

# **Syllabus: Auto 126: Mobile Heating Ventilation and Air Conditioning Systems**

## **Fall 2019, Section 1873**

### **Lecture and Lab:**

Room 2370 Lounibos Hall,  
"The Diesel Shop"  
TTh 9:30am to 12:00pm

### **Instructor:**

David Lemmer  
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Phone: (707) 695-4250c (ok to text or call)  
Office: Lounibos Service Center 2303/AutoShop,  
MW 11am-12pm and 3pm-5pm and by appointment

### **Prerequisite:**

Successful completion of Auto 80 (formerly Auto 100)  
or successful completion of DET 179 (formerly DET 80 or DET 60)

### **Recommended Preparation:**

Course Eligibility for ENGL 100 or ESL 100

### **Course Description:**

Theory, service and repair of many types of mobile heating and air conditioning systems. Includes environmental and safety concerns using R-12, R-134a, and R-1234yf refrigerants. Engine heating and cooling, manual and automatic system controls will also be introduced. Prepares the student to take the A7 & T7 ASE (Automotive Service Excellence) certification exams.

### **Student Learning Outcomes:**

Students will be able to:

1. Identify and describe the theory, service and repair of common types of automotive heating and air conditioning systems.
2. Correctly use diagnostic tools to diagnose and repair electrical control systems.
3. Demonstrate the skills necessary to pass the ASE (Automotive Service Excellence) A7, Heating and Air Conditioning Examination.

## **Objectives:**

Upon completion of this course, the students will be able to:

1. Use related tools and equipment safely.
2. Recognize environmental issues and apply standards involved in maintenance and repair of automotive refrigeration systems.
3. Describe the operation of basic automotive heating and refrigeration systems.
4. Identify and describe the components used in automotive heating and refrigeration systems.
5. Inspect and validate individual system components.
6. Diagnose and repair electrical control systems.
7. Correctly use diagnostic tools.
8. Analyze and write the complaint -- cause -- correction of a system failure.
9. Demonstrate the skills necessary to complete the A7 portion of the ASE test series.

## **Topics and Scope:**

- I. Principles of the basic refrigeration system and how they apply to any system
  - A. Automotive equipment
  - B. Transportation equipment
  - C. Hybrid and electric equipment
  - D. Agricultural and construction equipment
- II. Temperature and pressure fundamentals
- III. Engine cooling systems
- IV. Manual and automatic comfort systems
- V. Systems components
- VI. Case and duct systems
- VII. Air conditioning tools used in diagnosing and repairing
- VIII. AC system testing and diagnoses
- IX. Electrical control systems
- X. System service
- XI. Safety and hazards concerning use of refrigerants
- XII. Retrofitting R-12 systems to R-134a refrigerants

All topics are covered in the lecture and lab portions of the course.

## **Assignments:**

### **Lecture-related Assignments:**

1. Reading 25-50 pages per week
2. Answer the questions at the end of each chapter
3. Quizzes (2-5) and final exam

### **Lab-related Assignments:**

1. Participate in classroom discussion
2. Complete the demonstration worksheet for each classroom discussion
3. Skill demonstrations:
  - a. Employ rules about shop safety
  - b. Locate components used in automobile refrigeration systems
  - c. Identify, by touch, the areas of a refrigeration system which should be hot and cold and compare findings with the textbook and class discussions
  - d. Make use of recovery, recycling, and recharging equipment
  - e. Set up a system performance test
  - f. Show skill in using diagnostic tools

## Methods of Evaluation / Basis of Grade:

<b>Writing:</b> Assessment tools that demonstrate writing skill and/or require students to select, organize and explain ideas in writing.	Writing 0 - 0%
None	
This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	
<b>Problem solving:</b> Assessment tools, <i>other than exams</i> , that demonstrate competence in computational or non-computational problem-solving skills.	Problem Solving 5 - 10%
Homework problems	
<b>Skill Demonstrations:</b> All skill-based and physical demonstrations used for assessment purposes including skill performance exams.	Skill Demonstrations 20 - 30%
Demo worksheets; skill demonstrations	
<b>Exams:</b> All forms of formal testing, <i>other than skill performance exams</i> .	Exams 50 - 70%
Exams: multiple choice, true/false, matching items, completion, short answer	
<b>Other:</b> Includes any assessment tools that do not logically fit into the above categories.	Other Category 5 - 15%
Attendance and participation	

### Follow your grade totals online:

You will start at zero points and are working for a maximum total point count of approximately 1000 (look on Canvas to determine this semester's exact count). Remember that the midterm and final exams are 70% of your grade.

Unless otherwise informed by the instructor, grades are calculated based on total semester points that you have earned. Grades may be adjusted to a class curve, but you are guaranteed the grade listed in the following chart if you attain the point total associated with that grade.

Letter grade A = 90% - 100% (greater than 900 points)

Letter grade B = 80% - 90% (800-899)

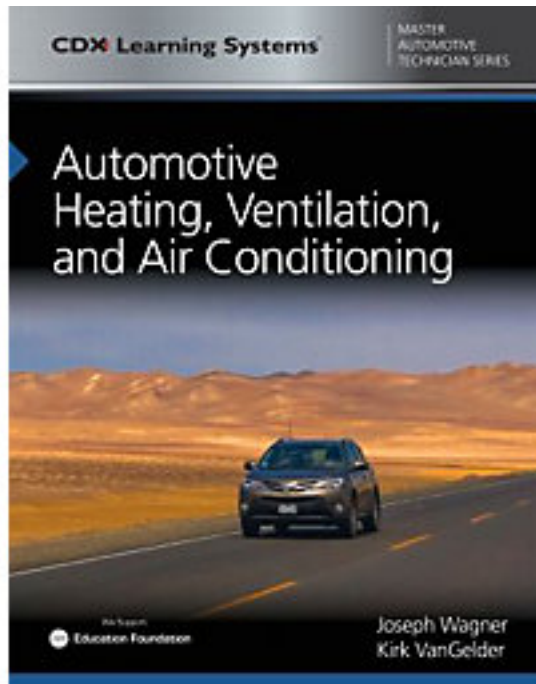
Letter grade C = 70% - 80% (700-799)

Note: this is a one class "mini certificate" class and is also a required class for the Automotive Certificate and the Automotive AA Degree as well as the Diesel Certificate and AS Degree. A letter grade of C or better is required and it cannot be taken credit/no-credit.

Letter grade D = 60% - 70% (600-699)

Letter grade F = ≤ 60% (less than 600)

**Textbooks:** Automotive Heating, Ventilation, & Air Conditioning



1. **ISBN:** 9781284119244
2. **Author:** Wagner
3. **Publisher:** Jones & Bartlett Learning
4. **Formats:** PAPERBACK
5. **Copyright Year:** 2018

## Important Dates and Deadlines:

Date Class Begins: 8/20/2019	Date Class Ends: 11/5/2019
Last Day Add w/o add code: 8/22/2019	Last Day Add with add code: 9/3/2019
Last Day Drop for Refund: 8/27/2019	Last Day for P/NP option:
Last Day Drop w/o W: 9/3/2019	Last Day Drop with W: 10/16/2019
FIRST CENSUS DATE: 9/3/2019	Date Final Exam: 11/5/2019
Date Midterm Roster: 9/26/2019 - 10/16/2019	

## Course Policies

Cell Phones: Cell phones are not allowed while in class or lab. This is also a common employer's shop rule. This includes ANY use of the phone. If you are observed using your phone in class you will be asked to leave until the end of the next break. Multiple infractions will result in a 2-day suspension. **Note: if you receive an emergency call, please step outside to talk.**

Cheating/Plagiarism: Cheating or plagiarism are unacceptable behavior and will result in an immediate 2-day suspension from class for all students involved; no exceptions.

No Smoking Policy: Santa Rosa Junior College is a non-smoking campus. This now includes "vaping". No smoking is allowed anywhere on campus or within 20 feet of the campus.

Class Participation: Your participation in class discussions is recommended and expected. Asking questions is a short cut to knowledge.

Missed Examination Policy: Missed examinations are discouraged but may be rescheduled with the instructor on a case-by-case basis up to two weeks past the original exam date.

Late Homework / Assignment Policy: Homework and all other types of assignments will only be accepted up to two weeks late.

Attendance/Tardiness: Your attendance is expected at all class meetings and tardiness is not acceptable. Consider this as valuable training for the work place; your employer will expect you to be at work daily. You are expected to remain in class or lab until dismissed by the instructor (this policy is also common with employers). No more than 10% of total class hours are to be missed per SRJC policy. That means that for this class you could miss 2.4 days. **I will allow 3, after that I will drop you** from the roster. This may result in a failing grade. See the policy link from Canvas for details.

projects in the shop.

### **Lab Safety:**

Safe procedures take precedence over everything else in our shop! Safe clothing must be worn at all times. Safety glasses must be worn when working on projects in the shop. If it cannot be done safely, **don't** do it. If you have any doubt, ask the instructor. If you find yourself struggling for more than a few minutes, there is likely a tool for that or some trick of the trade. Please don't hesitate to ask, I am more than happy to share those with you.

### **Student Conduct:**

We will conduct ourselves in a manner that reflects our awareness of common standards of decency and the rights of others. All students are expected to know the Student Conduct Code ([http://www.santarosa.edu/for\\_students/rules-regulations/scs/section1.shtml](http://www.santarosa.edu/for_students/rules-regulations/scs/section1.shtml)) and adhere to it in this class. Students who violate the code may be suspended from 2 classes and referred to Vice President of Student Services for discipline.

### **Respect:**

The best way to learn is through active participation; therefore, we respect others when talking by being on time, listening actively, and by being polite even when we disagree with another's viewpoint. Please turn off all electronic devices. If you use a laptop for note taking, please sit in the front row with the sound off. No food in class please.

**Academic Integrity:** All written work is to be original; plagiarism of any kind will result in a failing grade on that assignment. Students who plagiarize or cheat may be suspended [for one or two class meetings by the instructor] and referred to the Vice President of Student Services for discipline sanction, in cases of egregious violation. Please read the college policy/procedure on academic integrity at: <http://www.santarosa.edu/polman/3acadpro/3.11P.pdf>

**Emergency Evacuation Plan:** In the event of an emergency during class that requires evacuation of the building, please leave the class immediately, but calmly. Our class will meet at the south end of Lounibos Hall in the parking lot to make sure everyone got out of the building safely and to receive further instructions. If you are a student with a disability who may need assistance in an evacuation, please see me during my office hours as soon as possible so we can discuss an evacuation plan.

**Accommodations for Students with Disabilities:** If you need disability related accommodations for this class, such as a note taker, test-taking services, special furniture, etc., please provide the Authorization for Academic Accommodations (AAA letter) from the Disability Resources Department (DRD) to the instructor as soon as possible. You may also speak with the instructor privately during office hours about your accommodations. If you have not received authorization from DRD, it is recommended that you contact them directly. DRD is located in Analy Village on the Santa Rosa campus, and Jacobs Hall on the Petaluma Campus.

**This syllabus is an agreement, continued participation in this class means that you agree to the policies and procedures outlined in this syllabus.**

This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. However, the instructor reserves the right to modify, supplement and make changes as course needs arise.

### **Pedagogical Philosophy**

My philosophy is to provide you with the basic science and theory behind all of the automotive systems covered in class. In addition, I will give you practical, hands on tips for being a successful automotive technician. Ultimately, my goal is to empower you to think for yourselves to create problem solving techniques that you can use in any situation for the rest of your lives. Key to success here is communication, cooperation, creativity, and a desire for excellence. Automotive technology is evolving as rapidly now as it ever has. Keeping up with that promises to be as rewarding as it is challenging. I promise to be your partner and mentor as you begin your trek down this path.

*David J Lemmer*