

**PROGRAM CONCENTRATION: Architecture, Construction,
Communications & Transportation
CAREER PATHWAY: Transportation Logistical Operations
COURSE TITLE: Heating, Ventilation, Air Conditioning
And Refrigeration (HVACR) Concepts**

Heating, Ventilation, and Refrigeration (HVACR) Concepts is a course in the Transportation Logistical Operation Pathway. The course will help students build a strong scientific knowledge base and develop skills related to Heating, Ventilation, Air Conditioning, and Refrigeration in the diesel logistics sector. Mastery of these standards through project-based learning and leadership development activities of the Career and Technical Student Organizations will help prepare students with a competitive edge for the diesel logistics marketplace.

Note: For a more comprehensive and authoritative report of national academic related skills please refer to the National Automotive Technicians Education Foundation's document "APPLIED ACADEMIC & WORKPLACE SKILLS FOR AUTOMOBILE TECHNICIANS" available at www.natef.org

ACT-HVACR-1 Demonstrate knowledge of HVRC systems concepts, diagnosis, and repair.

Academic Standards:

ELA12W3 The student uses research and technology to support writing.

SPS10. Students will investigate the properties of electricity and magnetism.

National Academic Standards (NATEF):

LA283 The technician uses computerized and other databases to obtain system information.

SC341 The technician can explain in detail the three states of matter.

MA275 The technician can identify whether a temperature measurement should be made using a Fahrenheit or Centigrade measuring device.

ACT-HVACR-2 Demonstrate knowledge of refrigeration system concepts, diagnosis, and repair.

Academic Standards:

ELA12LSVI The student participates in student-to-teacher, student-to-student, and group verbal interactions.

SPS5. Students will compare and contrast the phases of matter as they relate to atomic and molecular motion.

MM4A4. Students will investigate functions.

National Academic Standards (NATEF):

LA285 The technician can comprehend and apply information in the operator's manuals to operate and maintain truck tools and equipment.

SC282 The technician can explain the differences between heat and temperature and demonstrate an understanding of how to measure each.

MA174 The technician can interpret charts, tables, or graphs to determine the manufacturer's specifications for a given system.

ACT-HVACR-3 Demonstrate knowledge of heating and engine cooling systems concepts, diagnosis, and repair.

Academic Standards:

ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

SPS8. Students will determine relationships among force, mass, and motion.

MM4P5. Students will represent mathematics in multiple ways.

National Academic Standards (NATEF):

LA023 The technician will visually skim or scan the manufacturer's service manuals or databases to identify information that is related to any unfamiliar system under review, then study the applicable information with the intensity necessary for the situation.

SC282 The technician can explain the differences between heat and temperature and demonstrate an understanding of how to measure each.

MA171 The technician can determine the degree of conformance to the manufacturer's specifications for length, volume, and other appropriate measurements using the metric system.

ACT-HVACR-4 Demonstrate knowledge of operating systems and related controls concepts, diagnosis, and repair.

Academic Standards:

ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

MM4P1. Students will solve problems (using appropriate technology).

National Academic Standards (NATEF):

LA035 The technician attends to all written and oral directions that relate to the task or system of the truck under study.

SC044 The technician develops a theory relative to the cause of the problem based on the information provided, then tests the hypothesis to determine the solution. Major steps include: identify the problem; gather information; develop hypothesis; take action; check results.

MA228 The technician can analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.

ACT-HVACR-5 Demonstrate knowledge of refrigerant recovery, recycling, and handling.

Academic Standards:

ELA12LSV2 The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.

SPS8. Students will determine relationships among force, mass, and motion.

MM4P5. Students will represent mathematics in multiple ways.

National Academic Standards (NATEF):

LA035 The technician attends to all written and oral directions that relate to the task or system of the truck under study.

SC007 The technician develops and maintains an understanding of all federal, state, and local rules and regulations regarding environmental issues related to the work of the truck technician. The technician uses such things as government impact statements, media information, and general knowledge of pollution and waste management to correctly use and dispose of products that result from the performance of a repair task.

MA228 The technician can analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education

Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.