset fittings and is not available in all materials and designs. For example, NHCI is not available with a hub and, therefore, not in a street design."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt short sleeve	ML	\$14.75	R
T-shirt long sleeve	ML	\$17.00	R
Hooded sweatshirt	ML	\$21.50	R
Basic coverall OR	ML	\$48.50	R
Jeans or poplin work pants - navy	YC	\$20.00	R
Leather work shoes - non-steel toe	YC	\$125.00	R
Tape measure 16' - 25'	YC	\$17.00	R
6' folding ruler	YC	\$18.00	0
Calculator basic x2	YC	\$15.00	R
EPA 608 Certification test		\$25.00	0

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Community College of Allegheny County

PLATION Introduction to the Plumbing Profession	1.0
DI T 101 Dlumbing Skills 1	1.0
$\mathbf{D} = \mathbf{T} \mathbf{D} \mathbf{T} \mathbf{D} \mathbf{D} \mathbf{D} \mathbf{D} \mathbf{D} \mathbf{D} \mathbf{D} D$	4.0
PLT 102 Plumbing Measuring and Calculating	2.0
PLT 106 Plumbing Blueprint Reading	3.0
====	

Total Credits Awarded: 10.0

Notes: This articulation agreement aligns POS 34D Plumbing Technology/Plumber 46.0503 for HS Graduation Years 2020, 2021, 2022 to ten (10) credits for CCAC CIP 46.0503 365 Plumbing Certificate Program.

Westmoreland County Community College		
HAC 105	Blueprint Reading for HVAC Technical	2.0
CMT 121	Contracts for The Tradesman	2.0
PMB 101	Plumbing 1	4.0
PMB 121	Estimating for The Plumber	2.0

Total Credits Awarded: 10.0

Notes: The Secondary CIP 46.0503 Plumbing Technology aligns ten (10) credits to the Westmoreland County

Community College CIP 46.0503 Plumbing Technology, Associate of Applied Science (AAS)Degree Program.

Orleans Technical Institute		Credits
PH 102	Safety in Plumbing and Heating	0.5
PH 105	Overview of Heating System	1.5
PH 109	Plumbing	7.0
====		
Total Credi	its Awarded: 9.0	

Notes: Post-secondary CIP: 46.0503, Plumbing and Heating Diploma

Career Pathways

System & Equipment Installer Systems Designer Purchasing Specialist HVAC Mechanic Engineer Education/Training Specialist Service Technician Plumber Project Manager Cost Estimator Contractor Salesperson Pipefitter Mechanical

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Plumber	10%	\$35,940	\$56,980	\$67,490
HVAC Mechanic	11%	\$33,890	\$51,360	\$60,090
Mechanical Engineer	7%	\$57,640	\$86,650	\$101,150

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications		
OSHA Certification	Step Ladder	
Pennsylvania Builders	Residential Construction	
Association Skills Certificate	Academy	
Articulated Ladder	S/P2 Construction	
Mobile Ladder	EPA 608 Certification	

	Single and Extension Ladder	
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Program Safety & Physical Considerations

- High degree of self-discipline and focus needed for safety in and around equipment, hand tools, power tools and other equipment found in the industry
- Coordination ability to adjust actions in relation to other actions
- Ability to work in all weather conditions
- Have no fear of heights or working in closed spaces
- Physical strength and stamina with the ability to lift 50 pounds overhead
- Learning and work environment with dust, dirt, and debris found in the HVACR industry, loud and sometimes startling noise and moving people

Aptitudes for Success

- Eye/hand/foot coordination
- Manual and finger dexterity
- Spatial acuity
- Forms perception
- Ability to visualize in 3 dimensions

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Precision Machining Technology

Precision Machining Technology students manufacture precision parts in the school's NIMS (National Institute for Metalworking Skills) authorized training center. The curriculum provides in-school instruction on topics such as: quality control, benchwork, blueprint reading, computer-controlled machines (lathes/milling machines), and manual machines (saws /drills /grinders /lathes and milling machines). Career opportunities range from machine operator to tool and die maker or mechanical engineer and may begin in high school with a Co-Op position providing job experience and a salary. Students who successfully complete the program may receive seven college credits from HACC as well as credits from PA College of Technology and Thaddeus Stevens College of Technology.

Task List

Part Inspection

- ✤ Use precision measuring instruments.
- ✤ Calibrate precision measuring instruments.
- Create quality control procedures.

Bench Work

- ✤ Apply bench work safety procedures.
- Cut material with a hand hacksaw.
- ✤ File work to specifications.
- Cut threads with hand taps and dies.
- ✤ Select and use hand tools.
- ✤ Use a hand arbor and hydraulic press.

Drill Presses

- ✤ Apply drill press safety procedures.
- Operate drill press work holding devices.
- Select correct drill sizes for drill press application.
- Demonstrate counterboring, spot facing, reaming, and countersinking.

Grinding Machines

- ✤ Apply pedestal and surface grinding safety procedures.
- ✤ Identify parts of pedestal grinder.
- ✤ Test, mount, and dress grinding wheels.
- ✤ Grind and sharpen tools.
- ✤ Identify parts of surface grinder.
- ✤ Grind surfaces flat and parallel using a magnetic chuck.
- ✤ Grind work surfaces square with a vise or angle plate.
- Grind precision angles using a sine plate or sine bar.

- ✤ Apply lathe safety procedures.
- ✤ Indicate work piece in a 4-jaw chuck.
- ✤ Align centers.
- ✤ Face workpiece.
- ✤ Turn inside and outside diameters to shoulders.
- ✤ Turn tapers.
- Demonstrate knurling.
- ✤ Part off and groove workpiece.
- ✤ Cut internal and external threads.
- File and polish workpiece.
- Perform boring operations.
- ✤ Install and remove tool holders.
- Select and apply work holding devices.
- Select gears for lathe operations.
- Perform drilling operations.

Milling Machines

- ✤ Apply milling machine safety procedures.
- ✤ Tram a mill head.
- ✤ Mount and indicate vise.
- ✤ Mill angles.
- ✤ Mill keyways.
- ✤ Use an edge finder.
- Differentiate between climb milling and conventional milling.
- ✤ Use an adjustable boring head.
- ✤ Install and remove cutting tool holders.
- Select cutting tool for milling operations.
- ✤ Square part.
- Select cutting tool for drilling operations.

Power Saw

- ✤ Apply power saw safety procedures.
- Follow the 3-tooth rule.
- Saw work piece.

Machines and Tools

- ✤ Lubricate and maintain machinery.
- ✤ Clean and store equipment.
- ✤ Inspect machine guards.

Metallurgy

- ✤ Identify metals classifications.
- ✤ Identify metal property applications.
- ✤ Identify heat-treating and annealing processes.

Charts and References

- ✤ Use the decimal equivalent chart.
- ✤ Calculate speeds and feeds.
- ✤ Use tap and drill charts.
- ♦ Use Machinery handbook and/or shop references to locate information.

Blueprint Reading

- Identify orthographic views and projections.
- ✤ Identify the alphabet of lines and symbols.
- ✤ Calculate material sizes.
- ✤ Differentiate angle projections.
- ✤ Interpret title block information.

CNC Programming/Operations

- ✤ Apply CNC safety procedures.
- ✤ Interpret G and M codes.
- ✤ Use Cartesian coordinate systems.
- ✤ Prove a CNC program.
- ✤ Set part zero and tool offsets.
- ✤ Transfer data files to and from a CNC machine.
- ✤ Use CNC control functions.
- Select and use work-holding devices.

Mathematics

(Successful Completion of Algebra 1 or Higher <u>Strongly</u> Recommended)		
	Numbers and Operations	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
	Measurement and Data, and Probability	
2.4.HS.B.5	Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.	
	Geometry	
2.3.HS.A.1	Use geometric figures and their properties to represent transformations in the plane.	
2.3.HS.A.2	Apply rigid transformations to determine and explain congruence.	
2.3.HS.A.3	Verify and apply geometric theorems as they relate to geometric figures.	
2.3.HS.A.4	Apply the concept of congruence to create geometric constructions	
2.3.HS.A.5	Create justifications based on transformations to establish similarity of plane figures.	
2.3.HS.A.6	Verify and apply theorems involving similarity as they relate to plane figures.	
2.3.HS.A.7	Apply trigonometric ratios to solve problems involving right triangles.	
2.3.HS.A.8	Apply geometric theorems to verify properties of circles.	
2.3.HS.A.9	Extend the concept of similarity to determine arc lengths and areas of sectors of circles	
2.3.HS.A.10	Translate between the geometric description and the equation for a conic section.	
2.3.HS.A.11	Apply coordinate geometry to prove simple geometric theorems algebraically.	
2.3.HS.A.12	Explain volume formulas and use them to solve problems	
2.3.HS.A.13	Analyze relationships between two dimensional and three dimensional objects.	
2.3.HS.A.14	Apply geometric concepts to model and solve real world problems	
Algebraic Concepts		
2.2.HS.D.3	Extend the knowledge of arithmetic operations and apply to polynomials.	
2.2.HS.D.8	Apply inverse operations to solve equations or formulas for a given variable.	
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.	
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric ratios.	
2.2.HS.D.1	Interpret the structure of expressions to represent a quantity in terms of its context.	
2.2.HS.D.2	Write expressions in equivalent forms to solve problems.	
2.2.HS.D.4	Demonstrate the relationship between zeros and polynomials to make generalizations about functions and their graphs	
2.2.HS.D.5	Use polynomial identities to solve problems	
2.2.HS.D.6	Extend the knowledge of rational functions to rewrite in equivalent forms.	
2.2.HS.D.7	Create and graph equations or inequalities to describe numbers or relationships.	

2.2.HS.D.10	Represent, solve and interpret equations/inequalities and systems of equations and inequalities.
2.2.HS.C.1	Use the concept and notation of functions to interpret and apply them in terms of their context
2.2.HS.C.2	Graph and analyze functions
2.2.HS.C.3	Write functions or sequences that model relationships between two quantities.
2.2.HS.C.4	Interpret the effects transformations have on functions and find the inverses of functions.
2.2.HS.C.5	Construct and compare linear, quadratic and exponential models to solve problems.
2.2.HS.C.6	Interpret functions in terms of the situation they model.
2.2.HS.C7	Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.
2.2.HS.C.8	Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.
2.4.HS.B.3	Analyze linear models to make interpretations based on the data.
2.4.HS.B.2	Summarize, represent, and interpret data on two categorical and quantitative variables.

Reading

Key Ideas/Details							
3.5.11-12 A	Cite specific textual evidence, etc.						
3.5.11-12.B	Determine the central ideas or conclusions of a text; etc.						
3.5.11-12.C	-12.C Follow precisely a complex multistep procedure, etc.						
	Craft & Structure						
3.5.11-12.D	Determine the meaning of symbols, key terms, and other domain specific words						
3.5.11-12.E	Analyze the structure of the relationships among concepts in a text, etc.						
3.5.11-12.F	Analyze the author's purpose in providing an explanation, describing a procedure & analyze the structure of the relationships among concepts in a text						
Integrate Knowledge & Ideas							
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart)						
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem						
3.5.9 -10. I	Compare and contrast findings presented in a text to those from other sources, etc.						
3.5.11-12.G	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem						
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible						
3.5.11-12. I	Synthesize information from a range of sources into a coherent understanding						
Range of Reading							
3.5.11-12.J	Comprehend technical texts independently and proficiently						

Writing

Text Types and Purpose						
3.6.11-12.A	Write arguments focused on discipline specific content					
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,					
	etc.					
Production & Distribution of Writing						
3.6.11-12 C	Produce clear and coherent writing, appropriate to task, purpose, and audience					
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience					
3.6.11-12.E	Use technology, including the internet, to produce, publish, and update individual or shared writing products					
Research						
3.6.1 -12.F	Conduct short and more sustained research to answer a question or solve a problem					
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,					
	following a standard format for citation					
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research					
Range of Writing						
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of					
	tasks, purposes, and audiencesetc.					

Examples of Course Material

Example #1 Precision Machining Course Material

Using the supplied drawing, please convert the Isometric drawing into a 3 view drawing. You may use the grid paper in the classroom. What I would like you to do, is take a picture of your drawing and upload. Please make sure the image you upload is clear and legible. Hold onto the original drawing in case I need to see it in person.



Grading Rubric

Criteria	Grading Scale					
Boarder Bold Black Boarder around print edge	4 Boarder goes all around print, No overlaps at corners and are straight lines	3 Boarder goes all Boarder all around ound print, No erlaps at corners d are straight es		2 Missing Boarder edges		1 No boarder at all
Title Block Lower Right hand Corner with correct details	4 Title block present, Correct Location, all information present (Name, Date, Scale, Part Name)	3 Title block present, But one of the following wrong: Location or Information Required		2 Title block present, but location is wrong, and information is missing		1 No Title block
Views 3 views required	4 Drawing has the 3 views present, and in correct orientation. Top, Front, Right side		2 Drawing has the 3 views present, but not in correct orientation. Top, Front, Right side		0 Drawing is missing 1 or more views	
Scale Scale is uniform between all views	4 All 3 views are drawn to same scale, Views are lined up		2 All 3 views are drawn to same scale, views are NOT lined up		0 Views are drawn with no scale in mind	
Dimension All required dimensions are present	4 All dimension are present, no duplicates between views	3 All dimensions are present, with duplicates present		2 Missing 1-3 dimensions		1 Missing 4 or more dimensions
Extention Lines/Dimension Lines	4 Extension Lines are close but not touching the part, and Dimension Arrows are touching Extension Lines		2 Of of the following Statements aren't true: Extension Lines are close but not touching the part, and Dimension Arrows are touching Extension Lines		0 Extension Lines are touching the object, and Dimension arrows aren't touching Extension lines.	

Total pts: 24


Textbook

Precision Machining Technology ISBN 978-1-4354-4767-7

Sample Textbook Reading:

"A lathe center is a cylindrical steel device with a 60-degree included angled point on one end and a Morse taper on the other end. One center is mounted in the headstock spindle using a reducing sleeve and another is mounted in the quill of the tailstock. Be sure that all mating surfaces are clean and burr free before installation. Holes are drilled in the ends of the workpiece for mounting between the lathe centers."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt	ML	\$14.75	R
Polo shirt	ML	\$20.50	0
Long sleeve button down shirt	ML	\$26.00	0
Industrial work pant	ML	\$22.50	R
Leather work boots - steel toe	YC	\$100.00	R
Binder 2" 3-ring	YC	\$5.00	R
Pens, pencils	YC	\$5.00	R
TI30X112 calculator	YC	\$15.00	R
Safety glasses ANSI Z87.1+	YC	\$6.00	R
6" caliper	YC		R
0-1 micrometer set	YC		R
6" steel rule set	YC		R
Above three items as a set	MSC	\$110.00	

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Reading Are	ea Community College	Credits
MTT 105	Introduction to Machining	3.0
MTT 110	Basic Machine Tools	3.0
MTT 157	Turning Technology - Level 1	3.0
MTT 158	Milling Technology - Level 1	3.0
T 10 11	1 1 1 0 0	

Total Credits Awarded: 12.0

Notes: Twelve (12) credits are aligned to the following Reading Area Community College POS CIP: 48.0501 Machine Tool Technology AAS. Course pre-requisites don't apply to SOAR credits being brought in by articulation.

Westmoreland County Community College		Credits
MTT 101	Blueprints	4.0
CNC 111	Computer Numeric Control I	4.0
MTT 111	Machining I	4.0
====		
\mathbf{T}	1 1 1 0 0	

Total Credits Awarded: 12.0

Notes: Twelve (12) credits are aligned to Westmoreland County Community College Programs of Study CIP 48.0501 Journeyman Machining Technology, Associate of Applied Science (AAS) Degree Program.

Delaware County Community College		Credits
MTT 110	Print Layout and Measurement for Machining	4.0
MTT 112	Lathe Operations I	3.0
MTT 124	Milling Operations I	3.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Delaware County Community College POS: CIP 48.0501 Machine Tool Technology, Associate in Applied Sciences (A.A.S.) Degree.

Thaddeus Stevens College of Technology		Credits
CIM 106	Blueprint Reading and Related Math	3.0
CIM 112	Manufacturing Processes	2.0
CIM 115	Measurement Systems	2.0
CIM 118	Lathe and Vertical Milling Machining I	4.0

Total Credits Awarded: 11.0

Notes: Eleven (11) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 48.0501 Computer-Integrated Machining, Associate in Applied Science Degree (A.A.S). To get this articulation agreement – students must successfully complete Precision Machining with a B or better, and must earn NIMS – Level 1 Milling, Drill Press, Turning-Between Centers, and Measurement, Material and Safety, and earn OSHA 10

Butler County	y Community College	Credits
DRFT 114	Blueprint Reading	3.0
MACH 131	Mill I	3.0
MACH 111	Lathe I	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Butler County Community College POS 20E CIP 48.0501 Machine Tool Technology, Workplace Certificate.

Johnson College		Credits
AMT 151	Foundationals of Metal Cutting	2.00
AMT 152	Foundationals of Metal Cutting Lab	1.00
AMT 153	Subtractive Manufacturing	1.00
AMT 154	Subtractive Manufacturing Lab	2.00
AMT 251	Computer Numerical Controls Machining	1.00
AMT 252	Computer Numerical Controls Machining Lab	2.00

Total Credits Awarded: 9.00

Notes: Nine (9) credits align to Johnson College's CIP 15.0613-Advanced Manufacturing Technology -AAS degree program.

255

The Manufacturer's Association

Year 1	OSHA 10 Certification
	Basic Shop Math and Precision Measurement
	Design and Processing/Quality Control
	Soldiworks/AutoCad Design
	Lean Manufacturing Intro
Year 2	Blueprint Reading
	Advanced Shop Math
	Shop Project 1, 2, and 3

Total Credits Awarded: 80 Hours

Notes: To get this articulation agreement - Successfully complete Precision Machining with a B or better, and must earn NIMS – Level 1 Milling, Drill Press, Turning-Between Centers, and Measurement, Material and Safety and earn OSHA 10.

Career Pathways

Manual Machine Operator Machinery Mechanic	CNC Machine Operator CNC Programmer	Inspection Technician CNC Set-Up
Technician		
Quality Control Inspector	Tool & Cutter Grinder	Automotive Machinist
Tool & Die Maker	Mechanical Engineer	

Position	PA Projected Employment Growth 2014-2024	Entry Salary	Avg PA Salary	Experienced Salary
Machinist	12%	\$30,700	\$43,380	\$49,720
Industrial Machinery Mechanic	22%	\$36,530	\$50,600	\$57,630
Tool and Die Maker	5%	\$37,400	\$50,050	\$56,380
Mechanical Engineering Technician	4%	\$38,910	\$54,840	\$62,810
Computer-Controlled Machine Tool Operators	21%	\$27,100	\$38,480	\$44,180

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification	NIMS Machining Level I: Manual		
	Surface Grinding		
NIMS CNC Milling: Programming	NIMS Machining Level I: Manual		
Setup & Operations	Turning Between Centers		
NIMS CNC Turning: Programming	NIMS Machining Level I: Manual		
Setup & Operations	Turning with Chucking		
NIMS Machining Level I: CNC	NIMS Machining Level I:		
Milling	Measurement, Materials, and Safety		
NIMS Machining Level I: Turning	NIMS Machining Level I: Planning,		
	Benchwork, & Layout		
NIMS Machining Level I: Manual	NIMS Machining Level II		
Drill Press Operations			
NIMS Machining Level I: Manual	Haas CNC Operator		
Milling			
Soldiworks	Mastercam		

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed for safety in and around equipment, hand tools, power tools and other equipment found in the industry
- Coordination ability to adjust actions in relation to other actions
- Have no fear of heights or working in closed spaces
- Physical strength and stamina with the ability to lift 50 pounds overhead
- Learning and work environment with dust, dirt, and debris found in the HVACR industry, loud and sometimes startling noise and moving people

Aptitudes for Success

- Eye-hand coordination
- Fine motor skills
- Arm-hand steadiness
- Finger and manual dexterity
- Spatial acuity
- Ability to discriminate between objects of similar size, shape, and color
- Visual acuity
- Depth perception
- Motor coordination
- Quick reaction time
- Multi-limb coordination and trunk strength
- Forms perception
- Ability to visualize in 3 dimensions
- Strong math skills

Release 1.2

Standardized Testing Requirement

 $NOCTI - 12^{th}$ Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Sports Therapy Science

Sports Therapy Sciences students will gain knowledge of pre-participation health and fitness assessments to design individual exercise and rehabilitation programs. Our goal is to provide an education that will encourage our students to continue their studies in fields such as athletic training, physical therapy, occupational therapy and other health and fitness related fields. Our curriculum includes human anatomy and physiology, medical terminology, basic first aid and CPR, injury management and personal training. At the conclusion of our program, each student will be eligible to take a personal training certification examination.

Task List

Organizational, Professional Health, and Wellbeing

- Comply with school and health care/fitness facility partner rules and regulations.
- Comply with course objectives, expectations, and grading procedures.
- ✤ Apply interpersonal conflict management skills.
- ◆ Utilize safety and emergency procedures and report emergencies immediately.
- ✤ Adhere to the professional standards for health care providers.
- Investigate fitness and health care careers by describing historical foundations, comparing, and contrasting scopes of practice, describing educational/licensure requirements, and analyzing different occupational opportunities.
- ✤ Use medical/fitness equipment.
- ◆ Use proper body mechanics for personal and patient/client safety.

Documentation, Legal and Ethical Issues

- ♦ Maintain the confidentiality of records/information as required by HIPAA/FERPA.
- ✤ Implement the components of informed consent.
- ✤ Identify the legal importance of accurate record keeping to the benefit of all parties.
- ♦ Define legal concepts of liability, negligence, supervision, and assumption of risk.
- ✤ Analyze legal considerations and ethical actions.

Emergency Care and Infection Control

- ✤ Identify the components of an Emergency Action Plan (EAP).
- ✤ Identify signs and symptoms, prevention, and treatment of weather-related illnesses.
- Perform CPR, AED, and Basic First Aid skills.
- Identify signs and symptoms, prevention, and treatment of head injuries/traumatic brain injuries (TBI's).
- ✤ Identify signs and symptoms, prevention, and treatment of acute traumatic spine injuries.
- ✤ Identify common causes of cardiorespiratory complications.
- ✤ Identify emergency management techniques for neuromusculoskeletal conditions.
- Apply protect, rest, ice, compress, and elevate (PRICE) principle.
- ♦ Clean and disinfect objects and surfaces to prevent disease transmission.
- Perform proper hand washing technique.
- ♦ Identify various blood borne pathogens and comply with OSHA standards.
- ✤ Utilize personal protective equipment (PPE).

Injury Prevention and Protection

- ✤ Identify types of bracing/splinting devices and techniques.
- Select the appropriate taping, bracing, and wrapping techniques.
- Utilize patient/client safety measures.
- ✤ Adapt strategies for special populations.

Treatment, Rehabilitation, and Clinical Skills

- Compose HOPS (history/observation/palpation/special tests) and SOAP (subjective/objective/assessment/plan) notes.
- ✤ Measure and record height and weight.
- ✤ Measure and record vital signs (VS).
- Perform visual acuity test.
- ♦ Measure and perform range of motion (ROM).
- ✤ Perform manual muscle test (MMT).
- Distinguish the phases of rehabilitation.
- ✤ Identify signs and symptoms, prevention, and treatment of neuromusculoskeletal injuries.
- ✤ Identify therapeutic modalities and related safety procedures.
- Assist the patient/client with activities of daily living (ADL) and necessary assistive devices (AD).
- Protect a patient's/client's privacy while treating him/her.

Nutrition and Hydration

- Explain daily nutritional requirements, caloric intake needs, and calculate basal metabolic rate (BMR).
- Evaluate food labels.
- Evaluate basic and sport nutrition needs, including hydration.
- ✤ Identify signs and symptoms of dehydration.
- ✤ Identify safe methods for weight loss and weight gain.
- ✤ Identify supplements and ergogenic aids.

Exercise Science and Prescription

- Simulate pre-exercise screening in determining physical activity participation.
- ✤ Utilize health/fitness intake questionnaire.
- Conduct baseline testing for body composition, cardiorespiratory, muscular strength, muscular endurance, and flexibility.
- ✤ Implement the components of exercise prescription and modification.
- Select and demonstrate exercises to improve body composition, cardiorespiratory fitness, muscular strength, muscular endurance, and flexibility.
- Select and demonstrate exercises to improve agility, power, speed, balance, and proprioception.
- Create short-term and long-term goals utilizing the SMART (specific, measurable, attainable, realistic and time bound) principle.
- Execute spotting techniques for resistance training exercise.

Human Development and Mental Health

- ✤ Identify the stages of human growth and development.
- Communicate according to the patient's/client's stage of development and background.
- ✤ Identify and discuss types of mental health disorders.
- ✤ Identify and discuss types of disordered eating.
- ✤ Identify physical and psychological indicators of stress.

Medical Terminology

♦ Use medical terminology and abbreviations/acronyms.

Anatomy, Physiology, and Pathophysiology

- ✤ Identify anatomical position, body planes, directions, and cavities.
- ✤ Identify organs, functions, and disease processes of the integumentary system.
- ✤ Identify organs, functions, and disease processes of the skeletal system.
- ✤ Identify organs, functions, and disease processes of the muscular system.
- ✤ Identify organs, functions, and disease processes of the nervous system.
- ✤ Identify organs, functions, and disease processes of the cardiovascular system.
- ✤ Identify organs, functions, and disease processes of the endocrine system.
- ✤ Identify organs, functions, and disease processes of the lymphatic system.
- ✤ Identify organs, functions, and disease processes of the respiratory system.
- ✤ Identify organs, functions, and disease processes of the urinary system.
- ✤ Identify organs, functions, and disease processes of the digestive system.
- ✤ Identify organs, functions, and disease processes of the reproductive system.
- ✤ Identify organs, functions, and disease processes of the immune system.

Pennsylvania Academic Standards

Mathematics

Numbers and	nd Operations	Foundational
2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents.	
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers	Yes
2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems	Yes
Measureme	nt and Data, and Probability	Foundational
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
2.4.5.A.1	Solve problems using conversions within a given measurement system.	Yes
Geometry		Foundational
2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume	Yes
Algebraic C	Concepts	Foundational
2.2.7.B.2	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations	Yes

Reading	
Key Ideas/Det	ails
3.5.9-10.A	Cite specific textual evidence, etc
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc
3.5.9-10.C	Follow precisely a complex multistep procedure, etc
Craft & Struc	ture
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specific words
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure
Integrate Kno	wledge/ Ideas
3.5.9-10.G	Translate quantitative or technical information expressed in a text into visual form $(e, g, a \text{ table or chart})$
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a technical problem
3.5.9 -10.I	Integrate and evaluate multiple sources of information presented in diverse formatsto solve a problem
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible
3.5.11-12.I	Synthesize information from a range of sources into a coherent understanding
Range of Read	ling
3.5.11-12.J	Read and comprehend technical texts independently and proficiently

Writing

Text Types a	nd Purpose
3.6.11-12.A	Write arguments focused on discipline specific content
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,
	etc.
Production &	& Distribution of Writing
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience
3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience
3.6.11-12.E	Use technology, including the Internet, to produce, publish, and update individual or shared writing products.
Research	
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research
Range of Wr	iting Grades
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiencesetc

Examples of Course Material

Example #1 Sports Therapy Science Course Material

Study Guide

Cells and Tissues

Adipose tissue - soft connective tissue that stores fat. Anatomy - The study of the structure of the body (how the body is put together) Meiosis - cell division that is necessary for proper fertilization and reproduction

Mitochondria – Known as the powerhouse. This area contains the genes that determine the physical and mental characteristics of a person. It is also the place where chemical reactions occur.

Neurons - Special cells that carry commands and information between the brain and the rest of the body.

Physiology - The study of the function of the body (how the body works) **Organs** - A collection of similar cells and their intercellular substances that work together to perform a particular function

Signs and symptoms of dehydration:

- Dry mucous membranes
- Thirst
- Weakness

Types of Muscle Tissue

- Cardiac
- Skeletal
- Visceral (smooth)

Principles of Wound Care

Most common ways to control bleeding:

- Elevation
- Ice
- Pressure direct pressure is the most effective way to control arterial bleeding

Dressing a wound:

• You should always remove rings, watches, or bracelets from the patient if dressing a hand or wrist

- Always wear gloves
- Control bleeding
- Cleanse the wound
- Open dressing using sterile technique
- 1st layer sterile, soft, nonstick material
- 2nd layer absorbent material and large enough to cover the wound
- 3rd layer holds the dressing in place
- Normal blood needs 4-6 minutes to clot

Important Facts

• Capillary bleeding is the most common type of external bleeding and occurs with most injuries.

 Indirect pressure – pressure points Temporal artery – front of the ear Carotid artery – neck Subclavian artery – under the clavicle Brachial artery – upper arm Ulnar artery – forearm Radial artery – forearm Iliac artery – groin Femoral artery – leg Popliteal artery – knee Dorsalis pedis artery – ankle
 Redness swelling increased pain for

• Redness, swelling, increased pain, foul-smelling drainage, red streaks, and an elevated temperature are indications of an infections

Injuries to the Soft Tissues

Abrasion - An open wound, road burn, or rug burn in which the outer layer of skin has been scraped off

Avulsion - Soft tissue injury in which a flap of tissue is torn loose or pulled off **Callus** - A thickened, usually painless area of skin caused by friction or pressure

Bites - For a person who is bitten by a venomous snake, the first aid action should be to alert EMS services. Bites or stings can cause a systemic reaction which involves the whole body rather than just a part.

Blister – fluid build-up under the skin

Contusion - A soft tissue injury caused by seepage of blood into tissue; a bruise. Will experience point tenderness and local pain at injury site; elevation will help to reduce swelling and pain

Hematoma - A blood-filled, swollen area: a goose-egg mass caused by bleeding under the tissues. Immediate treatment consists of ice, compression and elevation.

Incision – Clean cuts that can be deep. May need to be treated with sutures.

Laceration - wounds with jagged edges

Myositis ossificans - A condition in which bone forms in and replaces muscle tissue as a result of trauma

Puncture wound - A soft tissue injury caused by penetration by a sharp object, ie: stepping on the tip of a nail

Muscular System

Function of the muscular system:

- Provides strength
- Helps control movement

Injuries to the Muscle Tissues

Myositis Ossificans – condition where bone forms and replaces muscle tissue as a result of trauma **Sprain** - A stretching or tearing of the ligaments, characterized by the inability to move, deformity and pain

Strain - pulled muscle

Tendonitis – injury caused by repetitive motions

Movements

Abduction – Movement of the body part away from the middle of the bodyAdduction - Movement of a body part toward the middle of the bodyCircumduction -Dorsiflexion – toes pulled up towards bodyEversion - Turning outwardExtension – movement that results in an increased angle between two bonesFlexion - Movement that results in a decreased angle between two bonesInversion - Turning inwardPlantar Flexion – point toesPronation – palm upSupination – palm down

The Joints (Articulations)

Cartilaginous – type of joint that is slightly moveable, ie: vertebra in the spine **Fibrous** - type of joint that is immovable, ie: bones of the skull **Synovial** - type of joint that is freely movable, ie: elbow, shoulder, knee. Most frequently injured joint type.

Injuries to the Joints

Crepitus - A crackling or grating sound heard upon movement of a damaged bone or joint **Dislocation** - The separation of a joint and malposition of an extremity

Joint Laxity - Joint play; motions occurring between the ends of two or more bones that form a joint as it moves through its range of motion

Ligament - A band of white, fibrous connective tissue that helps hold bone to bone **Subluxation** - A partial dislocation

Synovitis - Inflammation of the synovial membrane in a joint, characterized by pain, swelling, localized tension, and increased pain with movement

Tendon - Fibrous connective tissue around a joint that connects muscle to bone

Treatment Methods:

RICE – rest, ice, compression and elevation. First aid for a mild strain or soft tissue injury. **PRICE** - Protection, rest, ice, compression, elevation. Systematic steps taken to mitigate or minimize injury especially from a sprain of a ligament.

The Skeletal System

Functions:

- Provides support for muscles, fat and soft tissues
- Protects internal organs
- Provides leverage for lifting and movement through the attachment of muscles
- Produces blood cells
- Stores the majority of the body's calcium supply

Fracture - A crack or break in a bone

Signs and Symptoms of a fracture:

- Pain
- Deformity
- Ecchymosis
- Crepitus
- Immobility
- Numbness/Tingling
- Pale, cold skin

Closed fracture – fracture that does not break the skin

Open fracture – bone protrudes through the skin, leaving an open wound like a laceration

Avulsion fracture – a fragment of bone is torn away at the attachment of a tendon or ligament **Blowout fracture** – break in the floor of the orbital socket resulting from a direct blow to the eye **Comminuted fracture** – a break with 3 or more fragments

Greenstick fracture - An incomplete fracture is which the bone is partially bent **Impacted fracture** – a break which one bone fragment becomes embedded in the interior of another bone fragment

Longitudinal fracture – break that splits or cracks the bone lengthwise

Oblique fracture – a diagonal break usually resulting from a torsion force

Salter-Harris fracture – a break across the epiphyseal (growth) plate

Spiral fracture – S-shaped break in the bone

Stress fracture – caused by repeated stress over time

Transverse fracture – break that occurs across the bone shaft

Treatment:

Splint - A rigid material used to support or immobilize and injured body part

Erikson's 8 Stages of Development Small Group Activity Menu

Non-negotiable: What all students must be able to do? What components must be in each learning activity?

- Include Erikson's stage "title" and timespan Ex: Birth-18 months Trust vs. Mistrust
- Address each component of the life stage: physical, social-emotional, and cognitive
- Include a works cited page
- Evidence of group member participation, description of what part each person completed or how he/she participated
- All will peer Evaluation forms

Ideas:

1. Write a "newspaper article" about the developmental stage to be read by a reporter to the class.

Create and include

- a crossword puzzle with your newspaper, which will be required to be completed by classmates Must include key vocabulary terms related to the stage,

-For example: infants/toddlers: crawl, creep, babble, separation anxiety, stranger anxiety -a "comic strip" about that stage of development depicting the physical, social-emotional, and cognitive abilities

1. PowerPoint, Prezi, or Other Visual Presentation (include pictures/photos of stage, visuals/charts)

a. Handout Guided Notes- peers will participate by filling in the missing words or definitions

a. End of Presentation Activity to check and see if your peers learned and understood the new information

i.Example: 321 Exit Tickets

- i.
- 1. Interactive Game or Theatrical methods- write your own script!
 - a. Act out or create a school appropriate 5 minute Flipgrid video about your topic for the class (must be teacher approved before presenting)
 - a. Check their learning through an interactive game such as Kahoot

How did the audience respond?

How do you know that they understood the material you shared? Can they pass the test based upon your presentation?

Resources for the Personal Trainer ISBN 978-1-4963-2289-0

Sample Textbook Reading:

"Decisions regarding the use of isometric, dynamic concentric, dynamic eccentric, and isokinetic modalities of exercise are important in planning any type of resistance training program. Not all equipment uses concentric and eccentric muscle actions, and this can impact training effectiveness (e.g., hydraulics). Whether for sport, fitness or rehabilitation, basic biomechanical analysis is used to decide which muscles to train and to identify the type of muscle action is involved in the activity. Most resistance training programs use several types of muscle actions."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
Ladies Polytech polo shirt	ML	\$21.25	R
Ladies CVC crew t-shirt OR	ML	\$9.00	R
Ladies Cool & Dry Sport Performance Interlock T-shirt	ML	\$9.50	R
Ladies Sport-Wick Stretch 1/2 zip pullover	ML	\$29.00	R
Ladies Poly Mesh/Tricot 5" shorts	ML	\$9.50	R
Ladies Tricot track pants	ML	\$27.00	0
Men's Polytech polo shirt	ML	\$21.25	R
Men's CVC t-shirt OR	ML	\$9.00	R
Men's Cool & Dry Performance Interlock t- shirt	ML	\$9.50	R
Men's Dry Zone long sleeve raglan t-shirt	ML	\$17.00	0
Men's Sport-Wick Stretch 1/2 Zip pullover	ML	\$29.00	R
Men's Mesh/Tricot 9" shorts OR	ML	\$10.75	R
Men's Mesh/Tricot 11" shorts	ML	\$14.75	R
Men's Tricot track pants	ML	\$27.00	0
Pants - khaki, gray or black	YC	\$25.00	R
Athletic shoes	YC	\$50.00	R
Watch with a second hand (or digital)	YC	\$20.00	R
2021-2022 sports physical	Physician	\$50.00	R
2-step Mantoux (tb test)	Physician	\$30.00	0
Criminal background check clearance	PA State	\$22.00	0
FBI fingerprint clearance	PA State	\$23.85	0
5 binders, various sizes	YC	\$20.00	R

Pencils/pens (blue or black ink only)	YC	\$3.00	R
Index cards (qty:500)	YC	\$3.00	R
Multicolored pencils	YC	\$3.00	R
Various color highlighters	YC	\$5.00	R
Spiral bound sketch book	YC	\$5.00	R
NASM certified personal trainer exam		\$200.00	0
HOSA - Future Health Professionals membership		\$20.00	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

None Available (2022)

Career Pathways

Personal Trainer Occupational Therapist	Athletic Trainer		Physical	Physical Therapist	
Position	Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary	
Personal Trainer	10%	\$20,710	\$37,920	\$46,530	
Athletic Trainer*	17%	\$34,090	\$46,590	\$52,850	
Physical Therapist*	26%	\$62,250	\$85,510	\$97,130	
Occupational Therapist*	21%	\$57,000	\$79,860	\$91,920	

(* denotes additional educational or certification requirements)

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
Heartsaver First Aid CPR/AED	OSHA Certification		
Bloodborne and Airborne	CPR and AED		
Pathogens			
First Aid			

Program Safety & Physical Considerations

- High degree of self-discipline and focus needed in the program and industry
- Good personal hygiene
- Stamina for prolonged standing, bending, and stooping
- Ability to lift 50 pounds to waist level without restrictions
- Must be able to work independently and with teams
- Physical strength and trunk strength required to lift patients for transfer
- Must follow HIPPA with patient confidentiality
- Emotional and mental stability
- Empathy towards others
- Not disturbed by incidences such as bodily fluids, surgeries, injections, traumatic situations, and willingness to safely handle various bodily fluids and medical waste

Aptitudes for Success

- Manual and finger dexterity
- Eye/hand coordination
- Color discrimination
- Clerical perception
- Arm-hand steadiness
- Multi-limb coordination
- Ability to multitask
- Ability to use the various tools in the Healthcare industry

Standardized Testing Requirement

NOCTI – 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Welding Technology

Welding Technology students design, fabricate and repair metal products in the school's shop facilities. They develop skills in testing procedures necessary to meet standards for welding certification and practice welding techniques according to the requirements of the American Welding Society. Utilizing state-of-the-art equipment, students learn shielded metal, gas metal, gas tungsten and flux core arc welding, blueprint reading, gas welding and brazing, oxyfuel cutting, metal layout and fabrication, computerized numerical control cutting, plasma cutting of sheet and plate metals, and structural and robotic welding. Technical careers range from a metal fabricator to an underwater welder. These opportunities may begin in high school with a Co-Op position providing job experience and a salary. Students who successfully complete the program may receive six college credits from HACC or entry level welder certification. The program is nationally recognized by the AWS (American Welding Society).

Task List

Occupational Orientation and Safety

- ✤ Complete time or job sheet, reports, or records.
- Perform housekeeping duties daily.
- Follow verbal instructions to complete work assignments and rules.
- ✤ Follow written instructions to complete work assignments and rules.
- ✤ Inspect and use Personal Protection Equipment (PPE) daily.
- ✤ Maintain proper organization and operation of work area.
- Demonstrate proper use of ventilation equipment.
- Discuss proper hot work operation.
- Demonstrate knowledge of proper work actions for working in confined spaces.
- ✤ Identify Safety Data Sheets (SDS) and precautionary labeling.
- ✤ Inspect welding and thermal cutting equipment for safe operation.
- Display familiarity with industrial and OSHA safety standards.
- Identify oxyfuel safety procedures.
- ✤ Identify arc welding/cutting safety procedures.
- Follow emergency action plan.

Principles of Welding

- ✤ Identify major types of metals (ferrous and nonferrous) used in welding.
- Describe the basic principles of heat, expansion, and contraction as they relate to metals.
- Describe the industry accepted welding codes, standards, and procedures and their use.
- ✤ Identify various joint designs (joint geometry).
- Clean and prepare materials for welding and/or cutting.
- ✤ Demonstrate proper use of hand tools.
- Demonstrate proper use of standard measuring and layout tools.
- ✤ Demonstrate proper use of power equipment.

Welding, Drawing, and Weld Symbol Interpretation

- ✤ Interpret basic elements of a drawing or sketch.
- ✤ Interpret welding symbol information.
- ✤ Fabricate parts from a drawing or sketch (class project).
- ✤ Identify structural materials used in the metal fabrication field.
- ✤ Perform basic metric conversion.

Visual Examination, Inspection, and Testing

- ✤ Interpret basic elements of a drawing or sketch.
- ✤ Interpret welding symbol information.
- ✤ Fabricate parts from a drawing or sketch (class project).
- ✤ Identify structural materials used in the metal fabrication field.
- Perform basic metric conversion.

Visual Examination, Inspection, and Testing

- Evaluate cut surfaces and edges of prepared base metal parts for testing.
- ✤ Identify and evaluate weld discontinuities as per accept/reject criteria.
- ◆ Perform visual inspection, destructive, and non-destructive testing.

Shielded Metal Arc Welding (SMAW)

- Perform safety inspections of SMAW equipment.
- ✤ Make minor external repairs to SMAW equipment.
- Set up and operate SMAW equipment.
- Perform qualification test.
- ✤ Pass fillet weld performance test in flat position.
- ◆ Pass fillet weld performance test in horizontal position.
- ◆ Pass fillet weld performance test in vertical position.
- ◆ Pass fillet weld performance test in overhead position.
- Pass groove weld performance test in flat position.
- ✤ Pass groove weld performance test in horizontal position.
- ✤ Pass groove weld performance test in vertical position.
- ✤ Pass groove weld performance test in overhead position.

Gas Metal Arc Welding (GMAW)

- Perform safety inspections of GMAW equipment.
- ✤ Make minor external repairs to GMAW equipment.
- Set up and operate GMAW equipment.
- ✤ Pass performance test.
- ✤ Pass fillet weld performance test in flat position.
- ◆ Pass fillet weld performance test in horizontal position.
- ◆ Pass fillet weld performance test in vertical position.
- ◆ Pass fillet weld performance test in overhead position.
- Pass groove weld performance test in flat position.
- ◆ Pass groove weld performance test in horizontal position.
- ✤ Pass groove weld performance test in vertical position.
- ✤ Pass groove weld performance test in overhead position.

Flux Corded Arc Welding (FCAW)

- Perform safety inspections of FCAW equipment.
- ✤ Make minor external repairs to FCAW equipment.
- Set up and operate FCAW equipment.
- ✤ Pass performance test.
- ✤ Pass fillet weld performance test in flat position.
- ◆ Pass fillet weld performance test in horizontal position.
- ◆ Pass fillet weld performance test in vertical position.
- ◆ Pass fillet weld performance test in overhead position.
- ✤ Pass groove weld performance test in flat position.
- ◆ Pass groove weld performance test in horizontal position.
- ◆ Pass groove weld performance test in vertical position.
- ✤ Pass groove weld performance test in overhead position.

Gas Tungsten Arc Welding (GTAW)

- Perform safety inspections of GTAW equipment.
- ✤ Make minor external repairs to GTAW equipment.
- Set up and operate GTAW equipment.
- ✤ Pass performance test on ferrous materials.
- Set up and operate GTAW on nonferrous materials.
- ✤ Pass performance test on nonferrous materials.
- ◆ Pass fillet weld performance test in flat position on ferrous materials.
- ◆ Pass fillet weld performance test in horizontal position on ferrous materials.
- ◆ Pass fillet weld performance test in vertical position on ferrous materials.
- ◆ Pass fillet weld performance test in overhead position on ferrous materials.
- Pass fillet weld performance test in flat position on nonferrous materials.
- ◆ Pass fillet weld performance test in horizontal position on nonferrous materials.
- ◆ Pass fillet weld performance test in vertical position on nonferrous materials.
- ◆ Pass fillet weld performance test in overhead position on nonferrous materials.

Manual Oxy-fuel Gas Cutting (OFC)

- Perform safety inspections of OFC equipment.
- ✤ Make minor external repairs to OFC equipment.
- ✤ Operate manual OFC equipment.
- ✤ Perform straight cutting operations on steel.
- ✤ Perform shape cutting operations on steel.
- Perform bevel cutting operations on steel.
- Perform piercing operations on steel.

Mechanized Oxy-fuel Gas Cutting (OFC)

- Perform safety inspections of mechanized OFC equipment.
- ✤ Make minor external repairs to mechanized OFC equipment.
- ✤ Set up and operate mechanized OFC equipment on steel.
- Perform straight mechanized OFC operations on steel.
- ◆ Perform bevel mechanized OFC operations on steel.

275

Manual Plasma Arc Cutting (PAC)

- ✤ Perform safety inspections of PAC equipment.
- ✤ Make minor external repairs to PAC equipment.
- Set up and operate manual PAC operations on ferrous and nonferrous materials.
- Perform shape PAC operations on ferrous and nonferrous materials.
- Perform gouging and scarfing PAC operations to remove base and weld metal on ferrous and nonferrous materials.

Manual Air Carbon Arc Cutting (CAC-A)

- ◆ Perform safety inspections of CAC-A equipment and accessories.
- ✤ Make minor external repairs to CAC-A equipment and accessories.
- Set up and operate manual CAC-A gouging and cutting operations on steel.
- Perform gouging and scarfing operations to remove base and weld metal on steel.

Pennsylvania Academic Standards (SAS)

Mathematics

	Numbers and Operations	Foundational
2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.	
2.1.HS.F.4	Use units as a way to understand problems and to guide the solution of multistep problems.	
2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
2.1.HS.F.6	Extend the knowledge of arithmetic operations and apply to complex numbers.	
2.1.7.D.1	Apply and extend previous understanding of operations with fractions to operations with rational numbers	Yes
	Measurement and Data, and Probability	Foundational
2.4.5.A.1	Solve problems using conversions within a given measurement system	Yes
2.4.5.A.2	Represent and interpret data using appropriate scale	Yes
	Geometry	Foundational
2.3.HS.A.13	Geometry Analyze relationships between two-dimensional and three- dimensional objects.	Foundational
2.3.HS.A.13 2.3.HS.A.9	Geometry Analyze relationships between two-dimensional and three- dimensional objects. Extend the concept of similarity to determine arc lengths and areas of sectors of circles.	Foundational
2.3.HS.A.13 2.3.HS.A.9 2.3.HS.A.8	Geometry Analyze relationships between two-dimensional and three- dimensional objects. Extend the concept of similarity to determine arc lengths and areas of sectors of circles. Apply geometric theorems to verify properties of circles.	Foundational
2.3.HS.A.13 2.3.HS.A.9 2.3.HS.A.8 2.3.HS.A.6	GeometryAnalyze relationships between two-dimensional and three- dimensional objects.Extend the concept of similarity to determine arc lengths and areas of sectors of circles.Apply geometric theorems to verify properties of circles.Verify and apply theorems involving similarity as they relate to plane figures.	Foundational
2.3.HS.A.13 2.3.HS.A.9 2.3.HS.A.8 2.3.HS.A.6 2.3.HS.A.4	GeometryAnalyze relationships between two-dimensional and three- dimensional objects.Extend the concept of similarity to determine arc lengths and areas of sectors of circles.Apply geometric theorems to verify properties of circles.Verify and apply theorems involving similarity as they relate to plane figures.Apply the concept of congruence to create geometric constructions.	Foundational
2.3.HS.A.13 2.3.HS.A.9 2.3.HS.A.8 2.3.HS.A.6 2.3.HS.A.4 2.3.HS.A.3	GeometryAnalyze relationships between two-dimensional and three- dimensional objects.Extend the concept of similarity to determine arc lengths and areas of sectors of circles.Apply geometric theorems to verify properties of circles.Verify and apply theorems involving similarity as they relate to plane figures.Apply the concept of congruence to create geometric constructions.Verify and apply geometric theorems as they relate to geometric figures.	Foundational
2.3.HS.A.13 2.3.HS.A.9 2.3.HS.A.8 2.3.HS.A.6 2.3.HS.A.4 2.3.HS.A.3 2.3.8.A.2	GeometryAnalyze relationships between two-dimensional and three- dimensional objects.Extend the concept of similarity to determine arc lengths and areas of sectors of circles.Apply geometric theorems to verify properties of circles.Verify and apply theorems involving similarity as they relate to plane figures.Apply the concept of congruence to create geometric constructions.Verify and apply geometric theorems as they relate to geometric figures.Understand and apply congruence, similarity, and geometric transformations using various tools	Yes

2.3.7.A.2	Visualize and represent geometric figures and describe the	Yes	
	Algebraic Concepts	Foundational	
2.2.HS.D.9	Use reasoning to solve equations and justify the solution method.		
2.2.HS.D.6	Extend the knowledge of rational functions to rewrite in equivalent forms.		
2.2.HS.C.9	Prove the Pythagorean identity and use it to calculate trigonometric ratios.		
2.2.HS.D.6	Extend the knowledge of rational functions to rewrite in equivalent forms.		
2.2.8.B.3	Analyze and solve linear equations and pairs of simultaneous linear equations	Yes	
2.2.7.B.2	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations	Yes	
2.2.7.B.1	Apply properties of operations to generate equivalent expressions	Yes	
Reading			
	Key Ideas/Details		
3.5.9-10.A	Cite specific textual evidence, etc		
3.5.9-10.B	Determine the central ideas or conclusions of a text, etc		
3.5.9-10.C	Follow precisely a complex multistep procedure, etc		
	Craft & Structure		
3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain specif	ic words	
3.5.9-10.E	Analyze the structure of the relationships among concepts in a text, etc.		
3.5.9-10.F	Analyze the author's purpose in providing an explanation, describing a procedure		
	Integrate Knowledge/ Ideas		
3.5.9-10.G	Translate quantitative or technical information expressed in a text into v (e.g. a table or chart).	visual form	
3.5.9-10.H	Assess the reasoning in a text to support the author's claim for solving a problem	a technical	
3.5.9-10.I	Integrate and evaluate multiple sources of information presented in dive formatsto solve a problem	erse	
3.5.11-12.H	Evaluate the hypotheses, data, analysis, and conclusions in a technical t the data when possible	ext, verifying	
3.5.11-12.I	Synthesize information from a range of sources into a coherent understa	anding	
Range of Reading			
3.5.11-12.J	Read and comprehend technical texts independently and proficiently		

Writing

Text Types and Purpose		
3.6.11-12.A	Write arguments focused on discipline specific content	
3.6.11-12.B	Write informative or explanatory texts, including the narration of technical processes,	
	etc.	
Production & Distribution of Writing		
3.6.11-12 C	Produce clear and coherent writingappropriate to task, purpose, and audience	

3.6.11-12.D	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or	
	trying a new approach, focusing on addressing what is most significant for a specific	
	purpose and audience	
3.6.11-12.E	Use technology, including the Internet, to produce, publish, and update individual or	
	shared writing products.	
Research		
3.6.11-12.F	Conduct short and more sustained research to answer a question or solve a problem	
3.6.11-12.G	Gather relevant information from multiple authoritative print and digital sources,	
	following a standard format for citation	
3.6.11-12.H	Draw evidence from informational texts to support analysis, reflection, and research	
Range of Writing Grades		
3.5.11-12.I	Write routinely over extended time frames and shorter time frames for a range of	
	tasks, purposes, and audiencesetc	

Examples of Course Material

Example #1 Welding Technology Course Material

Cutting Exercise #6 Name plate

Materials needed: Piece of ¹/₄ - 3/8" thick mild steel plate Properly set up and adjusted oxy-acetylene cutting torch All required safety gear

Directions:

a. cut a blank out of the steel plate 5" X 14"

b. the two 5" sides will have a 45 degree bevel

c. the two 14" sides will be 90 degrees

d. using a marker or soapstone lay out the letters of your

first or last name, centered vertically and horizontally

e. letters will be 3 1/2 inches tall +- 1/16"

f. cut out letters, all pieces will be kept, no waste

g. clean off all slag

h. turn in to instructor when done and cooled off

Example #2 Welding Technology Course Material

FCAW 1G Test Plate

You will be completing a 1/2"x2"x6" test plate in 1G 1/8" Open Root in FCAW process. After filing the bevels of your groove plate you will tack the plates together using a bent 1/8" weld rod to measure the gap, you will take a picture of tacked plate, ask your teacher to look at your weld, do not move to the next step before being given permission to do so. Clean and brush the root opening. Tack your plate to the edge of your table so the bottom of the open root is facing the ground and take a picture, ask your teacher to look at your weld, do not move to the next step before being given permission to do so. Next, you will weave your root pass from tack to tack, chip and brush the pass and take a picture, ask your teacher to look at your weld, do not move to the next step before being given permission to do so. Weld a fill pass, no weaving, chip and brush your weld, take a picture, ask Your teacher to look at your weld, do not move to the next step before being given permission to do so. Weld a fill pass, no weaving, chip and brush your weld, so. Weld another fill pass, no weaving, chip and brush your weld,

take a picture, ask your teacher to look at your weld, do not move to the next step before being given permission to do so. Weld your cap, no weaving, in to separate stringers, chip and brush your caps and take a picture, ask Your teacher to look at your weld, do not move to the next step before being given permission to do so.

Next, you will grind out your root pass on the back side of the plate, check with your teacher when you have cleaned the root opening and take a picture, and if instructed to do so, you may weld the root pass. Do not weld the root pass until being told to do so.

After having the plate inspected, you may grind both sides of the plate and take a picture.

When you are completed with grinding, ask your teacher for the layout instructions, take a picture of plate layout and you will cut the test plate using the band saw.

your plates will be tested by your teacher, no others will be allowed in the testing area, please remain in your work areas.

If you grind more than the test plate material it is an automatic failure.

If you quench the test plate it is a failure.

If you do not drag the Fluxcore it is a failure.

If your coupons are not the correct size it is a failure.

This project needs to be completed by end of day today, all steps, bend testing is the final step.

You will be graded all steps, root pass, fills and caps, grinding the root and welding it, grinding both sides, layout and cutting.

You will need a total of eight pictures uploaded to this assignment by end of day today.

Textbook

Modern Welding ISBN 978-1-60525-795-2

Sample Paragraph taken from the textbook:

"Changes to the power supply, torch, constricting nozzle and shielding gas are necessary to perform a plasma arc gouge. Voltages required for plasma arc gouging are much greater than those required for plasma arc cutting. During plasma arc cutting, the electrode and constricting nozzle are close to the base metal. The nozzle is only 1/16" -1/8" from the metal. When gouging, the nozzle can be over $\frac{1}{2}$ " from the metal. A power supply with a higher voltage is required to jump this large distance."

Anticipated Costs Sheet (2021-22)

KEY: ML - Major League (Item must be purchased through **ML**) **R or O** (Required or Optional) Cost - **ML or YC** - Your Choice for vendor the cost is approximate

Item	Vendor	Cost	R or O
T-shirt short sleeve	ML	\$11.50	R
T-shirt long sleeve	ML	\$14.00	0
Crewneck sweatshirt	ML	\$15.50	0
Hooded sweatshirt	ML	\$21.50	0
Pants - cotton such as Levi's, Dickies, Carhart	YC	\$20.00	R
Leather work boots, steel toe	YC	\$100.00	R
Tape measure	YC	\$17.00	R
Steel wire brush	Airgas	\$5.00	R
Chipping hammer	Airgas	\$8.00	R
Welding cap	Airgas	\$8.00	R
Welding gloves	Airgas	\$11.00	R
Welding hood	Harbor freight	\$39.00	R
Safety glasses ANSI Z87.1+	Airgas	\$2.00	R
Welding jacket	Airgas	\$19.50	R

Articulation/College Credit

Pending successful completion of requirements, you may receive credit for:

Community	College of Allegheny County	Credits
WLD 101	Welding Foundationals	3.0
WLD 102	Advanced Welding	3.0
WLD 221	Brazing and Welding	3.0

Total Credits Awarded: 9.0

Notes: This articulation agreement links POS 07E Welding Technology/Welder CIP 48.0508 (HS Graduation Years 2022, 2023, 2024) to CCAC programs 316 Welding Technology, AS (CIP 48.0508) and 317 Welding Technology, Certificate (CIP 48.0508).

Westmoreland County Community College		Credits
WEL 125	Introduction to Welding	4.0
WEL 221	Metal Fabrication	4.0
DFT 110	Blueprint Reading	2.0
WEL 228	SMAW	4.0

Total Credits Awarded: 14.0

Notes: Fourteen (14) credits are aligned to Westmoreland County Community College Programs of Study CIP 48.0508 Welding Engineering Technology, Associate of Applied Science (AAS) Degree Program and CIP 48.0508 Welding Engineering Technology Diploma Program.

Delaware County Community College		
WLD 200	Gas Metal Arc I	2.0
WLD 100	Introduction to Welding	2.0
WLD 101	Introduction to Oxy-Fuel Welding and Cutting	2.0
WLD 103	Shielded Metal Arc Welding I	2.0
WLD 104	Shielded Metal Arc Welding II	2.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits are aligned to the following Delaware County Community College POS: CIP 48.0508, Welding Technology I Certificate of Competency (WLD).

Northampton County Area Community College		Credits
WELD 105	Introduction to Welding Processes	5.0
WELD 125	GTAW and Semiautomatic Welding Processes	5.0

Total Credits Awarded: 10.0

Notes: Ten (10) credits align to POS 48.0508 Welding Technology Associate Applied Science Degree, POS 48.0508 Welding Foundationals Specialized Diploma.

Thaddeus Stevens College of Technology		Credits
WELD 120	Shielded Metal Arc Welding I	3.0
WELD 155	Gas Metal Arc Welding I	3.0
WELD 165	Gas Tungsten Arc Welding I	3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 48.0508 Welding Technology, Associate in Applied Science Degree (A.A.S).

Thaddeus Ste	evens College of Technology	Credits
MFWT 126	Drafting Foundationals	3.0
MFWT 106	Gas Metal Arc Welding/Plasma Arc Cutting	3.0
MFWT 111	Metals Fabrication I: Introduction to Hand and Machine Proces	ses 3.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the following Thaddeus Stevens College of Technology POS: CIP 48.0511 Metals Fabrication & Welding, Associate in Applied Science Degree (A.A.S).

Greater Altoona Career and Technology Center		Credits
WD 01-1	Occupational Orientation and Safety	3.0
WD 01-2	Principles of Welding	6.0

Total Credits Awarded: 9.0

Notes: Nine (9) credits are aligned to the POS: CIP 48.0508 Welding with Print Reading Diploma Program

Career Pathways

Metal Cutter	Metal Fabricator	Maintenance Welder
Electric-Arc Welder	Welding Inspector	Pipe Fitter
Pipe Welder	Underwater Welder	Sheet Metal Worker
Research and Development Engineer		Boilermaker
Ironworker-Structural Steel C	Construction	

Position	PA Projected Employment Growth 2014- 2024	Entry Salary	Avg PA Salary	Experienced Salary
Welder	6%	\$31,870	\$42,910	\$48,440
Welding Machine Setter, Operator and Tender	No Data Available	\$28,280	\$39,260	\$44,760
Metal Worker	-8%	\$23,840	\$38,860	\$46,370
Sheet Metal Worker	8%	\$31,480	\$53,570	\$64,620

Industry Certification

Within the scope of this program, you may be able to earn any of the following industry certifications:

Certifications			
OSHA Certification	Level II Advanced Welder		
FCAW 1G-4G D1.1 Code	SMAW 1G-4G 7018 D1.1 Code		
GMAW – Globular Transfer 1G-4G	S/P2 - Welding		
D1.1 Code			
Level I – Entry Welder			

Program Safety & Physical Considerations

- Self-discipline and focus are needed for safety using blow torches, welding equipment, hand tools, power tools, and other equipment found in the industry
- Exposure to noise levels, dust, debris, and fumes associated with the welding profession
- Ability to have tolerance for working in hot environment and in small spaces
- Ability to lift 50 pounds
- Stamina to stand for long periods of time
- Physical strength and trunk strength
- Requires long periods of intense concentration
- Inherently dangerous at all times

Aptitudes for Success

- Finger and manual dexterity
- Form perception
- Motor coordination
- Spatial acuity
- Good eyesight
- Arm-hand steadiness
- Mechanical aptitude
- Visualization
- Eye/hand coordination
- Near vision
- Multi-limb coordination

Standardized Testing Requirement

NOCTI - 12th Grade

The National Occupational Competency Testing Institute assesses students' ability to perform tasks related to their program of study. It consists of both an online exam and a hands-on classroom evaluation conducted by local industry experts.

Guidelines for Placement at LCCTC

School District Guidelines

All Students

- 1) Students should have a history of successful participation in school.
 - a. Students should have earned passing grades in 2 or more regular education courses, **AND**
 - b. Students should not have more than 10 absences for the previous school year without documentation of an on-going health issue.

Students with Special Needs

- 1) A current IEP (or 504) must be maintained with the LCCTC Special Populations Coordinator. The IEP must include:
 - a. The <u>completed signature page</u> and the appropriate <u>CIP Code</u> for the student enrolled.*
- 2) The CTC Special Populations Coordinator should be invited to all IEP meetings <u>for both</u> <u>current and prospective</u> CTC students.
 - a. Information relative to a prospective student's primary disability and present educational levels should be forwarded to the Special Populations Coordinator <u>in</u> <u>advance</u> of scheduled IEP meetings.
- 3) Copies or notification of newly written IEPs, revisions, and 504 plans should be forwarded to the Special Populations Coordinator within one week of the meeting date or revision.
- 4) LCCTC program changes or withdrawals require an IEP revision documenting the changes, including CIP codes and transition goals.
- 5) Students with more significant needs are encouraged to enroll in the LCCTC program one year in advance of their non-disabled peers.
- 6) The IEP team, students, and parents should review and discuss the program expectations prior to enrollment.
- 7) <u>Enrollment at LCCTC is a regular education placement</u>. We offer only itinerant support services. Full-time special education and supplemental support services are not available at LCCTC.

Parent & Student Guidelines

All Students

- 1) Students should have a history of successful participation in school.
 - a. Students should have earned passing grades in 2 or more regular education courses, <u>AND</u>
 - b. Students should not have more than 10 absences for the previous school year without documentation of an on-going health issue.

Students with Special Needs

- 2) Students with more significant needs are encouraged to enroll in the LCCTC program one year in advance of their non-disabled peers. If you think this may apply to your child, please consult your IEP team before applying. Placement is an IEP Team decision.
- 3) The IEP team, students, and parents should review and discuss the program expectations prior to enrollment.
- 4) The Special Populations Coordinator from CTC should participate in your child's IEP meeting.
- 5) <u>Enrollment at LCCTC is a regular education placement</u>. There are no pull-out or full-time special education classes offered. LCCTC will implement IEPs approved by the sending school district. There is no special education department, however the Special Populations Department can offer limited academic support.
- 6) LCCTC Special Populations Services support:
 - a. Individuals with disabilities
 - b. Individuals from economically-disadvantaged families
 - c. Individuals preparing for non-traditional fields
 - d. Single parents (and expecting)
 - e. English Language Learners
 - f. Individuals Experiencing Homelessness
 - g. Youth in the foster care system
 - h. Youth with a parent in the armed forces who is on active duty

Special Populations Program

Primary special education supports are provided by the sending school district. The CTC does not have a special education program. The Lebanon County Career and Technology Center provides a program for Special Populations. The Special Populations Program supports struggling learners within the CTC learning environment by attempting to reduce and remove barriers to learning. The Special Populations program strives to ensure equity for all students and advocate for students in need of assistance. Special populations aides in the acquisition of academic knowledge and technical employability skills of students who are identified in the subgroups of:

- 1. individuals with disabilities
- 2. individuals from economically-disadvantaged families, including low- income youth and adults
- 3. individuals preparing for non-traditional fields
- 4. single parents, including single pregnant women
- 5. English language learners
- 6. homeless individuals
- 7. youth who are in, or have aged out of, the foster care system; and
- 8. youth with a parent on active duty in the armed forces

FAQs

1. How many support personnel are at the CTC?

We currently have one (1) Program Coordinator, (2) Learning Facilitators, one (1) full-time and (1) one part-time aide and one (1) bilingual aide (Spanish/English).

2. What Services are provided by Special Populations personnel?

• Individuals with disabilities

- Create opportunities that students with disabilities can advocate for themselves.
- Challenge low expectations.
- Provide professional supports to faculty on strategies for providing.
- Support Universal Design for Learning and differentiated instruction with all.
- Increase Individualized Education Program (IEP) effectiveness by collaborating with all individuals who support a student.
- Support CTC teachers in how to understand a student's IEP, provide appropriate accommodations.
- Collaborate with community agencies to provide additional supports or training opportunities for students when available.
- Advocate for student success and learning.
- Participate in IEP meetings.
- Collaborate with sending schools regarding student education.

• Individuals from economically disadvantaged families

- Support students in the acquisition of program requirements when possible.
- Support participation in Career Trade School Organizations (CTSO).

• Collaborate with community agencies to provide additional supports or training opportunities for students when available.

• Individuals preparing for non-traditional fields

- Expose students to nontraditional career options to broaden their horizons about what careers are available to them.
- Offer summer camp, when possible, to encourage informal, low-risk, hands-on, skill-development experiences for students to try skills in a nontraditional program.
- Support the enforcement of civil rights and sexual harassment policies and practices. Assist students in awareness and reporting procedures as needed.

• Single parents (includes expecting parents)

• Connect single parents to support agencies.

• English Language Learners

- Engage families and community in supporting engagement in CTE and CTSOs.
- Provide bilingual support when available.
- Use technology to facilitate language translation.
- Facilitate collaboration between CTE and English as a Second Language (ESL) teachers.

• Individuals Experiencing Homelessness

- Support students experiencing homelessness and their families in understanding their rights under the McKinney-Vento Act.
- Coordinate with guidance counselors to help students experiencing homelessness maximize credit accrual and complete high school.
- Coordinate school and community resources that provide trauma-informed wraparound services such as transportation, referrals to health care, shelters, housing, and employment.
- Encourage students to attend school every day.

• Youth in the foster care system

- Learn about students in foster care.
- Build a relationship of trust with them or in their foster family.
- Help students who are transitioning out of foster.

• Youth with a parent in the armed forces who is on active duty

• Promptly refer a student for counseling who continues to show signs of stress, inability to function in school, or has high levels of emotional response after a family member deploys.

3. Do you offer special education classes?

No. All of our courses are regular education programs. Please see the Pennsylvania Academic Standards (above) for your program of interest to understand the expectations.

4. How can children with special needs participate in the regular education curriculum?

If the IEP team decides that CTC is an appropriate educational placement, specially designed instruction and modifications will be established in the IEP.

5. Will you participate in IEP and 504 meetings?

Yes. We will gladly participate in IEP/504 meeting when invited by the school district or parent.

6. My child does not yet attend CTC. Would you still attend their IEP/504 meeting?

Yes. We will gladly participate in meeting for any prospective student.

7. How are students graded?

Students are evaluated on work ethic, skill, and knowledge. Each category equals 33.33% of the final score.

Work ethic – Coming to class prepared, wearing the uniform as appropriate, participating in class, and daily attendance.

Skill – Completing the hands-on components addressed in the program task list.

Knowledge - Completing require academic work and assessments.

8. What is the NOCTI?

The NOCTI is a state assessment taken by all seniors at the CTC to evaluate their program knowledge. There are two components: Knowledge and Skill (hands-on).

9. Are students allowed to have accommodations on the NOCTI?

Students with disabilities may have accommodations as documented in their IEP or 504. English Language Learners are also eligible for accommodations. **Options allowed include: extended time, small group testing location, and test read aloud.**

Non-Discrimination Statement

The Lebanon County Career and Technology Center does not discriminate on the basis of race, color, national origin, sex, disability, or age in its programs and activities and provides equal access to the Boy Scouts and other designated youth groups. Justin Weaber has been designated to handle inquiries regarding the non-discrimination policies. For further information on notice of non-discrimination, visit <u>Office for Civil Rights Website</u> for the address and phone number of the office that serves your area, or call 1-800-421-3481.