HVAC Curriculum

In-Demand Skills for Rewarding Careers
**HVAC Courses**

**GREYSTONE**

<table>
<thead>
<tr>
<th>HVAC Courses</th>
<th>Course #</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Controls for HVAC</td>
<td>HVAC-1</td>
<td>20</td>
</tr>
<tr>
<td>Controls for Electric Furnaces</td>
<td>HVAC-2</td>
<td>20</td>
</tr>
<tr>
<td>Controls for Gas Furnaces</td>
<td>HVAC-3</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>60</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Hours are approximate and depend on class structure and teaching strategies.*

**Electrical Controls for HVAC (HVAC-1)**

Skilled HVAC technicians are expected to have excellent employment prospects! With an existing shortage of skilled workers, advances in HVAC technology and the impact of energy and environmental concerns, demand for qualified HVAC technicians is projected to grow faster than the average sector.

HVAC (heating, ventilation, and air-conditioning) technicians install and maintain the HVAC systems found in industrial, business and residential buildings. These systems handle all aspects of climate control, including heating, air quality, temperature and humidity control in homes, industrial plants, office buildings, schools and hospitals. HVAC technicians install, repair and maintain these systems, which consist of complex mechanical, electrical and electronic components such as motors, compressors, pumps, fans, thermostats, and switches.

Intelitek’s HVAC training courses feature stand-alone benchtop training stations providing students with an excellent blend of hands-on lab activities and instruction in the fundamental concepts essential for success. HVAC presents the working principles of heating, ventilation and air conditioning in the most effective way: using the same industrial-strength components used in industry.

Greystone training systems offer an all-in-one solution for your mechatronics and industrial maintenance lab! Durable lab equipment and rigorous courseware combine to deliver all you need for your secondary or post-secondary career and technology education program.

With industrial-grade components incorporated into rugged aluminum framework, these robust, versatile training stations allow for in-depth training in small spaces. All trainers include competency-based curriculum with emphasis on operating theory, installation, maintenance, and troubleshooting.

In this course students learn the basic operating principles of components and circuits used in electrical control of heating, ventilation and air conditioning.

**Course Outline**

- **Activity 1:** General Information and Safety
- **Activity 2:** Basic Electricity
- **Activity 3:** Electric Circuits
- **Activity 4:** Electric Meters
- **Activity 5:** Components, Symbols and Circuitry of Air Conditioning Wiring Diagrams
- **Activity 6:** Reading Schematic Diagrams
- **Activity 7:** AC, Power Distribution, and Voltage Systems

**Materials Included**

- **Order #10-HVAC-0001**
  - Electrical Controls for HVAC (HVAC-1) Trainer
  - Hook-up lead kit
  - Student study guide
  - Electrical Controls for HVAC Textbook 10-HVAC-TB01

**Hardware Specifications**

- **Frame size:** 34”h x 27”w x 14.25”d
  - 864mm x 686mm x 362mm
- **Trainer weight (approximate):** 40 lbs (18 kg)
- **Construction:** Anodized aluminum U-shaped frame with environmentally stabilized, non-conductive polymer panels.
- **Power requirements:** 120V 15A single-phase AC
- **Electrical connections:** All electrical components permanently mounted to the panels
- **Electrical components are wired through industry-standard terminal strips rated at 50-amps @ 600-volts**
- **Terminal strips feature recessed and insulated fasteners and are field-serviceable**

- **Electrical connections are completed through color-coded 16-gauge insulated and stranded lead wires**
- **Connecting lead wire is terminated with metal uninsulated, crimped ferrules**

**Components:**

- **1 Low-voltage, electromechanical, heat-cool thermostat**
- **1 Line-voltage, electric heat thermostat**
- **1 Electronic, programmable, thermostat**
- **1 Control-voltage transformer, 220/120 to 24-volts AC**
- **1 Fuse and fuse block**
- **1 Reset circuit breaker**
- **1 Low-pressure control with 1/4-inch hose barb connection**
- **1 High-pressure control with 1/4-inch hose barb connection**
- **1 Single-pole, normally closed (NC) potential relay**
- **1 24-volt AC, General purpose, switching relay**
- **1 120-volt AC, General purpose switching relay**
- **1 24-volt AC, line contactor**
- **1 Delay-on-make cycle timer**
- **1 Delay-on-break cycle timer**
- **1 3-inch fan with fan guard (evaporator simulator)**
- **1 3-inch fan with fan guard (condenser simulator)**
- **1 Electric heat indicator (simulator)**
- **4 assorted electric motor starting capacitors**
- **2 cleat mounted, 120-volt, lamp assemblies**
- **2 Single-pole, single-throw, toggle switches**
Controls for Electric Furnaces teaches students the basic operating principles of electrically-controlled heating systems. The course provides hands on training simulations of a typical household electric furnace. Also included is a control transformer and electric heat element. Each component is studied, tested and connected to complete a typical electric furnace installation.

Course Outline
- Activity 1: General Information and Safety
- Activity 2: Basic Electricity
- Activity 3: Electric Circuits
- Activity 4: Electric Meters
- Activity 5: Components, Symbols and Circuitry of Air Conditioning Wiring Diagrams
- Activity 6: Reading Schematic Diagrams
- Activity 7 AC, Power Distribution, and Voltage Systems
- Activity 8: Installation of Heating, Cooling and Refrigeration Systems
- Activity 9: Contactors, Relays and Overloads
- Activity 10: Thermostats, Pressure Switches, and Other Electric Control Devices
- Activity 11: Electric Heating Control Devices

Materials required (sold separately)
- Electrical Controls for HVAC (HVAC-1) Order #10-HVAC-0001

Materials Included
Order #10-HVAC-0002
- HVAC-2 Trainer
- Hook-up lead kit
- Student study guide

Hardware Specifications
- Frame size: 34" h x 27" w x 14.25" d
  864mm x 686mm x 362mm
- Trainer weight (approximate): 40 lbs (18 kg)
- Construction: Anodized aluminum U-shaped frame with environmentally stabilized, non-conductive polymer panels.
- Power Requirements: 120V 15A single-phase AC
- Electrical connections:
  - All electrical components permanently mounted to the panels
  - Electrical components are wired through industry-standard terminal strips rated at 50-amps @ 600-volts
  - Terminal strips feature recessed and insulated fasteners and are field-serviceable
  - Electrical connections are completed through color-coded 16-gauge insulated and stranded lead wires
  - Connecting lead wire is terminated with metal uninsulated, crimped ferrules

Components:
- 1 Control-voltage transformer, 220/120 to 24-volts AC
- 1 Electric heat thermostat
- 1 120-volt, double-pole, double-throw, power relay
- 1 Electric heat element sequencer, 24-volt AC with one (1) main and one (1) aux switch
- 1 Electric heat element/electric fan sequencer, 24-volt AC, four (4) switches and two (2) timings
- 1 Two-element, electric heating, simulator with two element inspection ports and high limit cutouts
- 1 Heating system, up draft, circulating blower with guard.
- 2 Fuse block and fuses

In this course, students learn the basic operating principles of components and circuits used in gas-powered HVAC systems. The course provides hands on training simulations of a typical household gas furnace with an intermittent pilot with electronic ignition. Also included is a combustion assist blower and an adjustable air pressure switch. Each component is studied, tested and connected to complete a typical gas furnace installation.

Course Outline
- Activity 1: General Information and Safety
- Activity 2: Basic Electricity
- Activity 3: Electric Circuits
- Activity 4: Electric Meters
- Activity 5: Components, Symbols and Circuitry of Air Conditioning Wiring Diagrams
- Activity 6: Reading Schematic Diagrams
- Activity 7 AC, Power Distribution, and Voltage Systems
- Activity 8: Installation of Heating, Cooling and Refrigeration Systems
- Activity 9: Contactors, Relays and Overloads
- Activity 10: Thermostats, Pressure Switches, and Other Electric Control Devices
- Activity 11: Heating Control Devices

Materials required (sold separately)
- Electrical Controls for HVAC (HVAC-1) Order #10-HVAC-0001
- Controls for Electric Furnaces (HVAC-2) Order #10-HVAC-0002

Materials Included
Order #10-HVAC-0003
- HVAC-2 Trainer
- Hook-up lead kit
- Student study guide

Hardware Specifications
- Frame size: 34” h x 27” w x 14.25” d
  864mm x 686mm x 362mm
- Trainer weight (approximate): 40 lbs (18 kg)
- Construction: Anodized aluminum U-shaped frame with environmentally stabilized, non-conductive polymer panels.
- Power Requirements: 120V 15A single-phase AC
- Electrical connections:
  - All electrical components permanently mounted to the panels
  - Electrical components are wired through industry-standard terminal strips rated at 50-amps @ 600-volts
  - Terminal strips feature recessed and insulated fasteners and are field-serviceable
  - Electrical connections are completed through color-coded 16-gauge insulated and stranded lead wires
  - Connecting lead wire is terminated on end with metal uninsulated, crimped ferrules

Components:
- 1 Control-voltage transformer, 220/120 to 24-volts AC
- 1 Gas heat thermostat
- 1 Sequencer
- 1 Electronic ignition gas valve and solid-state control
- 1 Ignitor sensor, pilot burner, flame rod, and spark ignitor
- 1 Combustion assist blower with adjustable pressure switch
- 1 Up-draft, circulating blower with guard
- 1 Main burner and heat exchanger simulator with ignitor inspection port
- 1 Main burner high limit switch
- 1 Main burner flame rollout switch

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ABOUT INTELITEK

Our Mission

Intelitek’s mission is to improve student outcomes in education by transforming the classroom for schools, colleges, universities and industrial training. Through our proven innovations in curriculum, lab equipment, classroom management technology, assessments, professional development and teacher training, Intelitek seeks to engage students, empower instructors and support administrators in the quest to equip learners of all types with relevant skills. Intelitek is committed to putting the best technology in the hands of educators to prepare a wider range of students with career- and college-ready skills and the desire to use such skills to improve the world around them.

Our Programs

From Mathematics to Mechatronics, Engineering to Agriculture, Intelitek has a program to fit your STEM education needs. Built on the power of the LearnMate® e-learning platform, Intelitek’s blended-learning programs deliver comprehensive, standards-based instruction via hands-on activities and compelling online curriculum.

At Intelitek, we provide far more than lab equipment and curriculum. The program we implement is a partnership fully backed by our sustained support and professional development. Everything we provide is for the purpose of an improved educational outcome for all those invested in education, from students and parents to teachers and administrators.

For more information, contact Intelitek or visit www.intelitek.com.