

# **Automotive Repair Technology**

## **Course Syllabus 2<sup>nd</sup> Year Fall-Spring Semesters**

2009 - 2010

**Southwestern Community College  
Creston, Iowa**

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# **Automotive Repair Technology**

## **Welcome**

America's love affair with the automobile has brought about increased safety, performance, and creature comfort systems that require high levels of skill to diagnose and repair. With this increased competency level come a growing demand for skilled technicians with higher pay levels and benefit programs with plenty of work as more and more vehicles enter the road systems will guarantee us job security.

A career that once as thought of as a blue collar, dirty work environment that employed primarily men, who worked well with their hands, did not require a great deal of training or knowledge, has yielded to significant changes. Today's technical advances in automotive design, safety, performance, and comfort levels require the expertise of a trained and skilled "Automotive Technician" that replaces the backyard "mechanic." Women have now found welcome positions in the automotive field, bringing with them high skill levels for attention to detail and application of technical knowledge to the various aspects of diagnosis and repairs. Technicians must no possess knowledge of mathematic formulas, simple physics, chemistry, and the ability to communicate both written and verbally. In addition to basic mechanical skills, automotive technicians must have up-to-date computer technology, teamwork, problem solving, decision making, and time management skills.

The learner outcomes of this program are designed to prepare the student for and entry level position into the diagnosis and repair of automotive systems and other automotive related trades plus prepare the student for Automotive Service Excellence (ASE) certification.

This course is designed to balance hands-on shop lab learner outcomes with classroom instruction. Working with the latest technical equipment and techniques to diagnose, repair, and service mechanical, drivability, chassis, electrical, safety, and ventilation systems, just to name a few.

Fundamentals of quality automotive repair will be covered in this course. Successful graduates will be more proficient and better prepared for entry-level positions in the automotive field, advanced trade extension courses, indentured apprenticeships, or further on-the-job training. ASE certification testing is encouraged as instructional groundwork has been used utilizing National Automotive Technicians Education Foundation (NATEF) standards.

## **Automotive Repair Technology**

### **Southwestern Community College**

#### **Purpose Statement:**

Southwestern Community College exists in order that Area XIV community members have the opportunity to gain skills and knowledge sufficient for successful employment, higher education achievement, or adult and continuing education.

#### **Special Accommodation:**

It is the policy of Southwestern Community College to make reasonable accommodations for qualified individuals with disabilities. Any student with a disability should contact the Special Needs Coordinator in the Administration Building, or by calling 641-782-1458.

#### **Nondiscrimination:**

Southwestern Community College prohibits discrimination in employment and its education programs and activities on the basis of race/color, national origin, religion/creed, age, marital status, disability, sex, veteran status, sexual orientation, gender identity, or associational preference. Southwestern Community College also affirms its commitment to providing equal opportunities and equal access to its facilities. Inquires regarding compliance with nondiscrimination policy may be directed to: Education Equity coordinator, Southwestern Community College, 1501 W. Townline St., Creston, Iowa, 50801, 641-782-1456 or 1-800-247-4023 ext. 456.

### **Automotive Repair Technology**

#### **Mission Statement:**

To prepare automotive repair technology students for entry level positions in the automotive industry with attention to diagnosis, repair, and maintenance service procedures for common automotive systems with emphasis to doing quality repairs.

#### **Our Commitment to You:**

- 1 To bring out technical expertise and real-life experiences to you in a qualified instructional program setting
- 2 To challenge you to do your best
- 3 To balance classroom instruction with hands-on lab experience
- 4 To answer your questions

**Your Commitment to Yourself:**

- 1 To show up everyday on time
- 2 To present and attitude to learn
- 3 To make the best use of your time
- 4 To study materials presented
- 5 To develop and maintain a good work ethic
- 6 To put a little “spring in your step”

**With this in mind, you will be successful, anything less; you are cheating yourself out of life-long knowledge. Like anything in life, you only get out what you put into it.**

**(Note: The terms and conditions of this syllabus are subject to change.)**

## Automotive Repair Technology

### Methods of Assessment and Grading

The grades assigned in Automotive Repair Technology are as follows:

A=Excellent  
B=Above Average  
C=Average  
D=Below Average

F=Failure  
I=Incomplete  
W=Withdraw

Grades of A through D are awarded to students who are able to achieve the behavioral objectives listed in the syllabus of each course. Grades will be based on the following percentages:

90-100%=A  
80-89% =B  
70-79% =C  
60-69% =D  
59% and below =F

For those students with final scores below 60% or unable to complete the behavioral objectives:

Grade of "F" will be given.

Grade of "I" will be given to those unable to complete course due to an excused reason.

Grade of "W" will be given to those who officially withdraw from class.

**Students must maintain a 2.0 grade point average in order to graduate.**

Grades will be tabulated as follows:

**50% Laboratory (Hands-On)** - Learner outcomes will compromise fifty percent of total grade. Each course will have a learner outcome check off list provided by National Automotive Technicians Education Foundation (NATEF) standards. Each learner outcome objective will be worth up to five points. If a student misses shop lab due to absence he or she will need to make an appointment to make up the learner outcome(s). Make-up learner outcome(s) will need to be completed within one week, with the exception of final semester learner outcome(s), and those need to be made up in one day, by appointment.

**Rating Criteria:**

5=Excellent-all steps correct-No assistance needed

4=Good-most steps correct-Little assistance needed

3=Above average

2=Average-needs practice-Assistance needed

1=Below average-does not understand-A lot of assistance needed

0=Failed or did not attempt

**25% Tests**-Unit test and semester tests will comprise twenty five percent of total grade. If student misses a test due to absence he or she will have one week to make up that test, except semester tests. Semester tests need to be made up in one day by appointment. Students will have the option to retake one unit test per course with the average of the two tests taken as a score to improve their test score.

**15% Quizzes and Assignments**-Daily assignments, quizzes and other assignments will comprise fifteen percent of total grade. No make up will be allowed for missed quizzes. A point value of "0" will be awarded for missed quizzes. Late assignments must be turned in within one week of the due date. Late assignments are worth half of the original value. After one week, a score of "0" will be awarded for late or missing assignments.

**10% Employability Skills**-Employability skills will comprise ten percent of the total grade. Punctuality, attendance, work ethic, housekeeping, judgment, use of time, initiative, ability to learn, quality of work , and attitude are the components of the employability skills grade.

## Automotive Repair Technology

### Safety Rules and Regulations

1. **Safety glasses must be worn in designated shop areas at all times.**
2. **No work will be done in the shop without directions or permission from your instructor.**
3. **No work will be done in shop or computer lab except during designated class time.**
4. Facemasks or goggles may need to be worn when operating power tools, equipment or machinery, which creates particular matter. (I.e. grinders, sanders, welders, torches)
5. Hard hats will be worn at instructor's discretion
6. Wear proper clothing. This is a working shop atmosphere.
  - a. Do not wear loose fitting clothing or articles that may be caught in moving machinery, equipment, or power tools.
  - b. **NO** open toed footwear.
  - c. It is **highly recommended** that boot-type footwear be worn in the shop area.
7. All power equipment will be shot off when not in use.
8. Do not leave power equipment or machinery left operating while unattended.
9. **DO NOT USE** tools, equipment, or machinery you have not been instructed on how to use.
10. Use the proper tool for the job at hand.
11. When operating equipment with another student, make sure which student is the operator.
12. Observe rules concerning operator's safety zones.
13. **DO NOT** hold a conversation with someone operating power tools, equipment, or machinery. The distraction may cause an accident.
14. **NEVER** operate power tools, equipment, or machinery without proper safety guards in place.
15. When using air, be sure that now one will be a target of the blast.
16. Report unsafe work practices or safety hazards to your instructor immediately.
17. Report any accident or injury, regardless how minor, to your instructor immediately.

18. Students are responsible for carrying their own medical insurance for injuries and illnesses sustained while a student at Southwestern Community College. If you do not have medical insurance and would like to purchase coverage, information is available at the Registrar's desk.
19. No horse play, running, scuffling, etc. in school facilities.
20. No cell phones allowed in classrooms or shop lab area, if you need to be reached for an emergency, you can be reached by calling 641-782-7081, SWCC receptionist will contact you. Or contact Sue Claiser tool room and parts clerk @ 641-782-1306

**Cell Phone Policy:**

Southwestern Community College believes in providing an environment conducive to learning. For this reason, cellular phone use should be kept to minimum on campus and conducted in appropriate locations only. Cell phone users should be respectful of others.

1. Students should turn cell phones off or to silent mode upon entering any classroom, computer lab, library, or auditorium.
  2. If necessary, students may conduct short, quiet cellular phone conversations in the hallways, away from doorways or outside of the building.
  3. Cellular phone with picture taking capabilities are not allowed in locker rooms or weight rooms.
  4. Faculty members have the right to limit the use of cell phones with picture taking and text messaging capabilities in their classrooms.
  5. Students who fail to comply with the above regulations will be referred to the Director of Students Services and will be considered in violation of the student code of conduct.
21. This is a tobacco free building, use of tobacco materials, by of age students, is designated areas only
  22. No one other than Automotive Repair Technology students are allowed to work in shop lab area. (I.e. no family, friends, etc.)



23. No children allowed in classrooms or shop lab area.

**Children on Campus Policy:**

Southwestern Community College strives to maintain a quality learning environment and has established the following guidelines regarding children on campus.

1. Students will not be allowed to bring children with them in the instructional setting which includes, but is not limited to, the classroom, the library, the student center, etc..
2. When children are present on campus, they must be under the direct supervision of a parent, legal guardian, registered student, or other authorized adult.
3. This policy does not intend to conflict with Southwestern Community College programs designed for the involvement of children. For example: 8<sup>th</sup> grade career day, youth camps, business contests, vocational open houses, etc.
4. Students who fail to comply with the above regulations will be referred to the Director of Student Services and will be considered in violation of the student code of conduct.

**Note: Non-conformity to Safety Rules and Regulations is subject to suspension and/or expulsion.**

## Automotive Repair Technology

### Eye Safety Law Notification Form

I have been informed that the Iowa School Safety Law requires that I wear eye protecting devices at all times while participation or while others are participating in any activity which may subject me to risk and hazard of eye injury.

I also now know that in this lab, I will be using materials or processes that could put me at risk. Because of being informed, I promise to wear proper safety glasses or prescription glasses with side shields at all times while in this lab.

I also have been informed that the first Violation will be a warning; the second violation will be a temporary suspension, and the third violation, cancellation of my registration.

\_\_\_\_\_  
(Student)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Parent/Guardian)

\_\_\_\_\_  
(Date)

1<sup>st</sup> violation\_\_\_\_\_

2<sup>nd</sup> violation\_\_\_\_\_

3<sup>rd</sup> violation\_\_\_\_\_

**Southwestern Community College  
Career Academy  
Student Disciplinary Citation**

Student Name \_\_\_\_\_

Student's School \_\_\_\_\_

Date of Occurrence \_\_\_\_\_ Program/Site \_\_\_\_\_

**First / Second / Third** disciplinary action with this student. (circle respective number.)

This documentation is a reprimand for actions or activities carries on by student, which interfered with or disrupted the positive production and/or academic achievement for all students in the class.

Description of Action \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Student's Signature \_\_\_\_\_ Date \_\_\_\_\_

Instructor's Signature \_\_\_\_\_ Date \_\_\_\_\_

SWCC Administrator's Signature \_\_\_\_\_ Date \_\_\_\_\_

**Student Conduct Policy**

*Students are expected to conduct themselves in a manner that will not interfere with the instructor's responsibility to teach or with the students' right to learn. Students need to keep in mind that this is a work-oriented program and that their conduct will have an affect on their grade. Upon the first offense that interferes with the educational process, a disciplinary citation will be documented and a personal conference will be held with the instructor to discuss the situation. Upon the second offense, a second disciplinary citation will be documented, a conference will be held with a SWCC Administrator, the instructor, the student, and the student's High School Administration will be notified. Upon the third offense, documentation will be filed; ad determination will be made by the Director of Student Services as to whether the student should be removed from the program.*

## Attendance Policy for Tech Prep Programs

Tech Prep programs offer students the opportunity to:

- 1 Earn college credit while attending high school
- 2 Easily transition to college
- 3 Gain self-esteem and self confidence
- 4 Develop career focus and achieve academic/personal goals

Our goal is to provide you with skills that will be valuable in future employment. Attendance is mandatory for our programs to present the curriculum and provide hands-on experience. Nine months is a relatively short time to expose you to the classroom materials and activities needed to develop these skills. Absenteeism only deprives you and other students of precious time. Absenteeism is one of the top concerns of potential employers. Excessive absence is not tolerated past 3-5 days a year in the industry, and will not be tolerated here as well.

Southwestern Community College Tech Prep programs will allow three “unexcused days per semester for whatever reason: sick time, doctors, dentists, funeral, work etc. Any absences past this allowance will require a letter be sent from Student Services placing the student on an Educational Contract. This contract will state that should the student miss two additional days, a meeting will be held between the student, parent, school, and SWCC staff to discuss what requirements the student must meet in order to continue in the program.

The only “excused absence is when the student presents a letter signed by a school administrator stating that the student is participating in a school sponsored event or under military orders. All school suspensions will count as unexcused absences, and no makeup days will be allowed. Notes from parents are considered “unexcused” absences.

It is the student’s responsibility to be in class as the appointed time. It is assumed that all students will have the interest, maturity, motivation, and discipline to arrive at class on time. Late arrivals miss valuable information and can cause disruption to the instructor’s daily plans. For this reason, three tardies will count as one unexcused absence.\

Students Signature \_\_\_\_\_

Date \_\_\_\_\_

Instructor’s Signature \_\_\_\_\_

Date \_\_\_\_\_

# Southwestern Community College

## Automotive Repair Technology

### Temporary Closing Policy:

Every effort will be made to keep the college open. However, should inclement weather or other emergencies necessitate closing the college or delaying the start of classes, the decision will be made between 5:00 and 5:30 am and will be announced on the following.

### Radio Stations:

KSIB-KITR	Creston	AM 1520	FM 101.3
KOAK-KCSI	Red Oak	AM 1080	FM 95.3
KMA	Shenandoah	AM 960	
WHO	Des Moines	AM 1040	
KELR	Chariton	FM 105.5	
KJAN	Atlantic	AM 1220	

### Television Stations:

KCCI-TV8	Des Moines
WHO-TV13	Des Moines
WOI-TV5	Ames/Des Moines

### Also posted on Southwestern Community College web-site:

[www.swcciaowa.edu](http://www.swcciaowa.edu)

### 2-Hour Late Start Information:

When inclement weather causes the college to have a 2-hour late start, the following procedures will be followed.

If the 2-hour late start occurs on a Monday, Wednesday, or Friday; the classes will start at 9:40 AM (7:30AM and 8:35AM classes will not meet). Offices will open at 9:00 AM.

If the 2-hour late start occurs on a Tuesday or Thursday, then classes will start at 9:00AM (7:30AM classes will not meet). Offices will open at 9:00AM.

# **Automotive Repair Technology II**

## **Curriculum**

### **Fall Semester**

<b>Course Name</b>	<b>Course Number</b>	<b>Credits</b>
Automotive Fuel Systems	AUT 834	4
Automotive Engine Repair	AUT 163	3
Advanced Automotive Engine Repair	AUT 173	3

### **Spring Semester**

<b>Course Name</b>	<b>Course Number</b>	<b>Credits</b>
Automotive Electronic Engine Controls	AUT 844	6
Advanced Automotive Brakes & Alignment	AUT 535	5
	<b>Total Credit Hours</b>	<b>21</b>

# **Automotive Repair Technology**

## **Course Outline Fall-Spring**

### **Fall Semester**

#### **Automotive Engine Repair AUT 163**

1. Read **Modern Automotive Technology** (text)
  - a. Chapter 11 Engine Fundamentals pages 145-161
  - b. Chapter 12 Engine Design Classifications pages 162-179
  - c. Chapter 13 Engine Top End Construction pages 180-197
  - d. Chapter 14 Engine Bottom End Construction pages 198-215
2. Lectures
3. PowerPoint Presentations
4. Video
5. Demonstrations and Lab Practicalities (written and hands-on)
6. Lab assignments (learner outcomes) (written and hands-on)
7. Daily assignments (written and hands-on)
8. Quizzes
9. Chapter and Semester exams (written and hands-on)
10. Guest Speaker(s)

#### **Advanced Automotive Engine Repair AUT173**

1. Read **Modern Automotive Technology** (text)
  - a. Chapter 48 Engine Mechanical Problems pages 899-916
  - b. Chapter 49 Engine Removal, Disassembly, and Parts Cleaning pages 917-933
  - c. Chapter 50 Engine Bottom End Service pages 934-956
  - d. Chapter 51 Engine Top End Service and Engine Installation pages 957-986
  - e. Chapter 52 Engine Front End Service and Engine Installation pages 987-1001
2. Lectures
3. PowerPoint Presentations
4. Video
5. Demonstrations and Lab Practicalities (written and hands-on)
6. Lab assignments (learner outcomes) (written and hands-on)

7. Daily assignments (written and hands-on)
8. Quizzes
9. Chapter and Semester exams (written and hands-on)
10. Guest Speaker(s)

### **Automotive Fuel Systems AUT 834**

1. Read **Modern Automotive Technology** (text)
  - a. Chapter 20 Automotive Fuels, Gasoline and Diesel Combustion pages 299-312
  - b. Chapter 21 Fuel Tanks, Pumps, Lines and Filters pages 313-337
  - c. Chapter 22 Gasoline Injection Fundamentals pages 338-367
  - d. Chapter 23 Gasoline Injection Diagnosis and Repair pages 368-392
2. Lectures
3. PowerPoint Presentations
4. Video
5. Demonstrations and lab Practicalities (written and hands-on)
6. Lab assignments (learner outcomes) (written and hands-on)
7. Daily assignments (written and hands-on)
8. Quizzes
9. Chapter and Semester exams (written and hands-on)
10. Guest Speaker(s)



# **Automotive Repair Technology**

## **Course Learner Outcomes**

### **Automotive Engine Repair AUT 163**

#### **Chapter 11 Engine Fundamentals**

You will be able to:

1. Identify the major parts of a typical automotive engine.
2. Describe the four-stroke cycle.
3. Explain the basic function of the major parts of an automotive engine.
4. Cite and demonstrate safe working practices related to engines.

#### **Chapter 12 Engine Design Classifications**

You will be able to:

1. Describe basic automotive engine classifications.
2. Compare gasoline and diesel engines.
3. Contrast combustion chamber designs.
4. Compare two-and four-stroke cycle engines.

#### **Chapter 13 Engine Top End Construction**

You will be able to:

1. Describe the design and construction of an engine cylinder head.
2. Explain umbrella and O-ring type oil seals.
3. Explain the purpose of valve spring shims, rotators, stem caps, and spring shields.
4. Describe the construction and operation of a camshaft.
5. Explain hydraulic and mechanical lifters
6. Describe different types of rocker arm assemblies.
7. Explain the construction and design of intake and exhaust manifolds.
8. Design safety practices used when working on engine top end components.

#### **Chapter 14 Engine Bottom End Construction**

You will be able to:

1. Compare the construction of different types of cylinder blocks.
2. Explain how piston construction affects engine operation.
3. Explain the construction of engine bearings.
4. Compare design variations of different engine bottom end components.
5. Explain safe practices when working with engine bottom end components.

## **Chapter 16 Engine Size and Performance Measurements**

You will be able to:

1. Describe engine size measurements based on bore, stroke, displacement, and number of cylinders.
2. Explain engine compression ratio and how it affects engine performance.
3. Explain engine torque and horsepower ratings.
4. Describe the different methods used to measure and rate engine performance.
5. Explain volumetric efficiency, thermal efficiency, mechanical efficiency, and total engine efficiency.
6. Follow safe practices when making engine performance measurements.

## **Advanced Automotive Engine Repair AUT 173**

### **Chapter 48 Engine Mechanical Problems**

You will be able to:

1. Explain why proper diagnosis methods are important to engine repair.
2. List common symptoms of engine mechanical problems.
3. Discuss how to find abnormal engine noises.
4. Summarize procedures for gasoline and diesel engine compression testing.
5. Explain when and how to do a wet compression test.
6. Summarize common causes of engine mechanical problems.
7. Discuss safety practices to follow while performing engine inspections.

### **Chapter 49 Engine Removal, Disassembly, and Parts Cleaning**

You will be able to:

1. Determine if engine removal is needed to make specific engine repairs.
2. List the preparation for engine removal.
3. Describe the general safety rules pertaining to engine removal, disassembly, and parts cleaning.
4. Explain the use of an engine lifting fixture or chain, and an engine crane.
5. Summarize how to properly disassemble an engine.
6. Describe typical inspections that should be during engine disassembly and cleaning.
7. List various methods for cleaning engine parts.
8. Describe safety practices to follow when cleaning parts.

### **Chapter 50 Engine Bottom End Service**

You will be able to:

1. Explain how to measure cylinder bore wear.
2. Hone cylinder walls.
3. Check block main bore straightness.
4. Measure block, head, and manifold war page.
5. Measure piston wear and piston-to-cylinder clearance.

6. Explain how to assemble a rod and piston.
7. Describe how to install piston rings.
8. Check piston ring end gap and piston ring side clearance.
9. Measure crankshaft journal wear and crankshaft straightness.
10. Install a rear main oil seal.
11. Use Plastigage to measure rod and main bearing clearance.
12. Measure rod and crank side clearance.
13. Properly assemble an engine bottom end.
14. Describe safety practices to be followed when performing engine bottom end repair.

### **Chapter 51 Engine Top End Service and Engine Installatoin**

You will be able to:

1. Check for cylinder head damage, valve guide wear, and other engine top end problems.
2. Describe how to correct worn valve guides, warped cylinder heads, damaged valve seats, and other problems.
3. Grind valve seats and valves.
4. Remove and install diesel engine precombustion chambers.
5. Test and shim valve springs.
6. Assemble a cylinder head.
7. Inspect, test, and service valve lifters, pushrods, and rocker assemblies.
8. Reassemble the top end of an engine.
9. Adjust engine valves.
10. Describe safety practices that must be followed while performing engine top end service.

### **Chapter 52 Engine Front End Service and Engine Installation**

You will be able to:

1. Inspect a timing chain and sprockets for wear.
2. Service a chain tensioner and a timing chain assembly
3. Properly align timing marks.
4. Check timing gears for wear or damage.
5. Remove and install timing gears.
6. Measure timing gear runout and backlash.
7. Install a timing chain or timing gear cover.
8. Remove and install a front cover oil seal.
9. Service a timing belt.

## **Automotive Fuel Systems AUT 834**

### **Chapter 20 Automotive Fuels, Gasoline and Diesel Combustion**

You will be able to:

1. Summarize how crude oil is converted into gasoline, diesel fuel, liquefied petroleum gas, and other products.
2. Describe properties of gasoline and diesel fuel.
3. Explain octane and octane ratings.
4. Describe normal and abnormal combustion of gasoline and diesel fuel.
5. Summarize the properties of alternative fuels.

### **Chapter 21 Fuel Tanks, Pumps, Lines and Filters**

You will be able to:

1. Define the major parts of a fuel supply system.
2. Describe the operation of mechanical and electric fuel pumps.
3. Describe the construction and action of air filters.
4. Explain the tests used to diagnose problems with fuel pumps, fuel filters, and fuel lines.
5. Repair a fuel line or replace a fuel hose.
6. Locate and replace fuel filters in both gasoline and diesel fuel systems.
7. State safety rules for working on fuel supply systems.

### **Chapter 22 Gasoline Injection Fundamentals**

You will be able to:

1. List some of the possible advantages of gasoline injection.
2. Describe the classification of gasoline injection.
3. Explain the operation of throttle body gasoline injection.
4. Explain the operation of electronic multiport gasoline injection.
5. Summarize the operation of airflow sensing, hydraulic-mechanical (continuous), and pressure-sensing gasoline injection systems.
6. Compare the various types of gasoline injection systems.

### **Chapter 23 Gasoline Injection Diagnosis and Repair**

You will be able to:

1. Diagnose typical gasoline injection system problems.
2. Test a fuel pressure regulator.
3. Test both electronic and continuous fuel injectors.
4. Explain OBD II testing features used on late model fuel injection systems.
5. Use a service manual when making basic adjustments on gasoline injection systems.
6. Cite safety rules for injection system service.

# Automotive Repair Technology

## Course Outline

### Spring Semester

#### I. Automotive Electronic Engine Controls AUT 844

1. Read **Modern Automotive Technology** (text)
  - a. Chapter 35 Ignition System Fundamentals pages 583-610
  - b. Chapter 36 Ignition System Problems, Testing, and Repair pages 611-646
  - c. Chapter 43 Emission Control Systems pages 789-816
  - d. Chapter 44 Emission Control System Testing, Service, and Repair pages 817-844
  - e. Chapter 45 Engine Performance and Drivability pages 845-855
  - f. Chapter 46 Advanced Diagnostics pages 857-886
2. Lectures
3. PowerPoint Presentations
4. Video
5. Demonstrations and lab Practicalities (written and hands-on)
6. Lab assignments (**learner outcomes**) (written and hands-on)
7. Daily assignments (written and hands-on)
8. Quizzes
9. Chapter and Semester exams (written and hands-on)
10. Guest Speaker(s)

#### II. Advanced Automotive Brakes and Alignment AUT 535

1. Read **Modern Automotive Technology** (text)
  - a. Chapter 73 Anti-Lock Brakes, Traction Control, and Stability Control pages 1406-1428
  - b. Chapter 74 Wheel Alignment pages 1429-1451
  - c. Chapter 79 Security and Navigation Systems, New and Future Technologies pages 1528-1540
2. Lectures
3. PowerPoint Presentations
4. Video
5. Demonstrations and lab Practicalities (written and hands-on)
6. Lab assignments (**learner outcomes**) (written and hands-on)
7. Daily assignments (written and hands-on)
8. Quizzes
9. Chapter and Semester exams (written and hands-on)
10. Guest Speaker(s)

# **Automotive Repair Technology**

## **Course Learner Outcomes**

### **Automotive Electronic Engine Controls AUT 844**

#### **Chapter 35 Ignition System Fundamentals**

You will be able to:

1. Explain the operating principles of an automotive ignition system.
2. Compare contact point, electronic, and computer controlled ignition systems.
3. Describe the function of major ignition system components.
4. Explain vacuum, centrifugal, and electronic ignition timing advance.
5. Sketch the primary and secondary sections of an ignition system.
6. Compare ignition coil, spark plug, and distributor design variations.
7. Describe the safety practices that must be followed when working with ignition systems.

#### **Chapter 36 Ignition System Problems, Testing, and Repair**

You will be able to:

1. Diagnose typical ignition system problems.
2. List symptoms produced by faulty ignition system components.
3. Describe common tests used to find ignition system parts.
4. Explain how to replace or repair ignition system parts.
5. Summarize contact point and pickup coil adjustments.
6. Adjust ignition timing.
7. Describe safety practices to follow when testing or repairing an ignition system.

#### **Chapter 43 Emission Control Systems**

You will be able to:

1. Define the fundamental terms relating to automotive emission control systems.
2. Explain the sources of air pollution.
3. Describe the operation principles of emission control systems.
4. Compare design differences in emission control systems.
5. Explain how a computer or engine control module can be used to operate emission control systems.
6. Summarize how OBD II systems use multiple oxygen sensors to check air-fuel mixture and catalytic converter efficiency.

#### **Chapter 44 Emission Control System Testing, Service, and Repair.**

You will be able to:

1. Explain the use of exhaust gas analyzers.
2. Inspect and trouble shoot emission control systems.
3. Perform periodic service operation on emission control systems.
4. Test individual emission control components.
5. Replace or repair major emission control components.

6. Demonstrate and practice safe work procedures.

### **Chapter 45 Engine Performance and Drivability**

You will be able to:

1. List the most common engine performance problems.
2. Describe the symptoms for common engine performance problems.
3. Explain typical causes of engine performance problems.
4. Use a systematic approach when diagnosing engine performance problems.

### **Chapter 46 Advanced Diagnostics**

You will be able to:

1. Use advanced diagnostic techniques to troubleshoot difficult problems.
2. Use scan tool snapshot and data stream values to find problems not tripping trouble codes.
3. Use a break out box to measure circuit values.
4. Explain the principles of an oscilloscope.
5. Summarize how to use waveforms to analyze the operation of sensors, actuators, ECU outputs, and other electrical-electronic devices.
6. Evaluate ignition system waveforms.
7. Summarize how to use and engine analyzer.

## **Advanced Automotive Brakes and Alignment AUT 535**

### **Chapter 73 Anti-Lock Brakes, Traction Control, and Stability Control**

You will be able to:

1. Identify the major parts of a typical anti-lock brake system
2. Describe the operation of anti-lock brake systems.
3. Compare anti-lock brake variations.
4. Diagnose problems in anti-lock brake systems.
5. Repair anti-lock brake systems.
6. Describe the operation and purpose of traction control and stability control systems.
7. Diagnose and repair traction control and stability control systems.

### **Chapter 74 Wheel Alignment**

You will be able to:

1. Explain the principles of wheel alignment.
2. List the purpose of each wheel alignment setting.
3. Perform a pre alignment inspection of tires, steering, and suspension systems.
4. Describe caster, camber, and toe adjustment.
5. Explain toe-out on turns, steering axis inclination and tracking.
6. Describe the use of different types of wheel alignment equipment.

### **Chapter 79 Security and Navigation Systems, New and Future Technologies**

You will be able to:

1. Explain the operation of vehicle security systems.
2. Explain the operation of vehicle navigation systems.
3. Compare security system design variations.
4. Summarize the operation of alternate power sources for vehicles.
5. Discuss how engineers might change vehicle designs in the future to increase safety, comfort, dependability, and environmental control of our planet.



# **Automotive Repair Technology**

## **Syllabus Acknowledgement**

I, \_\_\_\_\_, hereby acknowledge that I have received, read, understand, and agree to all terms and policies set forward in course syllabus for Automotive Repair Technology, presented to me. I understand that infractions of terms and policies set by Southwestern Community College could lead to my withdrawal from classes.

Name of student \_\_\_\_\_

Student's signature \_\_\_\_\_

Name of Parent/Guardian \_\_\_\_\_

Signature of Parent/Guardian \_\_\_\_\_

Date \_\_\_\_/\_\_\_\_/\_\_\_\_