AUTO 018: AUTOMOTIVE HEATING, VENTILATION & AIR CONDITIONING

Originator

dredman

Co-Contributor(s)

Name(s)
Anderson, Dorothy

Justification / Rationale

The Automotive Faculty are reviewing and/or updating this course to assure compliance with local, State, and Federal regulations; support consistency within the curriculum; practice relevance regarding automotive industry and community; and to make improvements that will strengthen the learning environment this course creates thus benefiting the learners.

Effective Term

Fall 2022

Credit Status

Credit - Degree Applicable

Subject

AUTO - Automotive Technology

Course Number

018

Full Course Title

Automotive Heating, Ventilation & Air Conditioning

Short Title

AUTO HVAC

Discipline

Disciplines List
Automotive Technology

Modality

Face-to-Face
Hybrid

Catalog Description

This course provides theory and hands-on experience in automotive heating and air conditioning including: theory of operation, service, diagnosis and repair. The course includes the following topics: heating ventilation and air conditioning (HVAC) theory of operation, HVAC housing and ducting, HVAC controls, compressor and clutch operation and servicing and testing HVAC systems. A $20.00 test fee for the appropriate Automotive Service Excellent (ASE) Student Exam is required. A uniform is required for this course.

Schedule Description

This class provides lecture/discussion and hands-on experience understanding, servicing, troubleshooting, diagnosing and repairing automotive heating and air conditioning systems. A testing fee is required. A $20.00 test fee for the appropriate Automotive Service Excellent (ASE) Student Exam is required. A uniform is required for this course.

Lecture Units

3

Lecture Semester Hours

54

Lab Units

1

Lab Semester Hours
54

In-class Hours
108

Out-of-class Hours
108

Total Course Units
4

Total Semester Hours
216

Required Text and Other Instructional Materials

Resource Type
Book

Open Educational Resource
No

Author
Various

Title
ASE Automotive Suite (Text, shop manual, and workbook for all 8 ASE automotive categories)

Edition
7th

City
Tinley Park, Illinois

Publisher
Goodheart Wilcox

Year
2021

College Level
Yes

Flesch-Kincaid Level
11.4

ISBN #
978-1-64564-559-7

Class Size Maximum
24

Course Content

1. Orientation, SP2 safety & environmental concerns.
2. Hand tools, special tools and shop equipment.
3. Overview of automotive HVAC system operation and components.
4. Electricity/electronics for automotive HVAC systems.
5. Automotive repair industry terms and conventions.
6. Temperature and pressure fundamentals.
7. System components.

8. Servicing and testing.
9. Compressors and clutches.
10. HVAC housing and ducting.
11. System controls.
12. Diagnosis and troubleshooting.
13. Refrigerant charging, recovery, recycling and handling including regulations and consumer protection issues.
14. Automotive industry web-based training modules.

Lab Content

1. Safety & Environmental Protection.
2. Identify system components on vehicle.
3. Practice proper servicing and testing procedures.
4. Diagnose, service and repair compressors and clutches concerns.
5. Diagnose, service and repair HVAC housing and ducting concerns.
6. Diagnose, service and repair system control concerns.
7. Maintenance & inspection of HVAC system.
8. Required tasks to meet the Automotive Service Excellence (ASE) 2017 Master Automotive Service Technician (MAST) standards.

Course Objectives

	Objectives
Objective 1	Upon satisfactory completion of the course, in a timely manner to industry standards, students will be able to: Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
Objective 2	Explain the importance of and perform a general: A/C system diagnosis and repair.
Objective 3	Explain the importance of and perform a refrigeration system component diagnosis and repair.
Objective 4	Explain the importance of and perform a heating, ventilation, and engine cooling systems diagnosis and repair.
Objective 5	Explain the importance of and perform an operating systems and related controls diagnosis and repair.
Objective 6	Explain the importance of and perform a refrigerant recovery, recycling, and handling procedure.
Objective 7	Complete the requisite shop and personal safety and SP2 training and exams.
Objective 8	Explain the importance of tools and equipment for HVAC diagnosis and repair.
Objective 9	Explain the importance of and prepare a vehicle for service.
Objective 10	Explain the importance of preparing the vehicle for customer delivery.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Demonstrate shop safety practices, given an automotive shop environment, a vehicle with a heating, ventilation, air conditioning (HVAC) system being serviced, with related service parts and fluids.
Outcome 2	Practice proper inspection, diagnostic, repair, and maintenance skills given an intermediate to advanced level HVAC system malfunction, using the proper diagnostic and repair tools, in a team setting.
Outcome 3	Demonstrate proficiency in referencing service information and documenting repairs, when servicing and repairing HVAC concerns.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Laboratory	Learners will analyze given lab based activities in order to complete their ASE standards job sheets.
Discussion	Learners will participate in discussions.
Demonstration, Repetition/Practice	Each learner will explain the importance of and perform a given task not limited to laboratory assignments, research projects, interactive role-play and group activities.
Technology-based instruction	Explain the importance of and perform diagnostic tests using industry standard equipment, computer-based tools, and virtual reality scenarios.

Participation	Learners will work in a team setting while analyzing customer concerns and performing lab activities.
Lecture	Lectures will analyze multiple aspects of course content.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
College level or pre-collegiate essays	Learners may be required to complete a research paper (both in and out of class).	In and Out of Class
Reading reports	Turned in by report, written, presentation, however, the learner is required to research information pertaining to the assignment (both in and out of class).	In and Out of Class
Student participation/contribution	Learners may participate in role play activities (both in and out of class).	In and Out of Class
Mid-term and final evaluations	Used to evaluate learners' knowledge and understanding of the information presented. Examples of these are not limited to quizzes, exams, presentations, research, or projects (both in and out of class).	In and Out of Class
Group activity participation/observation	Classroom and lab activities require critical thinking and diagnosis.	In Class Only
Presentations/student demonstration observations	Learners may participate in role play activities and be required to do a visual presentation	In and Out of Class
Laboratory projects	Learners will participate in lab based activities to complete their National Automotive Technicians Education Foundation (NATEF) standards job sheets.	In Class Only
Written homework	Read each assigned chapter, answer chapter homework.	Out of Class Only

Assignments

Other In-class Assignments

1. Review homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.
2. Begin 3 SP2 safety tests.
3. Notes on lecture.
4. Participation in discussion related to topic of lecture.
5. Review and discuss vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
6. Must develop teamwork skills through classroom interaction and discussion.

Other Out-of-class Assignments

1. Readings from required text: 1-3 chapters per week from both classroom and shop manuals. Each chapter 2 hours per week.
2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week. Each chapter 2 hours per week.
3. Completion of 2 SP2 safety tests, each subject including an average of 4 hours.
   a. Mechanical Safety
   b. Pollution prevention
4. Assigned readings and written summaries from selected instructor handouts.
5. Written summaries and analysis of assigned websites.
6. Must complete a course project consisting an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork, 8 hours.
7. Automotive industry web-based training modules, each taking roughly 3 hours.
8. Exam prep, 12 hours.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

50

On-campus %

50

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?

Lab component of the course will be completed in a laboratory environment on campus under the supervision of an appropriate facilitator.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?

The lab content is comprised of the required tasks to meet the Automotive Service Excellence (ASE) 2017 Master Automotive Service Technician (MAST) standards.

How will you assess the online delivery of lab activities?

Laboratory activities will not be delivered in the online setting, only in person.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

SP2 online safety training

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.

SP2 - free account provided to all used to ensure the learners ability to distinguish safe working practices and conditions from unsafe practices and conditions.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:

Chat room/instant messaging
Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Video or audio feedback
Weekly announcements

External to Course Management System:

Direct e-mail
Synchronous audio/video

For hybrid courses:

Orientation, study, and/or review sessions
Scheduled Face-to-Face group or individual meetings

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.

Regular effective contact will be practiced through online lecture, discussion board postings, email communications, regular announcements, prompt grading and feedback of assignments, and virtual office hours. This contact between the facilitator and learner on a regular basis will enhance learner confidence and understanding and promote critical thinking and analyzation of subject matter.

If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.
Interaction between instructor and learner will help to enhance learning and understanding of subject material.

Other Information

Provide any other relevant information that will help the Curriculum Committee assess the viability of offering this course in an online or hybrid modality.
With the uncertainty of the teaching environment, enabling the lecture portion of this course to be delivered in an online setting, while keeping the hands-on portion face-to-face, will ensure learners can access needed training to ensure knowledge and experience is achieved to gain employment in the automotive field.

MIS Course Data

CIP Code
47.0604 - Automobile/Automotive Mechanics Technology/Technician.

TOP Code
094800 - Automotive Technology

SAM Code
C - Clearly Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Transferable to CSU only

General Education Status
Y = Not applicable

Support Course Status
N = Course is not a support course

C-ID
AUTO 170 X

Allow Audit
Yes

Repeatability
No

Materials Fee
No

Additional Fees?
Yes

Additional Fee Amount
$20.00

Additional Fees Description
Automotive Service Excellent (ASE) Student Exam.

Approvals

Curriculum Committee Approval Date
3/17/2022

Academic Senate Approval Date
3/24/2022

Board of Trustees Approval Date
4/22/2022

Chancellor's Office Approval Date
5/07/2022

Course Control Number
CCC000631448

Programs referencing this course
Automotive Air Conditioning Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=104)
Automotive Braking Systems Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=109)
Automotive General Service Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=110)
Automotive Light and Medium Duty Diesel Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=111)
Automotive Steering, Suspension, Alignment Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=112)
Automotive Introductions Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=201)
Advanced Transportation Technologies AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=44)
Advanced Transportation Technologies AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=45)
Air Conditioning Refrigeration AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=51)
Automotive Technology AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=57)