



Industrial Technology Curriculum

Kearney Public Mission Statement

Create an environment that fosters mutual respect

Inspire the love of learning

Expect Excellence from all

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Small Engines

IT.SE.1 Students will work within a small engine laboratory safely.

- Students will explain why a clean, organized work area is important
- Students will list several dangers associated with working on small gas engines
- Students will explain the important of maintaining tools properly
- Students will demonstrate how to use tools properly
- Students will describe methods for minimizing risks associated with working on small engines
- Students will explain the functions of Occupational Safety and Health Administration Act (OSHA).

IT.SE.2 Students will decide which measuring tools to use and operate by using their judgment for the correct sized dimensions.

- Students will explain why quality tools and measuring instruments should be used when servicing small gas engines
- Students will demonstrate and use common hand tools properly
- Students will summarize the reasons that small engine components must be measured carefully
- Students will demonstrate several of the common measuring techniques

IT.SE.3 Students will evaluate and discriminate between theories of small engine construction and principles of operation.

- Students will explain simple engine construction
- Students will explain why gasoline is atomized in the small engine
- Students will list the qualities of gasoline that make it an efficient fuel for small engines
- Students will identify basic components of a small engine and describe the function of each part

IT.SE.4 Students will operate various precision measuring tools to decide if the motor he/she is working on is in need of repair or will perform as the OEM provider has suggested.

- Students will define engine performance
- Students will define and compute Bore, stroke, displacement, compression ratio, force, work, power, energy, and horsepower
- Students will differentiate between the various types of horsepower
- Students will explain the function of a Prony break and a dynamometer
- Students will define and calculate torque
- Students will explained volumetric efficiency, practical efficiency, mechanical efficiency, and thermal efficiency

IT.SE.5 Students will demonstrate the procedure of disassembly/assembly of the small gas engine carburetor formulating the steps that is required to repair if needed.

- Students will list and explain the principles of carburetion
- Students will identify the three basic types of carburetors
- Students will explain float -- type carburetor operation
- Students will display and operation of the diaphragm -- type of carburetors
- Students will define manual throttle controls

- Students will list the basic functions of the governor
- Students will adjust and maintain common governors
- Students will describe the purpose of an air cleaner

IT.SE.6 Students will solve ignition problems and recommend what parts would be needed for repair of ignition systems.

- Students will list primary purposes of the ignition system
- Students will identify the components in a typical magneto system and describe the function of each part
- Students will describe small engine ignition advance systems
- Students will list the advantages of solid-state ignition system
- Students will identify the three general classifications of magneto ignition systems explain the operation of each
- Students will describe the operation of a battery ignition system

IT.SE.7 The student will evaluate piston and piston ring condition and report which method of repair will be needed to bring the motor into original engine manufacture specification.

- Students will describe piston and piston ring construction
- Students will differentiate between compression rings and oil control rings
- Students will explain the purpose of ring end gap
- Students will identify the common types of piston damage and possible causes
- Students will summarize what happens during piston ring wear in
- Students will explain the purpose of a piston pin
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IT.SE.8 Students will show the procedure for rod, bearing, crankshaft, valve, and camshaft service.

- Students will describe the function of the connecting rod and bearings
- Students will define bearing spread and bearing crush
- Students will differentiate between friction bearings and anti-friction bearings
- Students will summarize the function of the crankshaft
- Students will service conventional and overhead valve assemblies
- Students will explain the operation of ports, reeds, and rotary valves
- Students will describe the purpose of the camshaft
- Students will explain the purpose of an automatic compression release

Electrical Fundamentals

IT.BE.1 Students will analyze the issues related to safety when working around electricity

- Students will explain why a clean, organized work area is important
- Students will list danger associated with working around electricity
- Students will explain the importance of maintaining tools and using them properly
- Students will explain the function of the *Occupational Safety and Health Administration*

IT.BE.2 Students will compare and contrast differences between voltage, current, resistance, and Ohm's law.

- Students will identify the relationship between elements and compounds
- Students will construct a model of an atom
- Students will discuss the concept of atomic weight in a atomic number
- Students will state the law of charges and explains it using several examples
- Students will explain what is meant by electric current, voltage, and resistance.
- Students will describe the two theories of current direction.
- Students will distinguish between conductors, insulators, and semiconductors.
- Students will state and explain Ohm's law.

IT.BE.3 Students will demonstrate the use of basic instruments and their measurements. Students will evaluate the working of voltmeter, ammeter, and ohmmeter.

- Students will explain the correct procedure for using an ammeter, a voltmeter, and an ohm meter.
- Students will interpret a linear scale.
- Students will compute shunt resistor values.
- Students will compute multiplier resistor values.
- Students will interpret a nonlinear scale.
- Students will discuss the concept of meter sensitivity.
- Students will understand basic electrical diagrams.
- Students will apply Ohm's law.

IT.BE.4 Students will categorize and differentiate basic electrical circuit materials.

- Students will identify different conductor types.
- Students will determine the cross -- sectional area of the conductor.
- Students will list the factors affecting resistance.
- Students will identify the various insulation materials.
- Students will list three special conductor pathways.
- Students will explain the manufacture of printed circuit boards.
- Students will identify various switching devices.
- Students will identify various lighting devices.
- Students will identify different types of Resistors.
- Students will determine the value of color -- coded resistors.

IT.BE.5 Students will classify principles of energy, both mechanical and electrical.

- Students will define work, power, and horsepower.

- Students will calculate electrical power in Watts.
- Students will convert horsepower to Watts.
- Students will combine Ohm's law with Watts Law to find unknown currents, voltages, resistances, and powers.
- Students will read a Watt meter
- Students will determine efficiency
- Students will determine gear and pulley ratios and power.
- Students will state and explain Ohm's law.

IT.BE.6 Students will demonstrate their knowledge of producing electricity from chemical action or batteries. Students will formulate how electricity is produced using light, solar batteries, pressure, and heat.

- Students will list the six basic sources of electricity.
- Students will explain the chemical action that creates electricity and various types of cells.
- Students will define polarization.
- Students will explain the differences between primary cells and secondary cells.
- Students will distinguish between series and parallel connections and batteries.
- Students will calculate outputs of batteries connected in series and parallel.
- Students will demonstrate the proper use of a hydrometer and explain its use.
- Students will calculate the theoretical capacity of a battery.

IT.BE.7 Students will appraise the principles of series circuits. The student will take complex series circuits and reduce each circuit into simple solvable circuits.

- Students will determine the total resistance of the series circuit.
- Students will determine the voltage drops in a series circuit
- Students will determine the current values of a series circuit.
- Students will determine the wattage values of a series circuit.
- Students will apply Ohm's law to solve for unknown voltage, current, and resistance in a series circuit.
- Students will apply series circuit theory to assist in troubleshooting a series circuit.

IT.BE.8 Students will evaluate and implement the theory and principles of parallel circuits.

- Students will determine the total resistance of a parallel circuit.
- Students will determine the voltage drops in a parallel circuit.
- Students will determine the current values of a parallel circuit.
- Students will determine the wattage values of a parallel circuit.
- Students will apply Ohm's law to solve for unknown voltage, current, and resistance in a parallel circuit.
- Students will apply parallel circuit theory to assist in troubleshooting a parallel circuit.

IT.BE.9 Students will compare and contrast residential components utilizing and sizing system used by the National Electrical Code (NEC).

- Students will compare and contrast amperage capacity of wire sizes
- Students will compare and contrast voltage drops for wire length and size
- Students will categorize conductor markings and colors
- Students will compute voltage drops in a conductor given current value and conductor size/length

IT.BE.10 Students will demonstrate installing boxes and conductors.

- Students will demonstrate a wiring rough in
- Students will demonstrate proper installation of electrical boxes in ceilings and walls
- Students will demonstrate pulling wire through walls
- Students will produce working electrical boxes used in residential layouts

IT.BE.11 Students will demonstrate residential wiring.

- Students will prepare conductors for connection
- Students will produce safe conductor splices
- Students will demonstrate various methods for attaching conductors to switches and fixtures
- Students will demonstrate grounding receptacles
- Students will construct split wired receptacles
- Students will demonstrate mounting fixtures

IT.BE.12 Students will diagram branch circuits.

- Students will categorize types and purposes of branch circuits
- Student will compute circuit loads
- Students will diagram locations of receptacles
- Students will diagram locations of lighting

IT.BE.13 Students will develop electrical prints and wiring circuits

- Students will diagram electrical prints using standard electrical symbols
- Students will compare and contrast schematic, electrical plan, and a pictorial drawing
- Students will analyze an electrical plan
- Students will develop an electrical plan
- Students will construct a cable layout plan
- Students will develop and install electrical components according to layouts
- Students will produce a circuit using a ground fault circuit interrupter (GFCI).

Electricity Electronics

IT.EE.1 Students will recognize and analyze series circuits. This analysis will include the usage of Ohm's Law for finding the voltages, currents, and resistances of various circuits.

- Students will determine the total resistance of the series circuit.
- Students will determine the voltage drops in a series circuit
- Students will determine the current values of a series circuit.
- Students will determine the wattage values of a series circuit.
- Students will apply Ohm's law to solve for unknown voltage, current, and resistance in a series circuit.
- Students will apply series circuit theory to assist in troubleshooting a series circuit.
- Students will identify Kirchoff's Voltage Law

IT.EE.2 Students will recognize and differentiate parallel and series circuits. Students will analyze parallel circuits to algebraically find voltage, current, and resistance.

- Students will determine the total resistance of a parallel circuit.
- Students will determine the voltage drops in a parallel circuit.
- Students will determine the current values of a parallel circuit.
- Students will determine the wattage values of a parallel circuit.
- Students will apply Ohm's law to solve for unknown voltage, current, and resistance in a parallel circuit.
- Students will apply parallel circuit theory to assist in troubleshooting a parallel circuit.

IT.EE.3 Students will distinguish series and parallel circuits within various combination circuits (series - parallel).

- Students will determine the equivalent circuit resistance for a given combination circuit.
- Students will determine the voltage drops in a combination circuit.
- Students will determine the current values and a combination circuit.
- Students will determine the wattage values and a combination circuit.
- Students will apply a combination circuit theory to troubleshoot a combination circuit.

IT.EE.4 After examining magnetism, students will summarize and construct a direct current (DC) motor . Students will then assess the how the various types of magnets are best suited for motor or generator construction.

- Students will explain the basic magnetic principles.
- Students will state the three laws of magnetism
- Students will describe line between electric current and magnetism.
- Students will explain Rowland's law.
- Students will discuss first types of relays and the manner in which they work.
- Students will describe the use of magnetic shields.

IT.EE.5 Students will formulate and appraise DC motor history and usage outlining the then and now aspects of this important development in the field of electricity.

- Students will explain the operating principles of DC motors.
- Students will explain counter electromotive force.
- Students will identify various DC motors.
- Students will discuss the purpose for, and the operation of, motor starting circuits.
- Students will identify and explain the operation of various DC motors.

IT.EE.6 Students will outline the distribution of electrical energy through the use of transformers. Students will compare and contrast transformers used in radio theory and home appliance usage.

- Students will explain the operation of the transformer.
- Students will discuss the relationship between mutual induction and transformers.
- Students will describe the effect of self induction.
- Students will calculate the various values of currents, voltages and transformer circuits.
- Students will list three types of transformer losses.
- Students will identify delta and wye transformer connections.
- Students will discuss grounding an electrical circuit.
- Students will troubleshoot procedures for transformers.
- Students will describe several special transformer applications.

IT.EE.7 Students will examine to predict what capacitance and resistor capacitor circuits with their usage will change radio or television reception and transmission.

- Students will define capacitance and the capacitor.
- Students will identified many different types of capacitor.
- Students will describe the transient response of the capacitor.
- Students will explain how a capacitor behaves in a DC circuit.
- Students will discuss the effect of capacitance on alternating current (AC) circuit.
- Students will describe the results of combining capacitance and resistance in the circuit.

IT.EE.8 Students will compare vacuum tubes, transistors, and amplifiers and their use in radio construction

- Students will explain the operation of the vacuum tube.
- Students will describe the working of the cathode ray tube.
- Students will explain the operation of the bipolar transistor.
- Students will explain the operation of field -- effect transistors.
- Students will discuss different biasing techniques.
- Students will identify various transistor circuit configurations.
- Students will list the components of amplifier circuits and give the function for each component.
- Students will plain amplifier operation.

- Students will compute the gain of amplifier circuits.
- Students will perform DC load line analysis on a transistor circuit.
- Students will discuss the advantages and disadvantages of various methods of amplifier coupling.
- Students will describe several common thyristors.

IT.EE.9 Students will develop, diagnose, and create AM radio communications.

- Students will discuss the history of radio wave receivers.
- Students will describe the different types of waves.
- Students will convert back and forth between frequency and wavelength.
- Students will describe different types of microphones.
- Students will discuss amplitude modulation frequency modulation.
- Students will list the components and explain the operation of an AM receiver and transmitter.
- Students will list the components and explain the operation of a super heterodyne receiver.

IT.EE.10 Students will classify to evaluate components of a personal computer (PC).

- Students will define filter replacement unit.
- Students will explain the function of Basic Input/Output System (BIOS).
- Students will describe the power on self test (POST).
- Students will describe how data is stored as magnetic media.
- Students will identify various types of computer ports.
- Students will identify the various factors that affect processor speed.

Mechanical Drawing

IT.MD.1 Students will identify appropriate drafting equipment.

- Students will identify the basic equipment using in Board Drafting
- Students will identify and describe various types of drafting media
- Students will identify the purpose of each instrument included in drawing instrument sets.
- Students will describe the characteristics of drafting pencils and erasers used in drafting.
- Students will select the appropriate scales for architectural, civil, and mechanical drafting.

IT.MD.2 Students will produce a finished technical drawing using drafting techniques.

- Students will employ safe practices in the drafting room.
- Students will prepare a drawing sheet for technical drawing.
- Students will use basic drafting tools and equipment properly and efficiently to produce technical drawings.
- Students will identify and use lines and line symbols recommended by the American National Standards Institute (ANSI).
- Students will produce a finished technical drawing using drafting techniques.

IT.MD.3 Students will solve technical and mathematical problems using geometric.

- Students will identify and describe various geometric shapes and constructions used by drafters.
- Students will construct various geometric shapes accurately.
- Students will solve technical and mathematical problems using geometric.

IT.MD.4 Students will formulate and demonstrate techniques used in multi-view drawing.

- Students will explain the relationship of orthographic projection to multi-view drawing
- Students will describe the difference between first- and third-angle projections.
- Students will determine the number of views needed to describe fully the shape and size of the object.
- Students will develop a multi-view drawing from the initial idea to a finished drawing.

IT.MD.5 Students will use board drafting techniques to add dimensions, notes, and geometric tolerances to a technical drawing.

- Students will apply measurements, notes, and symbols to a technical drawing.
- Students will use ANSI and International Organization for Standardization (ISO) standards for dimensions and notes.
- Students will differentiate between size dimensions and location dimensions.
- Students will determine appropriate sizes for precision fits between interchangeable mating parts.
- Students will specify geometric tolerances using symbols and notes.
- Students will designate appropriate surface textures.
- Students will use board drafting techniques to add dimensions, notes, and geometric tolerances to a technical drawing.

IT.MD.6 Students will create a finished drawing utilizing Computer Aided Drafting (CAD) software.

- Student will employ windows operating system for CAD.
- Students will create a series of drawing on the computer using CAD software.
- Students will create a finished drawing utilizing CAD software.

Wood Fabrication I

The focus of beginning woods is to provide learning opportunities in the areas of machine safety/operation and wood fabrication. Students design and construct a hardwood furniture project.

IT.WF.01 Students will apply safety rules and exhibit safe operations.

- Students will identify and explain safety rules.
- Students will apply safety rules and procedures.
- Students will demonstrate safe operation of woodworking equipment and related tools.
- Students will demonstrate and apply an understanding of construction site safety.

IT.WF.02 Students will distinguish the difference in quality, cost and use of quality hand tools, power tools and specialty tools.

- Students will identify usage of various woodworking tools.
- Students will identify quality of measurement tools.
- Students will identify and explain how to sharpen tools.
- Students will distinguish the quality, cost, and use of hand, power, and specialty tools.

IT.WF.03 Students will demonstrate the proper techniques and equipment used in finish carpentry to produce a hardwood project.

- Students will describe woodshop policies, costs, and requirements.
- Students will produce and read a working drawing and plan of procedure for individual projects.
- Students will develop, plan, and assemble an individual project.

IT.WF.04 Students will examine the phases within the construction industry.

- Students will identify various roles of construction.
- Students will explain construction terms.
- Students will describe house construction from start to finish.
- Students will identify and solve technical math.
- Students will identify processes of a variety of materials.
- Students will apply accurate measurements and make design adjustments.

IT.WF.05 Students will examine the main components for a career in finish carpentry.

- Students will identify careers and educational opportunities available in vocational education.
- Students will identify careers in the lumber industry.
- Students will identify careers in other related industries.
- Students will integrate a plan to help them differentiate between careers in the finish carpentry field.

Advanced Woods Fabrication II

The focus of Advanced Woods is twofold. First, it provides learning opportunities in the areas of wood fabrication and residential construction. Second, it allows students to reinforce, apply, and transfer their knowledge and skills to a variety of settings in the finish carpentry industry. Students design and construct a project with cabinet related applications.

IT.AWF.01 Students will apply safety rules and exhibit safe operations on each machine.

- Students will identify and explain safety rules on safety tests.
- Students will apply safety rules and techniques described in a safety manual.
- Students will identify safe working conditions.
- Students will demonstrate use and handling of power tools.
- Students will describe hazardous materials and exhibit proper disposal of such materials.

IT.AWF.02 Students will explain the lumber industry

- Students will differentiate between hardwood and softwood
- Students will identify and label various woods
- Students will compare and contrast characteristics of wood
- Students will describe lumber grading and sizing
- Students will define plywood and sheeting for building materials

IT.AWF.03 Students will analyze the proper techniques and equipment in finish carpentry.

- Students will describe woodshop policies, costs, and requirements.
- Students will demonstrate proper layout and cutting techniques.
- Students will estimate the required materials and costs of an individual project.
- Students will produce a working drawing and include a plan of procedure for an individual project.
- Students will produce a plywood project.

IT.AWF.04 Students will identify differences in the quality, cost, and use of hand tools, power tools, and specialty tools.

- Students will identify accurate measurement tools and show how to read them.
- Students will compare and contrast measurement tools
- Students will identify appropriate tools for construction of an individual project.

IT.AWF.05 Students will identify and illustrate how to build cabinets and countertops.

- Students will identify the different types of doors and drawers.
- Students will identify and explain different assembly methods.
- Students will identify and explain the installation process for doors and drawers.
- Students will identify and explain proper layout drawings and plans including the working triangle.
- Students will identify the proper cabinet installation processes.
- Students will identify proper counter top installation.
- Students will explain the proper ordering process of counter tops.
- Students will identify custom plastic laminated and the ordering process.
- Students will explain the advantage of each application.
- Students will identify and explain the proper processing techniques of plastic laminates.

IT.AWF.06 Students will define and apply phases within the construction industry.

- Students will identify construction technology terminology.
- Students will describe and identify various construction materials.
- Students will compare and contrast quality construction.
- Students will apply mathematic concepts in construction.
- Students will develop a plot layout and site development.
- Student will compare and contrast threaded and unthreaded fasteners along with uses of each.
- Students will demonstrate and apply the use of a finish nailer, rough framing guns, and staple guns.

IT.AWF.07 Students will examine aspects of the concrete industry.

- Students will define quality concrete mixing and composition.
- Students will identify equipment and tools of the trade.
- Students will identify flatwork, footings, and basement walls.
- Students will compare and contrast brick and block laying.

IT.AWF.08 Students will examine the main components of a career in finish carpentry and cabinet making.

- Students will identify careers and educational opportunities available in vocational education.
- Students will give examples of interest areas of construction.
- Students will identify careers in related industries.
- Students will formulate and integrate an individual career plan to help them differentiate between careers in the finish carpentry industry.

Introduction to Metals Technology

Metals Technology provides opportunities for students to explore a variety of metals processes and develop skills in the various metalworking and forming trades. Processes examined in this course include sheet metal work, foundry, wrought metal, various welding processes, heat treating and fundamental machine tool operation. Additionally students will gain an in-depth understanding of metalworking tools and equipment; measuring equipment, processes and systems, as well as metal working and shop safety.

IT.MT.1 Students will relate core academic skills to the metals trades

- Students will demonstrate effective oral and written communication skills
- Students will estimate supplies, materials, and cost
- Students will read and interpret appropriate blueprints, drawings, charts, diagrams and welding symbols
- Students will utilize mathematics in precision measuring operations.

IT.MT.2 Students will identify common shop tools. Students will properly and safely handle and operate the tools.

- Students will demonstrate basic understanding of hand tools
- Students will demonstrate proper use of cutting tools
- Students will identify and properly use measurement tools
- Students will identify and safely use power tools
- Students will identify machine tools
- Students will properly identify and use threading tools

IT.MT.3 Students will exhibit safe working habits. Students will create a safe working environment for themselves and their classmates

- Students will identify, understand and utilize Personal Protective Equipment (PPE)
- Students will identify shop safety hazards
- Students will exercise accident prevention practices
- Students will practice hand tool and power tool safety

IT.MT.4 Students will apply linear measurement practices and tools to the metals shop setting.

- Students will demonstrate use of rules and scales
- Students will identify and utilize precision measurement tools

IT.MT.5 Students will apply fundamental metallurgical concepts and application. Students will select proper materials to suit various situations.

- Students will distinguish between ferrous and nonferrous metals
- Students will identify the fundamental characteristics of various ferrous materials and their applications.
- Students will explain alloying and alloying elements
- Students will apply knowledge of hardening, tempering, annealing, normalizing, and case hardening steel

IT.MT.6 Students will construct a product using wrought metal techniques and tools.

- Students will identify wrought metal designs and terms
- Students will correctly identify and use tools

- Students will construct a product using wrought metal techniques

IT.MT.7 Students will produce a product using foundry techniques. Students will apply the proper tools and techniques necessary to produce various products

- Students will describe components and design elements of patterns
- Students will produce a functioning green sand mold
- Students will apply proper material preparation and safe pouring techniques

IT.MT.8 Students will demonstrate the function and application of machining tools and equipment.

- Students will demonstrate proficiency in basic cutting processes, including drilling, turning, boring, milling and broaching
- Students will utilize various work mounting procedures and devices on all machines
- Students will properly cut threads, turn tapers, polishes, knurls, and bores on the lathe
- Students will mill flat surfaces, bevels, chamfers, grooves, and keyseats utilizing proper milling procedures
- Students will utilize proper machines and procedures for surface grinding operations
- Students will machine and fit precision pieces

IT.MT.9 Students will create a sheet metal project.

- Students will demonstrate knowledge of the types, sizes, and properties of sheet metal materials and fasteners
- Students will draw sheet metal layouts and patterns utilizing accepted methods;
- Students will identify and construct common sheet metal seams
- Students will create a sheet metal project

Metals Fabrication

Metals Fabrication is the capstone course for the Metals/Welding program. Students will apply their skills and knowledge to complete a project of their own design. Students will design a project(s) to complete throughout the semester. During the fabrication process students will be required to document their progress. Documentation will include goal-setting, reflections, project plans and images of the build. This curriculum is designed to develop personal and professional skills desired in industry today.

IT.MF.1 Students will identify and demonstrate the employability characteristics of a successful worker in the modern workplace.

- Students will identify employment opportunities, including entrepreneurship, and preparation requirements for fields related to metals and welding
- Students will demonstrate the principles of group participation and leadership related to citizenship and career preparation
- Students will identify employers' expectations and appropriate work habits
- Students will demonstrate knowledge of the concepts and skills related to health and safety in the workplace, as specified by appropriate government regulations.

IT.MF.2 Students will apply core academic skills to the metals trades

- Students will demonstrate effective oral and written communication skills
- Students will estimate supplies, materials and cost
- Students will read and interpret appropriate blueprints, drawings, charts, diagrams and welding symbols
- Students will utilize mathematics in precision measuring operations.

IT.MF.3 Students will apply engineering and design fundamentals. Students will plan and fabricate useful, reliable, and appealing projects.

- Students will select adequate materials for each application
- Students will plan and utilize appropriate joining and shaping processes
- Students will fabricate metals projects

IT.MF.4 Students will implement appropriate processes and equipment to create parts and projects

- Students will apply prior knowledge of tools and operations
- Students will develop new concepts and skills as related to the metals field

Welding Technology

Welding technology is an introductory course to metal joining applications. Students will develop and display fundamental knowledge and skills as related to Shielded Metal Arc Welding, Gas Metal Arc Welding and Oxy-Fuel Welding processes.

IT.WT.1 Students will apply core academic skills to the metals trades.

- Students will demonstrate effective oral and written communication skills
- Students will estimate supplies, materials and cost
- Students will read and interpret appropriate blueprints, drawings, charts, diagrams and welding symbols
- Students will utilize mathematics in precision measuring operations.

IT.WT.2 Students will exhibit safe working habits.

- Students will identify risks and dangers associated with working in a welding lab or shop setting
- Students will demonstrate proper use of safety equipment
- Students will demonstrate safe operation of welding equipment and equipment related to the welding field

IT.WT.3 Students will compare and contrast the characteristics of metals.

- Students will explain basic concepts of metallic materials their properties
- Students will identify ferrous vs. non-ferrous metals and their properties
- Students will understand alloys and the purpose and basic processes of alloying metals
- Students will compare and contrast the characteristics of metals

IT.WT.4 Students will develop knowledgebase and skills necessary to achieve proficiency in Shielded Metal Arc Welding (SMAW).

- Students will develop fundamental understanding of electricity and electrical concepts
- Students will demonstrate the use of safety equipment and safety guidelines associated with arc welding processes
- Students will identify electrodes and their applications as designated by the number
- Students will setup equipment and processes including
 - Safety Equipment
 - Current/Polarity
 - Joint Preparation
- Students will identify and resolve various weld defects
 - Porosity
 - Distortion
 - Insufficient penetration
 - Burn-through
 - Poor appearance
 - Excessive spatter
 - Weak welds
 - Etc.
- Students will complete required welds.
 - Butt-Joint
 - T-Joint

- Lap-Joint
- Corner Joint

IT.WT.5 Students will demonstrate a variety of welds using Gas Metal Arc Welding (GMAW).

- Students will setup equipment and processes including
 - Safety equipment
 - Machine settings
 - Shielding gas
 - Consumables
 - Joint preparation
- Students will safely complete required welds
 - Butt-Joint
 - T-Joint
 - Lap-Joint
 - Corner Joint

IT.WT.6 Students will demonstrate a variety of welding and cutting procedures using oxy-fuel processes.

- Students will demonstrate safe handling and use of oxy-fuel supplies and equipment.
- Students will cut varying thicknesses of steel using an oxy-fuel setup
- Students will complete required brazed joints
 - Butt-Joint
 - T-Joint
 - Lap-Joint
 - Corner Joint
- Students will complete required oxy-fuel welded joints
 - Butt-Joint
 - T-Joint
 - Lap-Joint
 - Corner Joint

Introduction to Automotive Technology

Students will be introduced to the basic automotive industry. They will identify its major systems, and recognize techniques needed to work safely and efficiently.

IT.IAT.1 Students will recognize the major systems of today's automobile. They will understand the necessity of understanding the systems as it relates to servicing and repairing the vehicle.

- Students will identify the major automotive systems.
- Students will identify the components of each system.
- Students will explain the purpose of each system.

IT.IAT.2 Students will identify and select the correct tool needed to perform a specific service.

- Students will recognize how the size of a tool is determined.
 - Metric vs. Standard
 - Drive sizes
 - Etc..
- Students will identify various hand tools as they are applied to the automotive field.
- Students will compare and contrast tool quality.

IT.IAT.3 Students will identify proper safety procedures in the auto facility.

- Students will identify shop layout
- Students will identify automotive facility related accidents and how to prevent them.
- Students will explain Occupational Safety and Health Administration Act (OSHA) and how it affects the automotive facility.
- Students will identify how different types of fires are identified and explain how they are controlled.
- Students will identify proper safety procedures in the auto facility.

IT.IAT.4 Students will compare and contrast and apply the standard and metric measuring systems.

- Students will identify the proper measuring tools needed for specific service procedures.
- Students will describe both standard and metric systems of measurement.
- Students will identify basic measuring tools.
- Students will compare and contrast basic measuring tools and precision measuring tools.
- Students will describe the specific use of measuring tools as needed to service an automobile.
- Students will use conversion charts.
- Students will apply mathematics as needed to problem solve in the classroom.
- Students will compare and contrast and apply the standard and metric measuring systems.

IT.IAT.5 Students will perform fundamental electrical tests and procedures.

- Students will explain the principles of electricity/electronics.
- Students will describe the action of basic electric circuits.
- Students will describe the principles of magnetism and magnetic fields.
- Students will identify basic electric and electronic terms and components.
- Students will explain different kinds of automotive wiring.
- Students will perform fundamental electrical tests and procedures.

IT.IAT.6 Students will explain the importance of basic maintenance of the automobile.

- Students will check all fluid levels
- Students will explain the importance of vehicle maintenance.
- Students will locate and identify specific fluid leaks.
- Students will describe how an oil service is performed.
- Students will describe how an automatic transmission service is performed.
- Students will inspect for general problems with wiring, belts, hoses, and other under the hood components.
- Students will explain proper practices while working with vehicle fluids.
- Students will identify year, make, model and engine size of a given vehicle.

Auto Technology I

Automotive services include knowledge of the function of the major automotive systems and the principles of diagnosing and servicing these systems. In Automotive Technology, students gain knowledge and skills in the repair, maintenance, and diagnosis of vehicle systems. This study allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. The focus of this course is to teach the theory of operation of automotive vehicle systems and associated repair practices.

IT.ATI.1 Students will identify and demonstrate the employability characteristics of a successful worker in the modern workplace.

- Students will identify employment opportunities, including entrepreneurship, and certification requirements for the field of automotive services.
- Students will demonstrate the principles of group participation and leadership related to citizenship and career preparation.
- Students will identify employers' expectations and appropriate work habits;
- Students will apply the competencies related to resources, information, systems, and technology.
- Students will demonstrate knowledge of the technical knowledge and skills related to health and safety in the workplace, as specified by appropriate government regulations.
- Students will discuss ethics in a variety of workplace scenarios.
- Students will demonstrate effective oral and written communication skills with individuals from varied cultures such as fellow workers, management, and customers.

IT.ATI.2 Students will demonstrate technical knowledge and skills that form the knowledge of automotive services.

- Students will describe the function of the major components of powered vehicles such as engines, fuel, lubrication, cooling, electrical, and air conditioning systems
- Students will describe the function of the automotive chassis components such as braking, steering, transmission, drive train, and suspension systems
- Students will perform precision measurements to diagnose component wear, compare to published specifications, and determine necessary repair
- Students will know the functions and applications of the tools, equipment, technologies, and materials used in automotive services.
- Students will safely use hand and power tools and equipment commonly employed in the maintenance and repair of vehicles;
- Students will discuss the proper handling and disposal of environmentally hazardous materials used in servicing vehicles
- Students will explore new and emerging automotive technologies
- Students will identify diagnostic tools and equipment
- Student will apply the technical knowledge and skills of the trade-to-work situations
- Students will order, stock, and locate parts

IT.ATI.3 Students will diagnose service and repair the major automotive systems.

- Students will remove, repair, and replace engine components
- Students will service and repair braking, steering, and suspension systems
- Student will service and repair electrical and electronic systems
- Students will inspect, service, and repair chassis and power train components and systems

- Students will service and repair cooling and lubrication systems

Auto Technology II and III

Automotive services include advanced knowledge of the function of the major automotive systems and the principles of diagnosing and servicing these systems. In Auto Technology II and III, students gain knowledge and skills in the repair, maintenance, and diagnosis of vehicle systems. This study allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. The focus of this course is to teach the theory and operation of automotive vehicle systems and associated repair practices.

IT.ATII&III.1 Students will demonstrate employability characteristics of a successful worker in the modern workplace.

- Students will identify employment opportunities, including entrepreneurship, and certification requirements for the field of automotive service;
- Students will demonstrate the principles of group participation and leadership related to citizenship and career preparation
- Students will identify employers' expectations and appropriate work habits
- Students will apply the competencies related to resources, information, systems, and technology
- Students will demonstrate knowledge of the technical knowledge and skills related to health and safety in the workplace, as specified by appropriate government regulations;
- Students will complete repair orders and related paperwork

IT.ATII&III.2 Students will demonstrate technical knowledge and skills that form the core of knowledge of automotive service.

- Students will diagnose and repair the major components of powered vehicles;
- Students will diagnose and repair automotive chassis and driveline components;
- Students will locate, read, and interpret technical documents
- Students will perform precision measurements to diagnose component wear
- Students will demonstrate critical-thinking skills and structured problem-solving skills to diagnose vehicle malfunctions
- Students will compare and contrast alternative fuel vehicles.

IT.ATII&III.3 Students will demonstrate the functions and applications of the tools, equipment, technologies, and materials used in automotive service.

- Students will safely use hand and power tools and equipment commonly employed in the maintenance and repair of vehicles;
- Students will demonstrate the proper handling and disposal of environmentally hazardous materials used in servicing vehicles;
- Students will compare and contrast new and emerging automotive technologies
- Students will demonstrate proper use of diagnostic tools and equipment.

IT.ATII&III.4 Students will demonstrate technical knowledge and skills of the trade to simulated or actual work situations.

- Students will order, stock, and locate parts
- Students will analyze malfunctions, remove, repair, and replace engine components
- Students will diagnose, service, repair braking, steering, and suspension systems
- Students will diagnose, service, repair automotive electrical and electronic systems
- Students will diagnose, service, repair chassis and power train components and systems

- Students will test, diagnose, service, repair air, fuel, ignition, emissions, and drive systems
- Students will test, diagnose, service, repair cooling and lubrication systems

Technology Education

Introduction to Technology - 6th grade

Students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems. Knowledge and skills in the proper application of technology, the design of technology, the efficient production of technology, and the assessment of the effects of technology prepare students for success in the modern world. The study of technology allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. In addition to their general academic and technical knowledge and skills, students gain an understanding of career opportunities available in technology and what employers require to gain and maintain employment in these careers.

Knowledge and skills

IT.TE.1 Students will use a systems model to describe manufacturing, construction, communication, energy, power, transportation, and technology activities.

- Students will identify the inputs, processes, output, and feedback associated with each of the technological systems.
- Students will characterize technological activities as applying technology, designing technology, producing technology, and assessing technology.
- Students will describe how technological systems interact to achieve common goals.

IT.TE.2 Students will describe and use manufacturing, construction, communication, energy, power, transportation, and bio-related technology to meet specific goals.

- Students will apply manufacturing, construction, communication, energy, power, transportation, and bio-related technology to practical problems.
- Students will describe the factors that affect the purchase and use of products and services.
- Students will identify the roles of manufacturing, construction, communication, energy, power, transportation, and bio-related technology in business and industry.

IT.TE.3 Student will use appropriate design processes and problem solving techniques in manufacturing, construction, communication, energy, power, transportation, and bio-related technology.

- Students will create or improve a product or system that meets a specified need.
- Students will identify areas where quality, reliability, and safety can be designed into a product, service, or system.
- Students will list steps of design process.
- Students will list steps of problem solving methods.

IT.TE.4 Students will describe emerging and innovative manufacturing, construction, communication, energy, power, transportation, and bio-related technologies.

- Students will prepare reports on emerging and innovative technologies.
- Students will create a display that presents information on emerging and innovative technologies.
- Students will be able to identify emerging technologies.

- Students will compare and contrast emerging and innovative technologies.

IT.TE.5 Student will safely use the appropriate tools, equipment, machines, materials and technical processes to complete a project.

- Students will identify the chemical, mechanical, and physical properties and standard units of measure of manufacturing, construction, communication, energy, power, transportation, and bio-related technology materials.
- Students will identify the processes used in manufacturing, construction, communication, energy, power, transportation, and bio-related technology.
- Students will use a variety of tools, equipment, machines, materials, and technical processes.
- Students will produce an item using the appropriate tools, equipment, machines, materials and technical processes.
- Students will follow safety manuals, instructions, and requirements.
- Students will handle and store tools and materials correctly.
- Students will describe the results of negligent or improper maintenance.
- Students will complete a technology project.
- Students will participate in the organization and operation of a real or simulated manufacturing, construction, communication, energy, power, transportation.
- Students will identify and follow the steps needed to complete a project.

IT.TE.6 Students will identify the factors that influence the evolution of manufacturing, construction, communication, energy, power, transportation.

- Students will describe how changes in technology affect business and industry.
- Students will describe how the development and use of technology is influenced by past events.
- Students will discuss the international effects of technology.
- Students will identify and explore an area of interest within technology.

IT.TE.7 Students will apply communication, mathematics, and science knowledge and skills to manufacturing, construction, communication, energy, power, and transportation.

- Students will use written, verbal, and visual communication.
- Students will use mathematics concepts.
- Students will identify and apply science principles.

IT.TE.8 Students will describe the importance of teamwork, leadership, integrity, honesty, work habits, and organizational skills.

- Students will describe how teams function.
- Students will use teamwork to solve problems.
- Students will distinguish between the roles of team leaders and team members.
- Students will identify characteristics of good leaders.
- Students will identify employers' expectations and appropriate work habits.
- Students will define discrimination, harassment, and equality.
- Students will use time management techniques to develop and maintain work schedules and meet deadlines.
- Students will complete work according to established criteria.

Exploratory Middle School

This course is required for students in Grade 7 and as an elective for grade 8.

Exploring Communication Technology

Students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems. Knowledge and skills in the proper application of technology, the design of technology, the efficient production of technology, and the assessment of the effects of technology prepare students for success in the modern world. The study of technology allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. In addition to their general academic and technical knowledge and skills, students gain an understanding of career opportunities available in technology and what employers require to gain and maintain employment in these careers.

Essential Knowledge and skills

IT.ComT.01 Students will describe how a systems model can be used to describe communication activities.

- Students will identify the inputs, processes, output, and feedback associated with communication activities.
- Students will distinguish between photographic, digital graphic, printed graphic, technical graphic, audio, and video communication systems.
- Students will describe how technological systems interact to achieve common goals.

IT.ComT.02 Students will design communication products using appropriate communication design processes and techniques.

- Students will apply communication technology to individual or community problems.
- Students will describe the factors that affect the use and interpretation of communication products.
- Students will identify and describe the roles of communication in business and industry, such as informing, persuading, and educating.
- Students will develop or improve communication products that meet specified needs.
- Students will identify areas where quality can be designed into communication products, services, or systems.
- Students will identify the processes used in photographic, digital graphic, printed graphic, technical graphic, audio, and video communication systems.
- Students will use a variety of tools, equipment, and machines.
- Students will produce communication items.

IT.ComT.03 Students will identify the factors that influence the evolution of communication technology.

- Students will describe how changes in communication technology affect business and industry.
- Students will describe how the development and use of communication technology is influenced by past events.
- Students will describe change and the factors that affect the adoption or rejection of communication technology.
- Students will describe how and why technology evolves.

IT.ComT.04 Students will solve problems, thinks critically, and makes decisions related to communication technology.

- Students will improve a product by following a problem-solving strategy.
- Students will apply critical-thinking strategies to the analysis and evaluation of proposed technological solutions.
- Students will apply decision-making techniques to the selection of technological solutions.

IT.ComT.05 Students will apply communication, mathematics, and science knowledge and skills to communication activities.

- Students will use audio and visual communication techniques consistent with industry standards;
- Students will use mathematics concepts in communication technology;
- Students will identify and apply science principles used in communication technology; and
- Students will use the standard units of measure.

IT.ComT.06 Student will investigate career opportunities, requirements, and expectations in communication technology.

- Students will identify an area of interest in communication and investigate its entry level and advancement requirements.
- Students will describe the careers available in communications.

IT.ComT.07 Students will describe the importance of teamwork, leadership, integrity, honesty, work habits, and organizational skills.

- Students will describe how teams function.
- Students will use teamwork to solve problems.
- Students will distinguish between the roles of team leaders and team members.
- Students will identify characteristics of good leaders.
- Students will identify employers' expectations and appropriate work habits.
- Students will define discrimination, harassment, and equality.
- Students will use time management techniques to develop and maintain work schedules and meet deadlines.
- Students will complete work according to established criteria.

Exploring Construction Technology

Students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems. Knowledge and skills in the proper application of technology, the design of technology, the efficient production of technology, and the assessment of the effects of technology prepare students for success in the modern world. The study of technology allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. In addition to their general academic and technical knowledge and skills, students gain an understanding of career opportunities available in technology and what employers require to gain and maintain employment in these careers.

Essential Knowledge and skills.

IT.ConT.01 Student will describes how a systems model can be used to describe construction activities.

- Students will apply the universal systems model to construction activities.
- Students will identify the inputs, processes, outputs, and feedback associated with other systems used in construction.
- Students will distinguish between architectural and civil construction systems and related construction systems.
- Students will apply construction technology to individual or community problems.
- Students will identify and describe the roles of construction.

IT.ConT.02 Students will design an item for construction using appropriate design processes and techniques.

- Students will develop or improve a building or structure that meets a specified need.
- Students will identify areas where quality, reliability, and safety can be designed into a building or structure.
- Students will design and produce a model structure.
- Students will compare and contrast emerging and innovative construction technologies.
- Students will create a display that presents information on emerging and innovative technologies.
- Students will distinguish between good and bad quality.
- Students will describe how customers perceive quality.
- Students will demonstrate employability skills.

IT.ConT.03 Students will demonstrate the ability to solve problems, think critically, and make decisions.

- Students will develop or improve a building or structure by following a problem-solving strategy.
- Students will apply critical-thinking strategies to the analysis and evaluation of proposed technological solutions.
- Students will apply decision-making techniques to the selection of technological solutions.
- Students will use written, verbal, and visual communication techniques.
- Students will use mathematics concepts in construction technology.
- Students will identify and apply science principles used in construction technology.

IT.ConT.04 Students will investigate career opportunities, requirements, and expectations in

construction technology.

- Students will identify an area of interest in construction and investigate its entry level and advancement requirements.
- Students will describe the careers available in construction.

Exploring Energy, Power, and Transportation Technology.

Students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems. Knowledge and skills in the proper application of technology, the design of technology, the efficient production of technology, and the assessment of the effects of technology prepare students for success in the modern world. The study of technology allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. In addition to their general academic and technical knowledge and skills, students gain an understanding of career opportunities available in technology and what employers require to gain and maintain employment in these careers.

Essential Knowledge and skills.

IT.EPTT.01 Students will describe how a systems model can be used to describe energy, power, and transportation activities.

- Students will apply the universal systems model to energy, power, and transportation activities.
- Students will identify the inputs, processes, outputs, and feedback associated with energy, power, and transportation systems.
- Students will distinguish between mechanical, fluid, electrical, and thermal power systems.
- Students will distinguish between various forms of energy.
- Students will describe the differences between the various transportation modes, such as land, marine, air, and space.
- Students will describe the technological systems in transportation, such as propulsion, suspension, guidance, control, support, and structure.
- Students will describe how technological systems interact to achieve common goals.

IT.EPTT.02 Students will apply energy, power, and transportation technology to specific tasks.

- Students will apply energy, power, and transportation technology to individual and community problems.
- Students will describe the factors that affect the purchase and use of energy, power, and transportation technology.
- Students will identify and describe the roles of energy, power, and transportation.
- Students will develop or improve energy, power, and transportation products or services that meet a specified need.
- Students will identify areas where quality, reliability, and safety can be designed into a product, service, or system.

IT.EPTT.03 Students will investigate emerging and innovative energy, power, and transportation technologies.

- Students will report on emerging and innovative energy, power, and transportation technologies.
- Students will create a display that presents information on emerging and innovative technologies.

IT.EPTT.04 Students will build energy, power, and transportation devices using the appropriate tools, equipment, machines, materials and technical processes.

- Students will describe the chemical, mechanical and physical properties and standard units of measure of energy, power, and transportation materials and resources.

- Students will contrast the characteristics and sources of energy and power.
- Students will describe the processes used in energy, power, and transportation, such as conversion, control, transmission, and storage.
- Students will describe the processes used in transportation, such as receiving, holding/storing, loading, moving, unloading, and delivering.
- Students will use a variety of tools, equipment, and machines to build energy, power, and transportation products or system.
- Students will demonstrate employability skills.
- Students will describe how and why technology evolves.

IT.EPTT.05 Students will solve problems, thinks critically, and makes decisions related to energy, power, and transportation technology.

- Students will develop or improve an energy, power, and transportation product or service by following a problem-solving strategy.
- Students will apply critical-thinking strategies to the analysis and evaluation of proposed technological solutions.
- Students will apply decision-making techniques to the selection of technological solutions.

IT.EPTT.06 Students will apply communication, mathematics, and science knowledge and skills to energy, power, and transportation activities.

- Students will use written, verbal, and visual communication techniques consistent with industry standards.
- Students will use mathematics concepts in energy, power, and transportation technology.
- Students will identify and apply science principles used in energy, power, and transportation technology.

IT.EPTT.07 Students will investigate career opportunities, requirements, and expectations in energy, power, and transportation technology.

- Students will identify an area of interest in energy, power, and transportation, and investigate its entry level and advancement requirements
- Students will describe the careers available in energy, power, and transportation.

Exploring Manufacturing Technology

Students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems. Knowledge and skills in the proper application of technology, the design of technology, the efficient production of technology, and the assessment of the effects of technology prepare students for success in the modern world. The study of technology allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. In addition to their general academic and technical knowledge and skills, students gain an understanding of career opportunities available in technology and what employers require to gain and maintain employment in these careers.

Essential Knowledge and skills

IT.EMT.01 Students will describe how a systems model can be used to describe manufacturing activities.

- Students will apply the universal systems model to manufacturing activities.
- Students will identify the inputs, processes, outputs, and feedback associated with manufacturing systems.
- Students will distinguish between continuous, intermittent, custom, and other manufacturing systems.
- Students will describe how technological systems interact to achieve common goals.

IT.EMT.02 Students will design and build product or manufacturing system using appropriate design processes and techniques.

- Students will develop or improve a product or manufacturing system that meets a specified need.
- Students will identify areas where quality, reliability, and safety can be designed into a product or system.
- Students will distinguish between good and bad quality.

IT.EMT.03 Students will investigate emerging and innovative manufacturing technologies.

- Students will report on emerging and innovative manufacturing technologies.
- Students will create a display that presents information on emerging and innovative technologies.
- Students will identify the processes used in manufacturing.
- Students will safely use a variety of tools, equipment, and machines to manufacture products.
- Students will demonstrate employability skills.
- Students will use an assessment strategy to determine the risks and benefits of technological developments in manufacturing.
- Students will describe how technology has affected individuals, societies, cultures, economies, and environments.
- Students will discuss the international effects of manufacturing technology.

IT.EMT.04 Students will identify the factors that influence the evolution of manufacturing technology.

- Students will identify how changes in manufacturing technology affect business and industry.
- Students will identify how the development and use of manufacturing technology is influenced by past events.

- Students will identify change and the factors that affect the adoption or rejection of manufacturing technology.
- Students will identify how and why technology evolves.

IT.EMT.05 Students will apply communication, mathematics, and science knowledge and skills to manufacturing activities.

- Students will use written, verbal, and visual communication techniques.
- Students will use mathematics concepts in manufacturing technology.
- Students will identify and apply science principles used in manufacturing technology.
- Students will use the appropriate units of measure.

IT.EMT.06 Students will investigate career opportunities, requirements, and expectations in manufacturing technology.

- Students will identify an area of interest in manufacturing and investigate its entry-level and advancement requirements.
- Students will describe the careers available in manufacturing.

Production Technology

Knowledge and skills required to produce a product using current manufacturing or construction materials and processes. This course is recommended as an elective for students in the 8th Grade.

General requirements - Production Technology includes knowledge and application of the concepts of design and production of a product using a variety of materials and processes. This course is an elective offered in the eighth grade.

Introduction - Rapid advances in technology have created new career opportunities and demands in trades and industries. Trade and industrial education provides the knowledge, skills, and technologies required for employment in production systems. Students need to develop knowledge of the concepts and skills related to this system in order to apply them to personal/career development. Trade and industrial education depends on and supports integration of academic and career and technology knowledge and skills. To prepare for success, students must have opportunities to reinforce, apply, and transfer their knowledge and skills to a variety of settings and problems. Knowledge about career opportunities, requirements, and expectations and the development of workplace skills prepare students for success.

Knowledge and skills.

IT.PT.01 Students will know the employability characteristics of a successful worker in the modern workplace.

- Students will identify employment opportunities, including entrepreneurship, and preparation requirements for mill and cabinetmaking.
- Students will demonstrate the principles of group participation and leadership related to citizenship and career preparation.
- Students will identify employers' expectations and appropriate work habits.
- Students will apply the competencies related to resources, information, systems, and technology in appropriate settings and situations.
- Students will demonstrate knowledge of the concepts and skills related to health and safety in the workplace.

IT.PT.02 Students will relate core academic skills to the requirements of production technology.

- Students will demonstrate effective oral and written communication skills with individuals from varied cultures, including fellow workers, management, and customers.
- Students will apply the principles of mathematics for accurate linear and metric measurements.
- Students will read and interpret appropriate blueprints, drawings, charts, and diagrams.

IT.PT.03 Students will know the concepts and skills that form the core knowledge of production technology.

- Students will demonstrate knowledge of production and design of a product.
- Students will demonstrate knowledge of the use of materials, fasteners, hardware.
- Students will demonstrate knowledge of the industrial processes and procedures used in producing a product.

IT.PT.04 Students will know the function and application of the tools, equipment, technologies,

and materials used in production technology.

- Students will safely use hand and power tools and equipment commonly employed in producing a product.
- Students will properly handle and dispose of humanly and/or environmentally hazardous materials used in producing a product.
- Students will utilize the proper procedures in sawing, planing, shaping, turning, boring, mortising, and sanding various types of production materials.
- Students will demonstrate use of production tools and devices.

IT.PT.05 Students will apply the concepts and skills of a trade to simulated and actual work situations.

- Students will identify and construct the various joints utilized in producing a product.
- Students will utilize the proper procedures in gluing, clamping, laminating, veneering, welding, riveting, bending.
- Students will utilize the proper procedures to construct and install functional hardware.
- Students will utilize proper finishing techniques.
- Students will apply the essential knowledge and skills of production technology to work-based learning experiences.

Construction Technology

Students will construct a three bedroom single family home. They will be able to utilize modern construction techniques to work safely and efficiently.

IT.CT.01 Students will combine various sources of information to formulate a positive mindset in the area of safety.

- Students will watch safety videos.
- Students will evaluate written sources of safety materials.
- Students will demonstrate safety practices.

IT.CT.02 Students will summarize material given in the classroom and on-site to produce the rough framing of a house.

- Students will demonstrate the proper use of a tape measure.
- Students will participate in wall layout exercise.
- Students will construct wall components to specifications.
- Students will install trusses.
- Students will differentiate between different size and types of construction materials.
- Students will demonstrate proper safety techniques.
- Students will evaluate wall layout before sheeting is applied.

IT.CT.03 Students will demonstrate the proper application of roofing materials.

- Students will demonstrate tar paper layout.
- Students will demonstrate proper application of roofing discs.
- Students will apply metal to edges and valleys of the house.
- Students will apply starter shingles.
- Students will demonstrate proper shingle application.
- Students will demonstrate proper safety techniques.
- Students will evaluate progression of roof.

IT.CT.04 Students will utilize proper construction practices in the installation of doors and windows.

- Students will place windows in openings.
- Students will plumb and level windows in openings.
- Students will nail and fasten using proper techniques.
- Students will apply weather proofing materials
- Students will demonstrate proper safety techniques.

IT.CT.05 Students will apply varying processes to install siding on the exterior of the house.

- Students will install moisture barrier to exterior.
- Students will demonstrate leveling and placement of the starter strip.
- Students will identify and install accessory pieces.
- Students will illustrate proper nailing pattern.

- Students will apply siding to the house.
- Students will demonstrate proper safety techniques.
- Students will follow the manufactures guidelines and specifications for this process.

IT.CT.06 Students will produce a properly insulated envelope for the house.

- Students will identify areas of the house to be insulated.
- Students will hypothesize the consequences of proper and improper insulation techniques.
- Students will outline the proper handling and cutting applications.
- Students will demonstrate proper safety techniques.

IT.CT.07 Students will integrate drywall into the interior walls of the house.

- Students will differentiate between ceiling drywall and sidewall applications.
- Students will apply 5/8" drywall to the ceilings.
- Students will apply 1/2" drywall to the walls.
- Students will combine existing knowledge of proper construction techniques and utilize proper layout and cutting techniques
- Students will use proper hand and power tools.
- Students will demonstrate proper safety techniques.

IT.CT.08 Students will integrate the proper techniques of priming and painting into finishing the interior and some exterior finishes of the house.

- Students will contrast the difference between primer and top coat paints.
- Students will distinguish between latex and oil based paints.
- Students will compare and contrast the proper cutting and rolling processes.
- Students will demonstrate proper safety techniques.

IT.CT.09 Students will modify rough framing construction methods and apply those to finish carpentry.

- Students will refine techniques from rough carpentry to finish and trim work.
- Students will place and hang doors.
- Students will place and hang cabinets.
- Students will place finished woodwork.
- Students will install floor coverings.
- Students will modify and adjust as conditions warrant in the field.
- Students will install railing and its components.
- Students will clean.
- Students will demonstrate proper safety techniques.

IT.CT.10 Students will integrate the proper techniques of staining and varnishing into finishing the interior finishes of the house.

- Students will contrast the difference between stain and varnish.
- Students will distinguish between water based and oil based varnishes.
- Students will compare proper application and wiping processes.
- Students will demonstrate proper safety techniques.

IT.CT.11 Students will summarize material given in the classroom and on-site to produce the deck framing of the house.

- Students will use a tape measure properly.
- Students will participate in joist layout exercise.
- Students will construct all components to specifications.
- Students will combine their safety training and construction knowledge to install the railing.
- Students will differentiate between different size and types of construction materials.
- Students will demonstrate proper safety techniques.

IT.CT.12 Students will integrate the proper techniques for finish drywall mudding.

- Students will apply the joint compound in the proper amounts.
- Students will apply the drywall tape in the proper locations and amount.
- Students will differentiate the difference between adding more compound and sanding to make the finished joint look proper.
- Students will differentiate between the drywall taping tools and be able to use each in its proper application.
- Students will demonstrate proper safety techniques.

Engineering Drafting

Students will produce two and three dimensional drawings using standard practices for drafting. They will analyze the proper techniques and tools utilized in the production of drawings.

IT.ED.01 Students will analyze the main components for a career in drafting.

- Students will identify current and emerging careers related to drafting.
- Students will prepare an individual career plan.
- Students will explain how to prepare for a drafting career.
- Students will demonstrate skills and techniques for applying for a job.
- Students will demonstrate workplace skills.
- Students will explain typical uses of board and computer-aided drafting techniques.

IT.ED.02 Students will distinguish the main topics of design and sketching.

- Students will describe the three basic aspects of design.
- Students will describe the engineering design processes.
- Students will explain the importance of freehand sketching.
- Students will develop techniques for estimating proportions.
- Students will develop a technique of clear, neat handwriting for use on technical drawings and/or sketches.

IT.ED.03 Students will be able to differentiate between different drafting tools and equipment.

- Students will identify the basic equipment used in board drafting.
- Students will identify the various types and sizes of drafting media.
- Students will describe the characteristics of drafting pencils, technical pens, and erasers used in drafting.
- Students will select the appropriate scales for architectural and mechanical drafting.
- Students will describe the hardware components of a CAD workstation.
- Students will describe the ergonomic and personal safety factors to be considered when setting up a CAD workstation.
- Students will select the proper tools for tasks they are drafting.

IT.ED.04 Students will demonstrate the ability to use basic drafting techniques to properly produce technical drawings.

- Students will employ safe practices in the drafting room.
- Students will prepare a drawing sheet for a technical drawing
- Students will identify and use the lines and line symbols recommended by the American National Standards Institute (ANSI).
- Students will produce a finished technical drawing using board drafting techniques.

IT.ED.05 Students will be able to identify and describe various geometric shapes and constructions used by drafters.

- Students will construct various geometric shapes accurately.
- Students will solve technical problems through geometric constructions using drafting instruments.
- Students will apply Geometry to reduce or enlarge a drawing or to change the proportions of a drawing.

IT.ED.06 Students will be able to interpolate the basic drafting skills from the units before and implement the drawing concepts to produce multi-view drawings.

- Students will explain the relationship of orthographic projection to multi-view drawing.
- Students will describe third-angle projection.
- Students will determine the number of views needed to describe fully the shape and size of an object.
- Students will create the various views of an object.
- Students will develop a multi-view drawing from the initial idea to a finished drawing using either a drafting board or CAD techniques.
- Students will locate multiple views on a drawing according to accepted principles of drafting.

IT.ED.07 Students will choose the proper dimensioning rules techniques to properly describe the size and location of parts.

- Students will apply measurements, notes, and symbols to a technical drawing.
- Students will demonstrate ANSI and ISO standards for dimensions and notes.
- Students will differentiate between size dimensions and location dimensions.
- Students will specify geometric tolerances using symbols and notes.
- Students will demonstrate board drafting and CAD system techniques to add dimensions, notes, and geometric tolerances to a technical drawing.

IT.ED.08 Students will produce multi-view drawings using the prescribed techniques for sectional views.

- Students will describe the purpose of a sectional view.
- Students will select the appropriate type of sectional view to show the hidden feature.
- Students will demonstrate ribs, webs, fasteners, and similar features in section.
- Students will rotate selected features into the cutting plane.
- Students will describe and use conventional breaks and symbols.
- Students will prepare a drawing with sectional views using CAD techniques.

IT.ED.09 Students will evaluate that incorporate an inclined plane and construct drawings that will show the views on reference planes that are parallel to the inclined plane.

- Students will determine when a full or partial auxiliary view is required.
- Students will develop a primary auxiliary view using CAD Techniques.
- Students will demonstrate the concept of revolutions to determine the true size and shape of the inclined plane.

IT.ED.10 Students will be able to identify various fastener types and be able to reproduce those by using proper drafting techniques using the CAD system.

- Students will identify and describe various types of fasteners.
- Students will define common screw-thread terms.
- Students will specify threads and fasteners on a technical drawing.

- Students will demonstrate detailed, schematic, and simplified thread representations.
- Students will describe and list common thread series.
- Students will describe and specify the classes of thread fits.
- Students will demonstrate various types of threaded fasteners using CAD techniques.

IT.ED.11 Students will create a variety of pictorial drawings to represent the depiction of actual objects and parts.

- Students will inventory various uses of pictorial drawings.
- Students will select and draw the most practical type of pictorial for a specific purpose.
- Students will create isometric drawings with the proper CAD techniques.
- Students will explain the basic differences in the three types of axonometric projection.
- Students will develop one-point and two-point perspective drawings.
- Students will select and draw appropriate pictorial sections.
- Students will manipulate 3D models in AutoCAD to achieve isometric, oblique, and perspective views.

IT.ED.12 Students will select the proper drafting techniques and procedures and in compiling a full set of working drawings.

- Students will describe the various types of working drawings and explain the purpose of each.
- Students will demonstrate a working drawing.
- Students will explain the procedure for checking a set of working drawings.
- Students will produce detail drawings, assembly drawings, and assembly working drawings.
- Students will design and draw a title block, incorporating standard items of information.
- Students will develop a standard bill of materials.

IT.ED.13 Students will analyze different techniques to draft objects using pattern development.

- Students will explain how pattern development is used in the packaging industry.
- Students will describe the general principles of pattern development.
- Students will discuss the three main types of pattern development.
- Students will explain the purpose of transition pieces and intersections.
- Students will prepare patterns using parallel-line and radial developments.

IT.ED.14 Students will examine two of the basic elements that work in combination to form a machine.

- Students will explain the purposes and applications of cams and gears.
- Students will develop a displacement diagram.
- Students will develop a profile of a cam.
- Students will describe the three main types of cam motion.
- Students will describe the features of a typical gear drawing.
- Students will demonstrate gear teeth using a simplified method.
- Students will develop a gear-tooth drawing.

IT.ED.15 Students will be able to self guide themselves through a series of tutorials.

- Students will develop groups and details.
- Students will create basic 3D models and apply 3d viewing options.

- Students will create surface meshes, surface primitives, Gouraud shading, and photorealistic rendering.
- Students will create solid regions, solid primitives, basic solid modeling, Boolean operations, tailoring solid models, and documenting solid models.

IT.ED.16 Students will become familiar with the basic functions of the Autodesk Inventor package.

- Students will create solid model objects.
- Students will manipulate and transform objects into presentation quality applications.

Architectural Drawing

Students will design a 3 bedroom ranch-style home by studying current building and design applications of residential construction. They will utilize board drafting and CAD techniques to produce finished drawings.

IT.AD.01 Student will be able to recognize the different styles of residential buildings.

- Students will identify the historical influences that helped shape today's home designs.
- Students will recognize and describe the elements of contemporary dwellings.
- Students will discuss current trends in architecture.

IT.AD.02 Students will evaluate the different home designs within current construction practices.

- Students will recognize the four basic house designs.
- Students will inventory the chief advantages of each design.
- Students will map the traffic circulation for maximum efficiency.
- Students will compare the relative cost of heating and cooling for each design.

IT.AD.03 Students will distinguish between the primary considerations for building a new residential dwelling.

- Students will evaluate a given site with respect to important considerations.
- Students will discuss key site considerations, restrictions, zoning, and codes.
- Students will record topographical features of a site.
- Students will inventory family needs that should be considered when planning a dwelling.
- Students will describe the basic construction drawings used to build a structure.

IT.AD.04 Students will be able to differentiate between different drafting tools and equipment. Students will demonstrate the ability to use basic drafting techniques to properly produce technical drawings.

- Students will define the three principal views in orthographic projection.
- Students will inventory and explain the use of architectural drafting equipment.
- Students will explain the difference between size and scale.
- Students will reproduce the standard alphabet of lines.
- Students will demonstrate an acceptable architectural lettering style.
- Students will demonstrate freehand sketching.

IT.AD.05 Students will differentiate the benefits of using a CAD drafting system.

- Students will explain computer-aided drafting and design.
- Students will identify common applications for CAD in architecture.
- Students will inventory the components of a typical CAD workstation.

- Students will identify features of CAD software and how they should be evaluated when selecting a program.
- Students will explain the advantages of AEC specific CAD software.

IT.AD.06 Students will analyze the key features of design as associated with sleeping areas and bath facilities.

- Students will discuss factors that are important in the design of bedrooms.
- Students will plan the size and location of closets for a typical residence.
- Students will inventory requirements to make a bedroom assessable to the disabled.
- Students will implement design considerations for bathrooms
- Students will design a bathroom that follows solid design principles.
- Students will inventory the requirements to make a bathroom accessible to the disabled.

IT.AD.07 Students will analyze the key features of design as associated with living areas.

- Students will identify the rooms and areas that comprise the living area.
- Students will apply design principles to planning a living room.
- Students will analyze a dining room using good design principles.
- Students will design a functional entry and foyer.
- Students will communicate the primary design considerations for a recreation room.
- Students will integrate patios, porches, and courts into the total floor plan of a dwelling.

IT.AD.08 Students will analyze the key features of design as associated with service areas.

- Students will design the service area of a home by applying good design principles.
- Students will design a functional kitchen to meet a family's needs.
- Students will select kitchen appliances that are appropriate for a design.
- Students will design an efficient clothes care center.
- Students will describe appropriate dimensions for a garage space.

IT.AD.09 Students will review the elements of a plot plan to the level that they are able to construct a proper plan.

- Students will identify the various features shown on a typical plot plan.
- Students will visualize land elevations from contour lines.
- Students will recognize typical topographical symbols and apply them to site considerations.
- Students will properly locate a building on a site.
- Students will draw a plot plan using correct symbols and conventions.
- Students will draw a plot plan using CAD.

IT.AD.10 Students will differentiate between the different components that make up a foundation.

- Students will describe the procedure for staking out a house location.
- Students will inventory the major considerations when designing a footing for a residential foundation.
- Students will analyze a typical floor plan to determine the appropriate foundation.
- Students will discuss the design considerations for wood, concrete, and masonry foundations walls.
- Students will understand the principles of load and how post and beams are utilized.
- Students will explain the purpose of a lintel.

IT.AD.11 Students will analyze the key components that make up a foundation plan and compose a working drawing utilizing those key components.

- Students will identify the primary features included in a foundation plan.
- Students will discuss the difference between a foundation plan and a basement plan.
- Students will design and draw a foundation plan for a typical residential structure.

IT.AD.12 Students will evaluate the current building techniques associated with residential construction.

- Students will explain the difference between platform and balloon framing.
- Students will design the appropriate floor support using joists or trusses for a structure.
- Students will determine the proper joist sizes using atypical span data chart.
- Students will describe the components of a floor system.
- Students will explain the principles of post and beam construction.
- Students will select the appropriate engineered wood products for specific applications in residential construction.
- Students will identify the members of a typical frame wall.
- Students will explain methods of frame wall construction.
- Students will explain the applications, advantages, and disadvantages of steel framing in residential construction.

IT.AD.13 Students will differentiate between the numerous window and door choices in residential construction.

- Students will identify the functions that doors and windows perform.
- Students will compare the types of doors used in a residential dwelling.
- Students will draw proper door and window symbols on a typical floor plan.
- Students will prepare window and door schedules.

IT.AD.14 Students will identify the key components that go into the make-up of a residential staircase.

- Students will define common stair terminology.
- Students will explain the appropriate use of the various stair designs.
- Students will design a stairway for a residential structure.
- Students will draw structural details for main stairs.
- Students will perform stair calculations for a residential stairway.
- Students will identify code requirements for handrails and guardrails.

IT.AD.15 Students will compare various types of fireplaces that are appropriate for a residence.

- Students will identify the parts of a standard masonry fireplace and chimney.
- Students will apply the appropriate principles to design a typical fireplace.
- Students will explain the difference between a radiant and circulating fireplace.

IT.AD.16 Students will analyze the key components that make up a floor plan and compose a working drawing utilizing those key components.

- Students will identify the information required on a typical floor plan.
- Student will represent typical materials using standard architectural hatch patterns.
- Student will design and draw a residential floor plan using accepted techniques.

- Student will dimension a floor plan in a clear and precise manner.
- Student will identify the differences between well drawn and inadequate floor plans.
- Student will draw a floor plan using CAD.

IT.AD.17 Students will analyze the differences between roof designs and be able to identify key components of each.

- Student will identify the different types of basic roof designs.
- Student will describe the construction of a typical frame roof.
- Student will draw a roof that has a typical roof slope.
- Student will interpret information found on a rafter span chart.
- Student will explain the importance of proper attic ventilation and roof flashing.
- Student will compile the appropriate information to order roof trusses for a house.

IT.AD.18 Students will analyze the key components that make up an elevation plan and compose a working drawing utilizing those key components.

- Student will identify features that should be included on an exterior elevation.
- Student will identify the dimensions commonly shown on elevations.
- Student will explain symbols that are often found on elevations.
- Student will draw a typical exterior elevation that demonstrates proper techniques.

IT.AD.19 Students will identify key elements in residential wiring and analyze the proper usage electrical devices as used in residential construction.

- Student will define typical residential electrical terms.
- Student will plan for the electrical needs of a modern home.
- Student will identify and explain the three types of electrical circuits used in a residential structure.
- Student will identify the features related to information, communications, and security that would be considered when designing a new home.
- Student will discuss the components of a home automation system.