KeyTrain® Applied Technology
Course Objectives, Outlines and Estimated Times of Completion

Applied Technology Course Description:
KeyTrain's Applied Technology course teaches the ability to solve work-place problems involving complex equipment that rely on several technical principles. Many different variables and potential solutions exist and a large amount of information must be interpreted. Examples and situations focus on applying problem-solving skills in real-world situations. The program uses a variety of interactive exercises so that the learner can practice each concept. KeyTrain courses are comprehensive and easy-to-use. A full human-voice sound track and immediate feedback aid learning.

Applied Technology - Electricity Level 3 Objectives:
The learner shall: understand the concepts of voltage, circuits, and basic electrical components; understand the forces of attraction and repulsion; discuss current flow and the conditions required for current to flow; discuss static charge; categorize conductors and insulators; use resistors in light circuits; discuss resistance in conductors; determine which resistor will pass more current. Represent circuits with diagrams; understand that capacitors store electricity; identify how capacitors charge and discharge in a circuit; identify the conditions that would exist in bad capacitors; recognize that stored energy can be dangerous; understand how inductors affect current flow; identify which component should be used to change the circuit characteristics. Connect multiple devices in a circuit, using series or parallel construction; differentiate between serial and parallel circuits; understand the advantages and disadvantages of series and parallel circuits; diagram series and parallel circuits; understand the impact of series and parallel construction on system operation. Evaluate the affect of single component failures in circuits; identify problem components in circuits to isolate the failure. Use multimeters to measure voltage, resistance and current; define continuity and determine if a circuit has continuity. Reason, prioritize and make judgements concerning electrical problems; use a step-by-step approach to solve problems. Understand the operation, purpose, and function of fuses and circuit breakers. Apply elementary physical principles to electrical systems; efficiently determine the most likely cause of an electrical problem in a system of 2-4 components; solve problems that involve one-step analysis.; apply skills to troubleshooting examples.

Applied Technology - Electricity Level 3 Outline:
Introduction; Voltage & Current; Resistors; Circuits & Switches; Capactors; Inductors; Series & Parallel Circuits; Circuit Breakers; Multimeters; Troubleshooting Circuits; Quiz (affirms course content)

Applied Technology - Electricity Level 4 Objectives:
The learner shall: understand physical principles that are more abstract, less intuitive, and less observable; understand the operation of moderately complex tools and machines such as home appliances and office equipment. Recognize and identify information relevant to solving the problem while disregarding extraneous information, including reading and locating information. Determine what to check first in a malfunctioning system containing up to 10 potential sources of the problem; solve problems that require a two-step process or that involve the manipulation of two variables.

Understand the connection between electricity and magnetism; discuss how alternating current differs from direct current; discuss the advantages of AC current; discuss the advantages of 3-phase power; predict the reading on a meter in an AC circuit. Understand the purpose and function of transformers; discuss the design, use, and common failure mechanisms of transformers; calculate transformer output. Discuss how magnetism is used to generate electricity and power motors; list some of the factors affecting motor selection; discuss changing motor parameters, such as speed and direction of rotation; calculate power consumption and cost for common applications. Use Ohm's Law to calculate voltage and resistance in parallel and series circuits. Describe the concept of electrical power; ground equipment properly; understand the basic function of incandescent and fluorescent lighting; relays, and solenoids. Describe the function of electrical appliances and systems.

Applied Technology - Electricity Level 4 Outline:
Introduction; Magnets & electricity; Alternating & 3 Phase Current; Transformers; Motors & Generators; Ohm's Law; Grounding & GFCI's; Lighting Types; Relays & Solenoids; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology - Electricity Level 5 Objectives:
The learner shall: understand digital devices, such as computers and printers; discuss the major components inside a common computer and how they are connected; determine which part of a non-functioning computer is most likely the cause of the problem; diagnose common printer and photocopying problems. Use the basic physical principles in moderately advanced applications; understand complex machines, such as building electrical systems; manipulate 2 or 3 variables and break a system into manageable parts. Evaluate multiple solutions to determine the best solution for a problem, including determining available and needed resources; reduce a problem to be able to decide what to check first in a system which contains more than 10 possible causes of the problem.

Applied Technology - Electricity Level 5 Outline:
Introduction; Digital Circuits; Computers; Information Storage Devices; Printers; Photocopying; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology - Electricity Level 6 Objectives:
The learner shall: examine complex systems, such as thermocouples, analog-to-digital converters and electronic scales; diagnose problems with photoelectric devices. Use the principles of electricity in complex interacting systems; use subtle, less visible clues to determine the source of a problem; troubleshoot complex systems with several different problem sources; choose appropriate tests for diagnostic equipment to accomplish the task.

Applied Technology - Electricity Level 6 Outline:
Introduction; Thermocouples & Thermostats; Analog / Digital Converters; Electronic Scales; Light Sensors & Emitters; Solar Cells; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Fluid Dynamics Level 3 Objectives:
The learner shall: understand basic concepts of pressure and flow; apply concepts to liquids in pipes, valves and pumps. Examine resistance to flow; diagnose and solve problems involving fluid flow. Apply elementary physical principles to technical systems; understand the operation of basic equipment; efficiently determine the most likely cause of a problem in a system of 2-4 components; solve problems that involve one-step analysis.

Applied Technology – Fluid Dynamics Level 3 Outline:
Introduction; Pressure & Flow; Flotation; Pipes & Valves; Pumps; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Fluid Dynamics Level 4 Objectives:
The learner shall: understand the flow and characteristics of gases; examine the properties of compressed gases and vacuums; discuss the effect of compressing a gas on the temperature and volume. Understand physical principles that are more abstract, less intuitive, and less observable; understand the operation of moderately complex tools and machines such as multi-fluid piping. Recognize and identify information relevant to solving the problem while disregarding extraneous information, including reading and locating information. Determine what to check first in a malfunctioning system containing up to 10 potential sources of the problem; solve problems that require a two-step process or that

Applied Technology – Fluid Dynamics Level 4 Outline:
Introduction; Gases and Pressure; Vacuum; Compression Heating; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Fluid Dynamics Level 5 Objectives:
The learner shall: understand complex concepts which are used to design liquid and gas handling systems; use static and dynamic head to solve problems; understand the difficulty moving liquids over long distances and pumping uphill. Use the basic physical principles in moderately advanced applications; understand complex machines, such as building piping systems; manipulate 2 or 3 variables and break a system into manageable parts. Evaluate multiple solutions to determine the best solution for a problem, including determining available and needed resources; reduce a problem to be able to decide what to check first in a system which contains more than 10 possible causes of the problem.

Applied Technology – Fluid Dynamics Level 5 Outline:
Introduction; Piping Problems; Flow Measurement Devices; Mixing & Turbulence; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Fluid Dynamics Level 6 Objectives:
The learner shall: understand mixing and turbulence in fluid flow; change parameters to influence the ability of different liquids to mix together; discuss the role that fluids play in hydraulic power equipment. Use the principles of fluids in complex interacting systems; use subtle, less visible clues to determine the source of a problem; troubleshoot complex systems with several different problem sources; choose appropriate tests for diagnostic equipment to accomplish the task.

Applied Technology – Fluid Dynamics Level 6 Outline:
Introduction; Hydraulic Cylinders; Piping Systems; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Mechanics Level 3 Objectives:
The learner shall: examine the basic mechanical concepts of force, pressure, torque, and gravity; apply these concepts to the basic components of planes, levers, gears, pulley, and springs; troubleshoot mechanical systems. Apply elementary physical principles to technical systems; understand the operation of basic mechanical equipment; efficiently determine the most likely cause of an problem in a system of two to four components; solve problems that involve one-step analysis.

Applied Technology – Mechanics Level 3 Outline:
Introduction; Force & Pressure; Friction & Inertia; Planes & Levers; Torque & Gears; Wheels & Pulley; Springs; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Mechanics Level 4 Objectives:
The learner shall: examine more advanced mechanical concepts, including acceleration, centrifugal force, and center of gravity; apply these concepts to machines, such as amusement rides and automobiles. Understand physical principles that are more abstract, less intuitive, and less observable; understand the operation of moderately complex tools and machines such as home appliances, and pulley-driven equipment. Recognize and identify information relevant to solving the problem while disregarding extraneous information, including reading and locating information. Determine what to check first in a malfunctioning system containing up to 10 potential sources of the problem; solve problems that require a two-step process or that involve the manipulation of two variables.

Applied Technology – Mechanics Level 4 Outline:
Introduction; Screws; Acceleration; Rotation; Center of Gravity; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Mechanics Level 5 Objectives:
The learner shall: examine the applications of mechanical concepts in more complicated systems, such as lubrication and bearings. Apply concepts to conveyors, vibration, and sound. Troubleshoot mechanical systems. Use the basic physical principles in moderately advanced applications; understand complex machines, such as conveyors; manipulate 2 or 3 variables and break a system into manageable parts. Evaluate multiple solutions to determine the best solution for a problem, including determining available and needed resources; reduce a problem to be able to decide what to check first in a system which contains more than 10 possible causes of the problem.

Applied Technology – Mechanics Level 5 Outline:
Introduction; Bearings; Lubrication; Conveyors; Sound and Vibration; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Mechanics Level 6 Objectives:
The learner shall: examine complex systems such as gasoline engines; understand how different components must work together; consider machines in power generation, such as hybrid engines and other alternative power sources. Use the principles of mechanics in complex interacting systems; use subtle, less visible clues to determine the source of a problem; troubleshoot complex systems with several different problem sources; choose appropriate tests for diagnostic equipment to accomplish the task.

Applied Technology – Mechanics Level 6 Outline:
Introduction; Gas Engines; Alternative Power; Hybrid Engines; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Thermodynamics Level 3 Objectives:
The learner shall: examine the concepts of heat and temperature; consider the methods of transferring heat, such as conduction, convection and radiation; discuss the effect of heat on thermal expansion. Apply elementary physical principles to technical systems; understand the operation of basic equipment; efficiently determine the most likely cause of a problem in a system of 2-4 components; solve problems that involve one-step analysis.

Applied Technology – Thermodynamics Level 3 Outline:
Introduction; Temperature & Heat; Conduction; Thermal Expansion; Convection; radiation; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Thermodynamics Level 4 Objectives:
The learner shall: examine the effect of heat on gases and liquids; discuss melting and boiling and apply these principles to systems such as refrigerators; know how the refrigeration cycle is used in air conditioners, refrigerators, and heat pumps; relate the effect of pressure on temperature of a liquid. Understand physical principles that are more abstract, less intuitive, and less observable; understand the operation of moderately complex tools and machines such as cooling towers. Recognize and identify information relevant to solving the problem while disregarding extraneous information, including reading and locating information. Determine what to check first in a malfunctioning system containing up to 10 potential sources of the problem; solve problems that require a two-step process or that involve the manipulation of two variables.

Applied Technology – Thermodynamics Level 4 Outline:
Introduction; Melting & Freezing; Evaporation & Condensation; Boiling; Refrigeration; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Thermodynamics Level 5 Objectives:
The learner shall: examine more complex heat systems, such as boilers and furnaces; consider small systems as found in a house and larger systems found in factories; discuss the function and type of heat exchangers. Use the basic physical principles in moderately advanced applications; understand complex machines, such as ovens and furnaces; manipulate 2 or 3 variables and break a system into manageable parts. Evaluate multiple solutions to determine the best solution for a problem, including determining available and needed resources; reduce a problem to be able to decide what to check first in a system which contains more than 10 possible causes of the problem.

Applied Technology – Thermodynamics Level 5 Outline:
Introduction; Heat Exchangers; Ovens & Furnaces; Boilers; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology – Thermodynamics Level 6 Objectives:
The learner shall: examine the thermodynamic operation of common industrial equipment, including air washers, cooling towers and solar heating systems; troubleshoot systems that involve heat. Use the principles of thermodynamics in complex interacting systems; use subtle, less visible clues to determine the source of a problem; troubleshoot complex systems with several different problem sources; choose appropriate tests for diagnostic equipment to accomplish the task.

Applied Technology – Thermodynamics Level 6 Outline:
Introduction; Cooling Towers; Solar Heating Systems; Troubleshooting Exercises; Quiz (affirms course content)

Applied Technology Estimated Time of Completion:
Note: Although KeyTrain courses are delivered as an entire course with all Levels we are providing Level completion times.

Course Name	Section Title	Estimated Time of Completion
KeyTrain Applied Technology*	Program Introduction and Work Keys Introduction	1 hour
KeyTrain Applied Technology*	Problem Solving	3 hours
KeyTrain Applied Technology*	Electronics – Pre Test	1 hour
KeyTrain Applied Technology*	Electronics – Level 3	8 hours
KeyTrain Applied Technology*	Electronics – Level 4	8 hours
KeyTrain Applied Technology*	Electronics – Level 5	8 hours
KeyTrain Applied Technology*	Electronics – Level 6	6 hours
KeyTrain Applied Technology*	Mechanics – Pre-Test	1 hour
KeyTrain Applied Technology*	Mechanics – Level 3	8 hours
KeyTrain Applied Technology*	Mechanics – Level 4	8 hours
KeyTrain Applied Technology*	Mechanics – Level 5	8 hours
KeyTrain Applied Technology*	Mechanics – Level 6	6 hours
KeyTrain Applied Technology*	Thermodynamics – Pre-Test	1 hour
KeyTrain Applied Technology*	Thermodynamics –Level 3	8 hours
KeyTrain Applied Technology*	Thermodynamics – Level 4	8 hours
KeyTrain Applied Technology*	Thermodynamics – Level 5	8 hours
KeyTrain Applied Technology*	Thermodynamics - Level 6	6 hours
KeyTrain Applied Technology*	Fluid Mechanics – Pre-Test	1 hour
KeyTrain Applied Technology*	Fluid Mechanics – Level 3	8 hours
KeyTrain Applied Technology*	Fluid Mechanics – Level 4	8 hours
KeyTrain Applied Technology*	Fluid Mechanics – Level 5	8 hours
KeyTrain Applied Technology*	Fluid Mechanics – Level 6	6 hours