Utah System of Higher Education
HVACR Technician
FY2027 / 15 Credits (450 Clock-Hours)

Foundational Courses

TEAC 1010 Introduction to Air Conditioning, Heating and Refrigeration — 3 Credits / 90 Clock-Hours

An introductory course explaining the principles of Heating, Air Conditioning, and Refrigeration (HVACR). The basic refrigeration cycle and components will be covered. Elementary electrical concepts, electrical heating systems, and hydronic heating systems will be introduced. Guiding principles for service and installing technicians, i.e., hand-tools, safety, energy conservation, certifications, codes, and permits will be introduced. Careers in HVACR will be explored and trade math skills reviewed.

Objectives:
- Explain the basic principles of air conditioning, heating, refrigeration, and ventilation.
- Explain the basic refrigeration cycle and its four major components.
- Describe the fundamental principles of electricity and basic circuits.
- Identify common hand tools, their use, and care.
- Identify career paths in the air conditioning, heating, and refrigeration trade.

TEAC 1100 HVACR Electrical Essentials — 3 Credits / 90 Clock-Hours

The skills reviewed in Introduction to Air Conditioning, Heating, and Refrigeration will be applied to electrical circuits as basic electrical theory is broadened with activities using various electrical meters to reinforce learning from classroom instruction. Electrical components in HVACR systems will be presented as students learn to interpret and produce various electrical diagrams illustrating how these systems are controlled.

Objectives:
- Describe the fundamentals of electricity and electrical theory.
- Identify electrical measuring instruments and demonstrate their proper use.
- Identify electrical components utilized in ACHR systems and describe their functions.
- Identify, interpret, and create various types of electrical diagrams associated with HVACR systems.

TEAC 1120 Heating Systems — 3 Credits / 90 Clock-Hours

An introduction to heating fundamentals including heat transfer and combustion theory. Furnace types, their specific control components and sequences of operation will be covered. Students will also prepare for the Rocky Mountain Gas Association (RMGA) Gas Technician Certification exam.

Objectives:
- Explain the fundamentals of heating, heat transfer, and combustion.
- Explain the sequence of operation for residential forced-air furnaces.
- Troubleshoot a variety of electrical and mechanical furnace problems.
- Demonstrate mastery of RMGA Certification knowledge by passing the RMGA exam or its equivalent.

TEAC 1140 Basic Refrigeration Systems — 3 Credits / 90 Clock-Hours

An introductory course covering the physical and chemical laws governing the principles of refrigeration. A more in-depth study of the refrigeration cycle, system components, refrigerants, and refrigerant controls will be covered.

Objectives:
• Describe the fundamental refrigeration cycle including heat, states of substances, heat transfer, and pressure/temperature relationships.
• Identify common refrigerants and understand their differences and develop an understanding of proper refrigerant handling techniques and the application of EPA Section 608 rules.
• Identify and describe the function of the major refrigerant system components including compressor types and operational characteristics.
• Identify and describe the function of common refrigeration accessories and controls.
• Demonstrate the proper use of refrigerant manifold gauges to evaluate, service, and diagnose refrigerant systems including refrigerant recovery, system evacuation, and refrigerant charging procedures.

TEAC 1160 Basic Installation Skills — 3 Credits / 90 Clock-Hours

Copper tubing and pipe joinery will be covered, including tools and equipment, and their proper use will be demonstrated while emphasizing safety. Oxy-acetylene, air-acetylene and MAPP equipment will be covered. Installation related devices, wiring, tubing installation and sheet metal methods will also be covered. Various hanging and support methods will also be addressed.

Objectives:
• Identify and demonstrate several types of piping, fittings, and joining methods.
• Demonstrate how to safely start-up, operate and shut-down an oxy-acetylene torch set.
• Demonstrate electrical installation skills for both line voltage wiring and low voltage control systems.
• Describe lineset sizing and installation means and methods.
• Design and fabricate a basic sheet metal fitting/transition.

Supplemental Courses Varies by Institution

Davis

TEAC 2200 Refrigeration Systems **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician to understand the different temperature classifications, equipment and operational conditions within the classifications. This includes special refrigeration system components, such as two temperature system components, evaporator pressure controls, crankcase pressure regulators, low ambient controls, pressure controls and safety devises, defrost methods, and accessories. Refrigeration system applications are covered, which includes merchandising options for refrigeration systems, automatic pump down cycle, multiple evaporator systems, multiple compressor systems (rack systems), secondary refrigerant systems, pressurized liquid systems, staggered defrost methods, vending machine refrigeration, water coolers, mobile (transport) refrigeration systems, cascade refrigeration systems, and ice making. Special refrigeration applications are covered as well as the preparation of achieving the Environmental Protection Agency's 608 Refrigerate Handlers Certificate which is required by federal law.

Objectives:
• Explain multiple refrigeration system types and their major components.
• Explain valves, their function and placement in refrigeration systems.
• Explain compressor types and their characteristics.
• Explain and/or demonstrate troubleshooting components of a refrigeration system.

TEAC 2300 System Installation, Air Distribution, and Balance **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician with the in-depth study of system installation and start up. Covering proper system locations, piping, electrical connections, condensate removal, system leak and charge check. The air distribution system will be covered including configurations, selection, duct materials, installation, airflow calculations, sizing of air distribution systems, register and grill selection, and balancing of the system. Measuring airflow equipment used for system pressure balancing in the distribution system while adjusting air volumes, dampers and registers are addressed. With high cost of energy, monetarily as well as environmentally, Residential Energy Auditing and diagnostic testing of the system through numerical analysis and reporting is becoming crucial. Heat gain and heat loss calculations to ensure efficient and safe system round out this vital course.

Objectives:
• Recognize and explain air distribution systems and their configurations.
• Explain and/or demonstrate applications, installations and joining of duct materials
• Explain and/or demonstrate sizing and balancing of the air distribution system.
• Explain and/or demonstrate residential energy auditing and its importance.

TEAC 2400 System Diagnostics, Troubleshooting, and Servicing **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician with the in-depth study of system diagnosis in high, medium and low temperature classes. Exploring causes and remedies from superheat and/or sub cooling out of parameters to evaluating the efficient operating conditions of compressors, condensers, evaporators and metering devices. Troubleshooting is a vital part of maintaining an efficient and safe operating system while performing a successful service call. Critical thinking will be addressed including verifying the problem, gathering information, performing visual inspections, isolating and identifying system problems ultimately correcting the problem, testing and completion of the service call. Residential Energy Auditing including diagnostic testing, duct and air leakage testing, combustion and furnace efficiency, HVAC/R venting, and draft testing, numerical analysis and reporting will be covered.

Objectives:
• Explain and/or demonstrate the purpose of controls, types, and control mechanisms.
• Explain industrial, commercial, automotive, and appliance refrigeration components for servicing.
• Explain electrical theory and safety related issues.
• Explain and recognize special refrigeration systems and their components.

TEAC 2500 Sheetmetal **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician to understand the physical creation of different air distribution systems. By understanding field measurements, calculations, fittings, construction and sheet metal drawings. This will be an introduction to radial line development, triangulation, duct fabrication standards, bend allowances and soldering as it pertains to the Air Conditioning, Heating and Refrigeration industry.

Objectives:
• Explain and/or demonstrate solving basic equations related to linear measurements, angles, triangles, circles, and arcs and make field measurements and calculate offsets.
• Explain and/or demonstrate various construction plans, identify and describe codes and standards organizations and SMACNA standard for sheet metal.
• Explain and/or demonstrate radial line development to lay out tapered components, describe the triangulation method and how it is used and identify bending factors.
• Explain and/or demonstrate tools and their use and materials used to solder sheet metal.

Dixie

TEAC 1300 HVACR Residential and Commercial Air Conditioning Systems **2 Credits / 60 Clock-Hours**

This course is designed to give an in-depth study for the student to understand the operations of air conditioning systems. The course will cover air conditioning operations, diagnostics, troubleshooting, and repair of the systems and components.

Objectives:
• Explain the fundamentals of air conditioning systems.
• Explain the sequence of operation for residential and commercial air conditioning.
• Troubleshoot a variety of electrical and mechanical air conditioning problems.
• Demonstrate proper charging practices using superheat and subcool.

TEAC 1310 HVACR Exit skills **1 Credit / 30 Clock-Hours**

Students will be required to demonstrate basic entry level skills required to be a successful HVACR technician.

Objectives:
• Student will demonstrate basic skills through real life scenarios before being awarded certification.

TEAC 1315 HVACR Residential and Commercial Refrigeration **2 Credits / 60 Clock-Hours**

Residential refrigeration will be covered in detail followed by an introduction into commercial refrigeration systems. Students will have hands-on training with both residential and commercial refrigeration systems. Opportunities for HVACR career paths will also be explored.

Objectives:
• Explain the basic functions of residential and commercial refrigeration systems.
• Demonstrate industry standards for service, repair, and maintenance of residential and commercial refrigeration systems.
• Describe career paths in residential and commercial refrigeration.

TEAC 1320 Electrical Essentials II **1 Credit / 30 Clock-Hours**

In this course, students will gain an in-depth understanding of electrical motors and motor circuits as well as motor diagrams and wiring, with a focus on different types of motors and their applications in HVACR. The course will also cover motor installation, motor starting, diagnosis, troubleshooting, and protection components.

Objectives:
• Identify different types of basic motors and their applications in HVACR, with an understanding of their operation and application.
• Proficiently read motor wiring diagrams and properly wire motors.
• Proficiently install, diagnose, and troubleshoot different types of electrical motors.

Mountainland

TEAC 1400 Introduction to HVACR Careers **3 Credits / 90 Clock-Hours**

The Introduction to HVACR Careers and RMGA Certification course will prepare students for the Rocky Mountain Gas Association Gas technician certification. Students will learn HVACR mathematics for technicians and be introduced to the HVACR career field identifying multiple career field paths, with an emphasis on future industry changes. Trac Pipe Gas Certification training provided by AIMR.

Objectives:
• Describe an overview of the HVACR industry.
• Describe the different career paths offered in HVACR. Including and not limited to Residential, Commercial, Sales & marketing, Automated Controls, HVAC Technology, Building Operations, Energy Management, Building Commissioning, Renewable Energy, Energy Auditing & Analysis and Design & Engineering.
• Perform mathematical calculations for technicians.
• Pass the RMGA exam.
• Obtain the Trac Pipe Gas Certification by Association of Industry Manufacturers Representatives (AIMR).

TEAC 1420 Advanced Controls and Exit Skills **3 Credits / 90 Clock-Hours**

The Advanced Controls and Exit Skills course is an introduction to advanced electrical principles and theory with regards to residential and commercial HVACR controls, with an emphasis on the following: direct digital controls, electrical wiring, proper grounding of equipment, common problems such as fraying, corrosion, disconnection, and troubleshooting using the hopscotch method.

Objectives:
• Diagnose and troubleshoot electrical control systems commonly used in HVACR systems considering the operation and interconnections of controller digital and analog inputs, and digital and analog outputs, to include relays, contactors, switches, transformers, and control boards.
• Read and interpret electrical schematics and blueprints to effectively install, repair, and modify wiring systems in HVACR applications including wire sizing, color coding, grounding, and safety protocols.
• Explain the components and operation of HVACR systems, including air conditioning, heating, ventilation, and refrigeration. Discuss the interplay between mechanical and electrical components as a whole system.
• Diagnose and rectify mechanical issues commonly encountered in HVACR systems. Demonstrate techniques for troubleshooting problems related to compressors, fans, motors, coils, valves, and refrigerant circuits.
• Engage in and demonstrate practical exercises and hands-on labs to reinforce troubleshooting skills and enhance familiarity with mechanical and electrical controls, wiring techniques, and HVACR systems.
• Demonstrate customer relation techniques and crew leadership best practices.
• Complete the NATE CHP-5 Service Certification.

Salt Lake

TEAC 1510 Air Distribution Systems **3 Credits / 90 Clock-Hours**

Students will be introduced to air movement theory and laws, air measurement, air distribution systems, air distribution equipment, and air system design. The different types of fans and blowers will be studied along with their various applications and energy characteristics.

Objectives:
• Explain how pressure, velocity, and volume are related to airflow.
• Describe the equipment and materials used in air distribution systems.
• Identify various air distribution systems and their energy characteristics.
• Demonstrate the planning and installation of modern duct systems.

TEAC 1520 Carbon Steel Piping Practices and Refrigerant Certification **3 Credits / 90 Clock-Hours**

This course will introduce the tools and equipment used to fabricate carbon steel piping systems and their proper use. Additionally, a deeper study of handling refrigerants as students prepare to take the Environmental Protection Agency Section 608 Refrigerant Handling Certification.

Objectives:
• Identify the different types of steel pipe, steel fittings, and their uses.
• Demonstrate the various methods used to join steel piping.
• Demonstrate the proper and safe use of steel pipe fabricating tools and equipment.
• Prepare for and obtain the Environmental Protection Agency Section 608 Refrigerant Handling Certification.

Snow

TEAC 2200 Refrigeration Systems **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician to understand the different temperature classifications, equipment and operational conditions within the classifications. This includes special refrigeration system components, such as two temperature system components, evaporator pressure controls, crankcase pressure regulators, low ambient controls, pressure controls and safety devises, defrost methods, and accessories. Refrigeration system applications are covered, which includes merchandising options for refrigeration systems, automatic pump down cycle, multiple evaporator systems, multiple compressor systems (rack systems), secondary refrigerant systems, pressurized liquid systems, staggered defrost methods, vending machine refrigeration, water coolers, mobile (transport) refrigeration systems, cascade refrigeration systems, and ice making. Special refrigeration applications are covered as well as the preparation of achieving the Environmental Protection Agency's 608 Refrigerate Handlers Certificate which is required by federal law.

Objectives:
• Explain multiple refrigeration system types and their major components.
• Explain valves, their function and placement in refrigeration systems.
• Explain compressor types and their characteristics.
• Explain and/or demonstrate troubleshooting components of a refrigeration system.

TEAC 2300 System Installation, Air Distribution, and Balance **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician with the in-depth study of system installation and start up. Covering proper system locations, piping, electrical connections, condensate removal, system leak and charge check. The air distribution system will be covered including configurations, selection, duct materials, installation, airflow calculations, sizing of air distribution systems, register and grill selection, and balancing of the system. Measuring airflow equipment used for system pressure balancing in the distribution system while adjusting air volumes, dampers and registers are addressed. With high cost of energy, monetarily as well as environmentally, Residential Energy Auditing and diagnostic testing of the system through numerical analysis and reporting is becoming crucial. Heat gain and heat loss calculations to ensure efficient and safe system round out this vital course.

Objectives:
• Recognize and explain air distribution systems and their configurations.
• Explain and/or demonstrate applications, installations and joining of duct materials
• Explain and/or demonstrate sizing and balancing of the air distribution system.
• Explain and/or demonstrate residential energy auditing and its importance.

TEAC 2400 System Diagnostics, Troubleshooting, and Servicing **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician with the in-depth study of system diagnosis in high, medium and low temperature classes. Exploring causes and remedies from superheat and/or sub cooling out of parameters to evaluating the efficient operating conditions of compressors, condensers, evaporators and metering devices. Troubleshooting is a vital part of maintaining an efficient and safe operating system while performing a successful service call. Critical thinking will be addressed including verifying the problem, gathering information, performing visual inspections, isolating and identifying system problems ultimately correcting the problem, testing and completion of the service call. Residential Energy Auditing including diagnostic testing, duct and air leakage testing, combustion and furnace efficiency, HVAC/R venting, and draft testing, numerical analysis and reporting will be covered.

Objectives:
• Explain and/or demonstrate the purpose of controls, types, and control mechanisms.
• Explain industrial, commercial, automotive, and appliance refrigeration components for servicing.
• Explain electrical theory and safety related issues.
• Explain and recognize special refrigeration systems and their components.

TEAC 2500 Sheetmetal **3 Credits / 90 Clock-Hours**

This course is designed to enhance the qualifications of the technician to understand the physical creation of different air distribution systems. By understanding field measurements, calculations, fittings, construction and sheet metal drawings. This will be an introduction to radial line development, triangulation, duct fabrication standards, bend allowances and soldering as it pertains to the Air Conditioning, Heating and Refrigeration industry.

Objectives:
• Explain and/or demonstrate solving basic equations related to linear measurements, angles, triangles, circles, and arcs and make field measurements and calculate offsets.
• Explain and/or demonstrate various construction plans, identify and describe codes and standards organizations and SMACNA standard for sheet metal.
• Explain and/or demonstrate radial line development to lay out tapered components, describe the triangulation method and how it is used and identify bending factors.
• Explain and/or demonstrate tools and their use and materials used to solder sheet metal.

USU - Eastern

TEAC 1510 Air Distribution Systems **3 Credits / 90 Clock-Hours**

Students will be introduced to air movement theory and laws, air measurement, air distribution systems, air distribution equipment, and air system design. The different types of fans and blowers will be studied along with their various applications and energy characteristics.

Objectives:
• Explain how pressure, velocity, and volume are related to airflow.
• Describe the equipment and materials used in air distribution systems.
• Identify various air distribution systems and their energy characteristics.
• Demonstrate the planning and installation of modern duct systems.

TEAC 1520 Carbon Steel Piping Practices and Refrigerant Certification **3 Credits / 90 Clock-Hours**

This course will introduce the tools and equipment used to fabricate carbon steel piping systems and their proper use. Additionally, a deeper study of handling refrigerants as students prepare to take the Environmental Protection Agency Section 608 Refrigerant Handling Certification.

Objectives:
• Identify the different types of steel pipe, steel fittings, and their uses.
• Demonstrate the various methods used to join steel piping.
• Demonstrate the proper and safe use of steel pipe fabricating tools and equipment.
• Prepare for and obtain the Environmental Protection Agency Section 608 Refrigerant Handling Certification.