

TEAU 1740 - Heating and Air Conditioning (3 Credits)

Course Description

Automotive Heating and Air Conditioning is an in-depth industry based course that meets ASE/NATEF standards. In this course you will examine safety concerns when working with refrigerants and superheated liquids, construction and operation systems, testing and diagnosis of automotive passenger comfort systems. When you have completed this course, you will be prepared to take the certification exam in ASE (Automotive Service Excellence) Automotive Heating and Air Conditioning systems.

Course Objectives

- Demonstrate a working knowledge of temperature vs. pressure in HVAC systems.
 - Diagnose and repair engine cooling and passenger comfort systems.
 - Describe the operating principles found in mobile HVAC systems.
 - Demonstrate a working knowledge of mobile HVAC system components.
 - Diagnose and repair mobile refrigerant systems.
 - Diagnose and repair compressors and components.
 - Use on-board diagnostic systems to control and test mobile HVAC systems.
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Course Outline

- Heating and AC Temperature/Pressure Fundamentals
 - Engine Cooling and Comfort Heating Systems
 - Air Conditioning System Operating Principles
 - Refrigerant System Components
 - Refrigerant System Service and Testing
 - Diagnosis of the Refrigerant System
 - Compressors and Clutches
 - System Controls and Ducting Systems
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Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation	Locate and Use a Vehicle Identification Number Video
Orientation Acknowledgement	HAC SM Chapter 2 Video Questions: Locate and use repair information
Remind Txt Group	HAC SM Chapter 2 Matching Exercise: VIN Identification
STECH Auto Student Information Sheet	HAC SM Chapter 2 ASE-Style Review Questions: Typical Shop Procedures and Tools
Automotive Student OE Instructions	HVACLAB 1
STECH COVID-19 Policies and Procedures Agreement Review	HVACLAB2
STECH Auto Right-To-Know Agreement	HVACLAB3
SWAM 2720 Heating and Air Conditioning Course Syllabus Review	HVACLAB4
SWAM 2720 Heating and Air Conditioning Course Lab Assignment Checklist Review	HVACLABS
SWAM 2720 Heating and Air Conditioning Course Task List Review	HVACLAB6
Cleaning Expectations	HVACLAB7
Southwest Technical College Automotive Video Playlist	HVACLAB8
Student Tool and Equipment Use Waiver	HVAC LAB9
Cell Phone	Checkpoint Meeting Module 1
Instructions	Chapter 4: Engine Cooling and Comfort Heating Systems
Digital Lab Explanation	HAC CM CH 4 Reading: Engine Cooling and Comfort Heating Systems
Module Breakdown	Overview of Engine Cooling System Video
Module 1 Labs	Typical Cooling System Video
Module 2 Labs	Pressure Cap Operation Video
Module 3 Labs	Purpose and Operation of Vehicle Water Pumps Video
Module 4 Labs	Engine Cooling Fan Systems Video
Module 5 Labs	Cooling System Components and Operation
Module 6 Labs	HAC CM Chapter 4 Video Questions: Thermostat purpose and operation
Module 7 Labs	HAC CM Chapter 4 Labeling Activity: Water pump parts ID
Module 8 Labs	HAC CM Chapter 4 Multiple Choice and True-False Quiz: Engine Cooling and Comfort Heating Systems
Cleaning Labs	HAC SM CH 4 Reading: Engine Cooling and Comfort Heating Systems Service
Cleaning Lab 1	Inspecting and Testing Engine Cooling System Video
Cleaning Lab 2	Source of and Effects of Electrolysis on Cooling System Video
Cleaning Lab 3	Measure and Adjust Engine Drive Belts Video
Cleaning Lab 4	Replace Engine Drive Belt Video
Cleaning Lab 5	Fan Relay Operation Video
HAC CM CH 1 Reading: History and the Environment	Engine Coolant Mixture Video
HAC Effects of UV Light Video	Flush and Refill Engine Cooling System Video
HAC Greenhouse Effect Video	HAC SM CH 4 Photo Sequence 1: Servicing the serpentine drive belt
HAC Engine Coolant Mixture Video	HAC SM Chapter 4 ASE-Style Review Questions: Engine Cooling and Comfort Heating Systems Service
HVAC CM Chapter 1 Multiple Choice and True-False Quiz: History and the Environment	HAC SM CH Chapter 4 ASE Challenge Questions: Engine Cooling and Comfort Heating Systems Service
HAC CM CH 2 Reading: Temperature and Pressure Fundamentals	HVAC LAB 10
Condensation and Evaporation Video	HVAC LAB 11
Heat Transfer Video	HVACLAB 12
Heat Absorption Principles	HVACLAB 13
Effects of Heat Transfer Video	
HAC CM Chapter 2 Matching Exercise: Convection, Conduction, Radiation	
HAC CM Chapter 2 Multiple Choice and True-False Quiz: Temperature and Pressure Fundamentals	
HAC SM CH 2 Reading: Typical Shop Procedures and Tools Gauge Set Operation Video	

HVACLAB 14
Checkpoint Meeting Module 2
CM CH 5 Reading: Air-Conditioning System and Operating Principles
R134A Service Fitting Operation Video
Receiver Drier Operation Video
Expansion Valve Operation Video
Refrigeration Circuit Video
HAC CM Chapter 5 Video Questions: Fixed orifice tube air conditioning system
HAC CM Chapter 5 Labeling Activity: Expansion valve A/C system ID
Air Conditioning Cycle Components and Operation
HAC CM Chapter 5 Multiple Choice and True-False Quiz
HAC SM Reading: The Manifold and Gauge Set
Refrigerant Flow Through the Manifold Video
HAC SM CH 5 Photo Sequence 3: Connecting a manifold and gauge set to 134a system
HAC SM Chapter 5 ASE-Style Review Questions
HAC SM Chapter 5 ASE Challenge Questions
A/C Parts ID Sheet
HVAC LAB 15
HVAC LAB 16
HVAC LAB 17
HVAC LAB 18
HVAC LAB 19
HVAC LAB 20
Checkpoint Meeting Module 3
HAC CM CH 6 Reading: Refrigerant Systems Components
Types of Condenser Flow Designs Video
HAC CM Chapter 6 Video Questions: Refrigeration Cycle
HAC CM Chapter 6 Matching Exercise:
Component/Pressure/State/Temperature
HAC CM Chapter 6 Multiple Choice and True-False Quiz:
Refrigerant Systems Components
HAC SM CH 6 Reading: Servicing System Components
Fitting Disconnection Video
Spring Lock Disconnect Tool Video
Removing an Orifice Tube Video
Removing a Broken Orifice Tube Video
HAC SM Chapter 6 Video Questions: Units of Measurement - Including Metric System
HAC SM CH 6 Photo Sequence 4: Recovering (Purging) refrigerant from the system
HAC SM Chapter 6 ASE-Style Review Questions: Servicing System Components
HAC SM Chapter 6 ASE Challenge Questions: Servicing System Components
HVAC LAB 21
HVAC LAB 22
HVAC LAB 23
HVAC LAB 24
HVAC LAB 25
HVAC LAB 26

HVAC LAB 27
HVAC LAB 28
Checkpoint Meeting Module 4
HAC CM CH 7 Reading: Refrigerant System Service and Testing
Evacuating the System Video
HAC CM Chapter 7 Labeling Activity: A/C plenum, mode door, blend door operation
Air Conditioning System Servicing
HAC CM Chapter 7 Multiple Choice and True-False Quiz:
Refrigerant System Service and Testing
HAC SM CH 7 Reading: Air Conditioning System Service and Testing
HAC SM Chapter 7 Video Questions: Pressure Testing with Gauges
HAC SM CH 7 Photo Sequence 7: Checking for Leaks
HAC SM Chapter 7 ASE-Style Review Questions: Air Conditioning System Service and Testing
HAC SM Chapter 7 ASE Challenge Questions: Air Conditioning System Service and Testing
HVAC LAB 29
HVAC LAB 30
HVAC LAB 31
HVAC LAB 32
HVAC LAB 33
Checkpoint Meeting Module 5
HAC CM CH 8 Reading: Diagnosis of the Refrigeration System
Refrigeration System Components Video
Restricted Orifice Video
HAC CM Chapter 8 Matching Exercise: Pressure Readings/ Causes
HAC CM Chapter 8 Fill in the Blank Questions: Diagnosis of the Refrigeration System
HAC CM Chapter 8 Multiple Choice and True-False Quiz:
Diagnosis of the Refrigeration System
HAC SM CH 8 Reading: Diagnosis of the refrigeration system
Diagnostic Strategies (8-Step Process) Video
HAC SM Chapter 8 Matching Exercise: Thermostatic Expansion Valve Diagnosis
HAC SM Chapter 8 ASE-Style Review Questions: Diagnosis of the refrigeration system
HAC SM Chapter 8 ASE Challenge Questions: Diagnosis of the refrigeration system
HVAC LAB 34
HVAC LAB 35
HVAC LAB 36
HVAC LAB 37
HVAC LAB 38
HVAC LAB 39
HVAC LAB 40
HVAC LAB 41
Checkpoint Meeting Module 6
HAC CM CH 9 Reading: Compressors and Clutches

Compressor Operation Video
Axial Plate Operation Video
Operation of Rotary Vane Compressor Video
HAC CM Chapter 9 Video Questions: Diodes - Construction and Operation
HAC CM Chapter 9 Labeling Activity: Scroll compressor parts identification
HAC CM Chapter 9 Multiple Choice and True-False Quiz: Compressors and Clutches
HAC CM Chapter 9 Fill in the Blank Questions: Compressors and Clutches
HAC SM CH 9 Reading: Compressors and Clutches Service
Compressor Manifold Seals Video
HAC SM CH 9 Photo Sequence 11: Compressor Clutch Coil and Diode
HAC SM Chapter 9 ASE-Style Review Questions: Compressors and Clutches Service
HAC SM Chapter 9 ASE Challenge Questions: Compressors and Clutches Service
HVAC LAB 42
HVAC LAB 43
HVAC LAB 44
HVAC LAB 45
HVAC LAB 46
HVAC LAB 47
HVAC LAB 48
HVAC LAB 49
Checkpoint Meeting Module 7
HAC CM CH 10 Reading: Case and Duct Systems
Air Distribution - Mode Doors Video
HAC CM Chapter 10 Labeling Activity: Single A/C duct parts identification
Case and Duct System
HAC CM Chapter 10 Fill in the Blank Questions: Case and Duct Systems
HAC CM Chapter 10 Multiple Choice and True-False Quiz: Case and Duct Systems
HAC SM CH 10 Reading: Case and Duct Systems Service
Instrument Panel Air Flow Video
HAC SM CH 10 Photo Sequence 14: Testing a check valve
HAC SM Chapter 10 ASE-Style Review Questions: Case and Duct Systems Service
HAC SM Chapter 10 ASE Challenge Questions: Case and Duct Systems Service
HAC CM CH 11 Reading: System Controls
Pressure Cycling Switch Operation Video
Sun Load Sensor Video
HAC CM Chapter 11 Video Questions: Common Circuit Problems
HAC CM Chapter 11 Matching Exercise: Sensor ID and Purpose
HAC CM Chapter 11 Fill in the Blank Questions: System Controls
HAC CM Chapter 11 Multiple Choice and True-False Quiz:

System Controls
HAC SM CH 11 Reading: System Controls Service
HAC SM Chapter 11 ASE-Style Review Questions: System Controls Service
HAC SM Chapter 11 ASE Challenge Questions: System Controls Service
HAC CM CH 12 Reading: Retrofit and Future Trends (R-12 to R-134a)
HAC CM Chapter 12 Matching Exercise: Refrigerants and label background color
HAC CM Chapter 12 Fill in the Blank Questions: Retrofit and Future Trends
HAC CM Chapter 12 Multiple Choice and True-False Quiz: Retrofit and Future Trends
HAC SM CH 12 Reading: Retrofit Service
HAC SM Chapter 12 Video Questions: Refrigerant Types and Identification
HAC SM CH 12 Photo Sequence 18: Removing and replacing a schrader valve core
HAC SM Chapter 12 ASE-Style Review Questions: Retrofit Service
HAC SM Chapter 12 ASE Challenge Questions: Retrofit Service
HVAC LAB 50
HVAC LAB 51
HVAC LAB 52
HVAC LAB 53
HVAC LAB 54
HVAC LAB 55
HVAC LAB 56
HVAC LAB 57
HVAC LAB 58
HVAC LAB 59
Checkpoint Meeting Module 8
Student Feedback
End of Course Survey
Heating and Air Conditioning Competency Profile (2021)
Ac Review
AC Final Exam

Subject to change. Please consult your Canvas course for the most current instructions and updates.

Classroom Hours

Mo, Tu, W, Th
8:00 AM - 12:00 PM
1:00 PM - 5:00 PM

Friday
8:00 AM - 12:00 PM

For a full list of course hours visit: [Course Schedule](#)

Instructor Contact Information

Cody Dawson — cdawson@stech.edu
Shad Esplin — sesplin@stech.edu
Dallin Robinson — drobinson@stech.edu
McKael Stapel — mstapel@stech.edu

Office Hours: By appointment

Email is the preferred method of communication; you will receive a response within 24 hours during regular business hours.

Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- stech.instructure.com
- For Canvas passwords or any other computer-related technical support contact Student Services.
- For regular Hours and Weekdays call (435) 586 - 2899.
- For after Hours & Weekends call (435) 865 - 3929 (Leave a message if no response).

Course Policies

Course Grading: Students must achieve 80% (B-) or higher to pass graded work. Incomplete assignments must be redone to meet the required standards. Guidelines, rules, and expectations for completing assignments are provided in each course.

High School Power School Grades: Quarter student grades will be determined by student progress percentage. Faculty will use the higher percentage of either 1) quarter progress, or 2) cumulative progress for the current training plan year.

Grade Scale: The following grading scale will be used to determine a letter grade.

• A : 94 - 100%	• B : 83 - 86%	• C : 73 - 76%	• D : 63 - 66%
• A- : 90 - 93%	• B- : 80 - 82%	• C- : 70 - 72%	• D- : 60 - 62%
• B+ : 87 - 89%	• C+ : 77 - 79%	• D+ : 67 - 69%	• F : 0 - 59%

Course Policies: Class attendance is required during your scheduled time. Cell phones for many have become a distraction. When you are in class or lab we encourage you to keep your cell phones put away in a secure location. If you use ear buds we ask that you only use one so you can still hear the things going on around you. If you are using your phone for things other than school related items, instructors will ask you to put them away. Please follow the direction of your instructors. Those who have been asked to refrain from using your cell phone and fail to do so will be asked to meet with the Director of Transportation and student services will be notified. The program is designed to provide the student with as much hands-on work as possible. In the automotive industry you may be required to lift heavy objects and stand for hours at a time to complete work required. Technicians deal with chemicals and materials which require caution, these will be identified in the Right to Know Agreement provided to you. You will also be required to use computers to track and complete work.

Additional Information

InformaCast Statement: Southwest Tech uses InformaCast to ensure the safety and well-being of our students. In times of emergency, such as weather closures and delays, this app allows us to promptly deliver notifications directly to your mobile devices. To stay informed and receive real-time updates, we encourage all students to sign up for notifications. Your safety is our priority, and staying connected ensures a swift response to any unforeseen circumstances. More information and directions for signing up are available at: <https://stech.edu/emergency-notifications/>

Internet Acceptable Use Policy: The student is expected to review and follow the Southwest Technical College Internet Safety Policy at: <https://stech.edu/students/policies/>

Student Code of Conduct Policy: The student is expected to review and follow the Southwest Technical College Student Code of Conduct Policy at: <https://stech.edu/students/policies/>

Accommodations: Students with medical, psychological, learning, or other disabilities desiring accommodations or services under ADA, must contact the Student Services Office. Student Services determines eligibility for and authorizes the provision of these accommodations and services. Students must voluntarily disclose that they have a disability, request an accommodation, and provide documentation of their disability. Students with disabilities may apply for accommodations, based on an eligible disability, through the Student Services office located at 757 W. 800 S., Cedar City, UT 84720, and by phone at (435) 586-2899. No diagnostic services are currently available through Southwest Technical College.

Safety and Building Maintenance: The College has developed and follows a variety of plans to ensure the safe and effective operation of its facilities and programs. The following plans are available online:

1) Facilities Operations and Maintenance Plan; 2) Technical Infrastructure Plan; and 3) Health and Safety Plan.

Withdrawals and Refunds: Please refer to the Southwest Technical College Refund Policy at: <https://stech.edu/students/policies/>

Any high school or adult student, who declares a technical training objective is eligible for admission at Southwest Technical College (Southwest Tech). Program-specific admissions requirements may exist and will be listed on the Southwest Tech website. A high school diploma or equivalent is not required for admission but is mandatory for students seeking Title IV Federal Financial Aid.

Non-Discriminatory Policy: Southwest Technical College affirms its commitment to promote the goals of fairness and equity in all aspects of the educational enterprise, and bases its policies on the idea of global human dignity.

Southwest Tech is committed to a policy of nondiscrimination. No otherwise qualified person may be excluded from participation in or be subjected to discrimination in any course, program or activity because of race, age, color, religion, sex, pregnancy, national origin or disability. Southwest Technical College does not discriminate on the basis of sex in the education programs or activities that it operates, as required by Title IX and 34 CFR part 106. The requirement not to discriminate in education programs or activities extends to admission and employment. Inquiries about Title IX and its regulations to STECH may be referred to the Title IX Coordinator, to the Department of Education, and/or to the Office for Civil rights.

If you believe you have experienced discrimination or harassment on our campus, please contact the Title IX Coordinator, Cory Estes: cestes@stech.edu, (435) 865-3938.

For special accommodations, please contact the ADA Coordinator, Cyndie Tracy: ctracy@stech.edu, (435) 865-3944.

Southwest Technical College

757 West 800 South

Cedar City, UT 84720

info@stech.edu

(435) 586-2899